

JOHN FRAIN

EXPLORING SYMPTOMS

AN EVIDENCE-BASED APPROACH
TO THE PATIENT HISTORY



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Exploring Symptoms – An Evidence-based Approach to the Patient History

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Preface

Patients present with symptoms not diseases. They rely on healthcare professionals to accurately interpret these symptoms. A patient who attends their doctor is saying: 'I've noticed my anatomy and physiology are changing'. Can you tell me: is this normal change as I get older? Or am I developing a disease? If it is a disease: will it get better, and will I return to normal? Or will it continue and change my health and level of function? Will it shorten my life?

Answering these questions requires good communication but also accurate interpretation of the patient's description based on understanding of what is being described. *Exploring Symptoms* describes the connection between the underlying science of symptoms and the words used by patients to describe them. Though many patients may have a particular disease, each person's experience and description of it is unique to them. Nonetheless, connecting science, patients words, and studies of how symptoms are presented in disease facilitates clinical reasoning and diagnostic accuracy. It is safer for patients and more professionally satisfying for clinicians. Importantly, it may lead to more judicious use of finite resources with more appropriate choice of limited diagnostic technologies.

Despite technological advances in medicine and particularly in diagnostics, the patient history remains responsible for approximately 80% of diagnoses. Even where examination, blood tests and imaging are undertaken, they can only be accurately interpreted by reference to the patient's symptoms. Rightly, we emphasise the evidence-base to establish new investigations and treatments not least on the grounds of patient safety. However, the history, our most important tool, remains without a firmly established and widely known evidence-base so far as its content is concerned. Understanding the patient's symptoms is crucial to modern medicine for diagnostic accuracy, patient safety, and satisfaction and for good resource management in finite health services.

I have tried to ensure this work is representative of those who too often feel excluded from health care and who suffer discrimination from services through no fault of their own. I could not include everything about all groups or individuals, but this book is dedicated to everyone. I hope it will contribute to improving care for all of us.

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Abbreviations

ACS	acute coronary syndrome
ADL	activity of daily living
aF	birth-assigned female
AIDS	acquired immune deficiency syndrome
aM	birth assigned male
AOR	adjusted odds ratio
ASDR	age-standardised death rates
ASIR	age-standardised incidence rate
ASMR	age standardised mortality ratio
ASR	age standardised rate
AUC	area under the curve
BPD	borderline personality disorder
BPH	benign prostatic hypertrophy
CFS	chronic fatigue syndrome
CGA	comprehensive geriatric assessment
CI	confidence interval
CNS	central nervous system
COPD	chronic obstructive pulmonary disease
CRC	colorectal cancer
CVD	cardiovascular disease
DALY	disability adjusted life year
DGBI	disorders of gut-brain axis
DIMS	disorders of initiating and maintaining sleep
DLQI	dermatology life quality index
DOS	disorders of excessive somnolence
DSM V	diagnostic and statistical manual of mental disorders
EASI	eczema area and severity index
ED	erectile dysfunction
EDC	endocrine disrupting chemicals
EMBIG	endocrine, metabolic, blood and immune disorders
ENS	enteric nervous system
FND	functional neurological disorder
FSH	follicle stimulating hormone
FTD	formal thought disorder
FUO	fever of unknown origin

GCS	Glasgow coma scale
GD	gender dysphoria
GI	gastrointestinal
GP	general practitioner
GTS	generalised tonic-clonic seizures
GUM	genitourinary medicine
HCl	hydrochloric acid
HIV	human immunodeficiency virus
HMB	heavy menstrual bleeding
HPA	hypothalamo-pituitary-adrenal axis
HRT	hormone replacement therapy
HVS	hyperventilation syndrome
IADL	instrumental activities of daily living
IBD	inflammatory bowel disease i.e. ulcerative colitis and Crohn's
IBS	irritable bowel syndrome
IPSS	international prostate symptom score
LBP	low back pain
LGBTQ+	lesbian, gay, non-binary, transgender, queer +
LR	likelihood ratio
LUTS	lower urinary tract symptoms
ME	myalgic encephalitis
MRI	magnetic resonance imaging
MSK	musculoskeletal
MSM	men who have sex with men
NCCP	non-cardiac chest pain
NEWS	national early warning score
NSAID's	non-steroidal anti-inflammatory drugs
NSTEMI	non-ST elevation myocardial infarction
OA	osteoarthritis
OAB	overactive bladder
OR	odds ratio
PASI	psoriasis area and severity index
PNES	psychogenic non-epileptic seizures
PUD	peptic ulcer disease
PVB	premature ventricular beat
RA	rheumatoid arthritis
RA-ILD	rheumatoid arthritis-interstitial lung disease
RR	risk ratio
SAH	subarachnoid haemorrhage
SDI	socio-demographic index
SGM	sexual and gender minority
SIBO	small intestinal bacterial overgrowth
SIRS	systemic inflammatory response syndrome
SM	sexual minorities
SNOOP4	mnemonic for assessment of headache: Systemic symptoms Neurological symptoms

	Onset sudden
	Onset after age 50
	Progressive
	Precipitated by Valsalva
	Postural relationship
	Papilloedema
SOC	skin of colour
SOCRATES	Site
	Onset
	Character
	Radiation
	Alleviating factors
	Time course
	Exacerbating factors
	Severity
SAH	subarachnoid haemorrhage
STD	sexually transmitted disease
STI	sexually transmitted infection
TIA	transient ischaemic attack
UI	uncertainty interval
UK	United Kingdom of Great Britain and Northern Ireland
US	United States of America
UTI	urinary tract infection
WHO	World Health Organisation
WSW	women who have sex with women
YLD	years lost to disability
YLL	years of life lost

1

Exploring Symptoms

KEY POINTS

- ‘80% of diagnoses are made on the basis of the history’
- Physical examination and choice of investigations are directed by the history
- A good medical history requires effective communication
- History-taking can be affected by cognitive bias
- Listening to the patient is crucial
- Accurate diagnosis depends on inclusive history-taking

1.1 This History of the History

Interviewing the patient has always been essential in diagnosing illnesses and managing their health conditions. We know little about the structure of the consultation prior to the nineteenth century. However, listening was a virtue associated with the competent doctor [1]. The patient’s description of their symptoms enabled the doctor to make a diagnosis. Good listening skills were essential to the doctor’s employment, as only wealthier patients were able to pay for the services of a doctor [1].

1.1.1 What We Know Now

Medical students are told ‘80% of diagnoses are made from the history’. Where does this come from? A study by Hampton in 1975 at Queen’s Medical Centre, Nottingham, UK examined 80 outpatient referral letters and compared the initial diagnosis in the letter with the final diagnosis following investigation [2]. The initial diagnosis based on the history alone was correct for 82.5% of patients. Examination clarified the diagnosis for a further 8.75% (7/80 patients) and investigation another 8.75% (7/80). Clearly, the choice of examination and investigation is also influenced by the patient’s history. In six patients (7.5%), the history and examination could not make a diagnosis. However, investigation led to a confirmed diagnosis in only one of these patients. The authors concluded ‘*more emphasis must be placed on teaching students accurate history-taking*’ and ‘*more emphasis must be placed on research into communication between patient and physician*’ [2].

Surprisingly, and sadly in the era of evidence-based medicine, the diagnostic accuracy of the history is under-researched. Hampton’s sample was small, and the method used does not meet modern standards for a diagnostic accuracy study [3]. Medicine has changed greatly since 1975 with the availability of more accurate imaging modalities, blood tests and other investigations. One might expect the history to have declined relatively in importance to other diagnostic methods.

Nonetheless, the available evidence is, despite advances in other diagnostic technologies, around 80% of diagnoses continue to be on the patient's history [4–6]. Furthermore, more recent studies suggest nuance for accuracy of the history exists between different specialities, types of clinical problems, levels of clinical experience and acute versus chronically ill patients [7–9]. Again, sample sizes are small and methodology could be improved. However, the maxim of 80% of diagnoses being made by the history remains correct.

Clear communication with patients, clinician understanding of patient's description of their symptoms, accurate diagnosis and patient understanding requires a more detailed and nuanced understanding of how the history works. The history may indeed be '*our greatest diagnostic technology*' [10]. It is certainly likely to be our most cost-effective healthcare technology. Like any technology, it can be used well or badly. We need to better understand how it works and how to harness its potential for the benefit of patients.

1.1.2 What the History Is Not

Understanding the patient's history and making a diagnosis requires the clinician to interpret the patient's description of their symptoms in the light of the clinician's own knowledge of anatomy, physiology and the pathophysiology of how symptoms arise, develop and why patients present them to a clinician. Inattention to primary data (symptoms) from the history and failure to develop working hypotheses based on these has been described as 'clinical hypocompetence' [11].

It is important for clinicians, teachers and students to understand this. As Faith Fitzgerald has commented:

The word 'history' has changed over the years to include less and less of the story of the symptoms and the story of the patient, and more and more of the story of the patient's previous medical investigations [12].

The following contains no information about the origins, risk factors, development, patient's perspective or treatment of patient's symptoms:

Mr X went to see his GP because he had chest pain. The GP did some blood tests, an electrocardiogram (ECG) and sent him for a chest x-ray. These were all normal, so the GP referred him for an exercise test, and he is now waiting to see the consultant to find out about his diagnosis

Effective history-taking, including its presentation in verbal or written form (see Chapter 15), shows evidence of comprehensive data gathering, data synthesis and a differential diagnosis with explicit reasoning to justify the diagnosis given (Box 1.1).

The first history tells us nothing about the patient's experience of their symptoms but is just a list of events and investigations. It is the second version of this patient's history that connects the patient's description of their experience of chest pain with the clinician's, and the reader's, knowledge of the pathophysiology of coronary heart disease. An understanding of the epidemiology of coronary heart disease in a patient of this age, these risk factors and this description of pain has an 80–95% pretest probability of having this condition [13] (see Chapter 4).

1.1.3 Patient-Centred History-Taking

The post-World War II era has seen further development of the Enlightenment's understanding of the person, autonomy and human rights. Individuals, communities and nations expect to determine their own lives. Article 25 of the Universal Declaration of Human Rights stipulates the right of all to a standard of living adequate for themselves and their families including medical care [14]. Healthcare is now not only '*what is the matter with the patient?*' but also '*what matters to the patient?*' [15].

Our ideal now is patient-centred care based on the belief that each patient '*has to be understood as a unique human being*' [16]. This is scientifically rational, for while patients with, for example, coronary heart disease all have the same condition, they do not all have the same threshold for presentation to a clinician, give the same

Box 1.1 The Patient with Chest Pain

Mr Heaney is a 58-year-old man who smokes and is diabetic. He presented to his GP with a two-week history of central chest pain brought on by exertion. The pain is dull and heavy in character. He says it radiates down his left arm. The pain is relieved by stopping and resting. It usually stops within 2–3 minutes though now it is lasting longer, maybe up to five minutes. It is also relieved by a glyceryl trinitrate (GTN) spray, prescribed for him by his GP. Mr Heaney has been doing some heavy work in his garden over the past three weeks as he is relaying a patio. He is worried this may be a heart problem as his father developed angina at a similar age and died of a heart attack at 66 years of age.

Mr Heaney's problems are pain which is brought on by exertion. It causes him to stop until the rest allows it to settle. The pain radiates and is getting worse. He has a family history of ischaemic heart disease.

Based on his description of the character and distribution of the pain, I think Mr Heaney has typical angina which is possibly worsening. He has risk factors for cardiovascular disease of smoking, diabetes and has now been found to be mildly hypertensive today which give him an increased pretest probability for coronary heart disease. My other diagnoses would be musculoskeletal chest pain due to the heavy work in his garden or physical deconditioning.

identical history, describe their symptoms the same way or have the same concerns about their meaning nor do they always fit the textbook or lecturer's description of how they should do so. This is easily appreciated by listening to online resources such as <http://Healthtalk.org> where one can follow several patients with the same condition from initial symptoms through to treatment and living with their condition [17].

A frequent comment from students taking their first histories is 'but I don't know what questions to ask...'. This arises from the assumption that history-taking requires simply administering a preset list of questions for the patient's condition and it will generate the correct diagnosis. As of 2024, there are more than 10 000 known diseases [18]. It is a misconception that history-taking could ever require simply asking the right questions for the condition. If you don't know the diagnosis at the outset, how would you know which set of questions to ask? If diagnoses were simply a case of asking the right questions, why would we need clinicians? Furthermore, there are only 40–50 common symptoms (Table 1.1). [19]. Even if we included every single rare symptom ever described, we would still be talking only in the hundreds and these, at most, hundreds or more likely, 40–50 common symptoms generate thousands of possible diagnoses.

So, the patient's experience and perspective on their symptoms are crucial to the clinician's gathering of information and making a diagnosis. Fortunately, it is the same symptoms that repeatedly emerge. A Danish study of 49 706 participants found that 44 symptoms accounted for almost all symptoms experienced [19]. Analysis of these could be categorised into 5 domains and 16 subdomains (Table 1.2) [19]. Each person being unique, the modern clinician needs to be capable of exploring anyone's symptoms. This is an important consideration in how we learn and teach these skills.

1.2 What Is a Symptom?

A symptom is: [20]

something a person feels or experiences that may indicate that they have a disease or condition. Symptoms can only be reported by the person experiencing them. They cannot be observed by a health care provider or other person and do not show up on medical tests. Some examples of symptoms are pain, nausea, fatigue, and anxiety.

Table 1.1 The 44 included single symptom experiences.

Tiredness	Erectile dysfunction
Night-time urination	Pelvic pain
Lack of energy	Shortness of breath
Headache	Hoarseness
Back pain	Urge incontinence
Abdominal bloating	Loss of appetite
Memory problems	Blood in stool/rectal in bleeding
Abdominal pain	Pelvic pain during intercourse
Coughing	Fever
Concentration problems	Difficulty swallowing
Change in stool texture	Weight loss
Dizziness	Incontinence without stress/urge
Feeling unwell	Pain/burning when urinating
Constipation	Lump/swollen lymph node
Increase in waist circumference	Black stool
Change in stool frequency	Repeated vomiting
Diarrhoea	Vaginal bleeding after intercourse
Nausea	Postmenopausal bleeding
Swollen legs	Blood in urine
Difficulty in emptying the bladder	Blood in semen
Frequent urination	Coughing up blood
Stress incontinence	Blood in vomit

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Source: Rasmussen et al. [19]/Hindawi/CC BY-4.0.

A sign is something found during a physical examination that shows a person may have a condition or disease. It can be observed by a clinician or another person (e.g. the parent of a child). Examples of signs include a rash, a fast pulse or breathing rate or a heart murmur. A good clinical sign is one where two or more clinicians agree on its presence or absence in a patient and there is epidemiological evidence it is more likely to be present in patients with the disease and absent in patients without the disease (e.g. clubbing in a patient with lung cancer [21], conjunctival rim pallor in a patient with anaemia [22].).

Though not always, symptoms tend to be experienced by patients before physical signs appear. An example is angina, where the patient gives a clear history of the condition, but no physical signs are present, and the examination is normal. Symptoms are sometimes described as subjective, arising from the patient, while signs are considered objective evidence. This is unfortunate as it may, in the clinician's mind, devalue the patient's contribution to diagnosis as well as their concerns about their symptoms [23]. Taken together with a lack of knowledge about the patient, symptom or condition, on the part of the clinician as well as poor ability to communicate, these attitudes contribute to delayed or missed diagnoses.

Table 1.2 Patients' experience of the symptoms they reported in the study.

Domains	Subdomains	Items
Symptom experience	Specific and nonspecific cancer alarm symptoms	Alarm symptoms covering the following areas Lung, gastrointestinal, gynaecological and urogenital cancer.
	General, frequent symptoms	Tiredness, fever, feeling unwell, feeling ill and loss of appetite.
	Abdominal symptom-based conditions	Symptoms based on the consensus classification regarding dyspepsia and irritable bowel syndrome. Symptoms forming the basis for diagnosis of gastroesophageal reflux.
	Bodily distress syndrome	Cardiopulmonary, gastrointestinal, musculoskeletal and general symptoms.
Symptom experience characteristics	Debut	First occurrence of the symptom experience.
	Impact	Impact of the symptom on daily life activities.
	Concerns	The respondents concern regarding the symptom experience.
Reactions in response to symptom experience	Use of social network	Discussion of symptom experience with friends, acquaintances and family.
		Contact with GP, other therapists, hospital doctors, community nurses, physiotherapists etc.
		Decisions of four barriers to healthcare-seeking using the ABC (awareness and beliefs about cancer).
		'It would be embarrassing for me'. 'I would be worried about wasting the doctor's time'. 'I would be worried about what the doctor might find'. 'I was too busy to find time to go to the doctor'
Selected factors with potential influence on the symptom experience and healthcare-seeking	Lifestyle	Smoking
		Alcohol
		Body mass index
	Access to social network	Frequency of contact in terms of telephone contact with others.
	Concerns for the respondent	The GPs and surroundings reaction and concern for the respondent.
Personality characteristics in relation to symptom experience and healthcare-seeking	Experience with illness	Experience with serious illness in the immediate family and close friends.
	Attitude towards risk-taking	Attitudes towards risk in relation to health and finances.
	Self-rated health	Respondents' own assessment of health.
	Coping strategies	Respondents' assessments of coping with problems using the Brief Approach/Avoidance Coping Questionnaire.

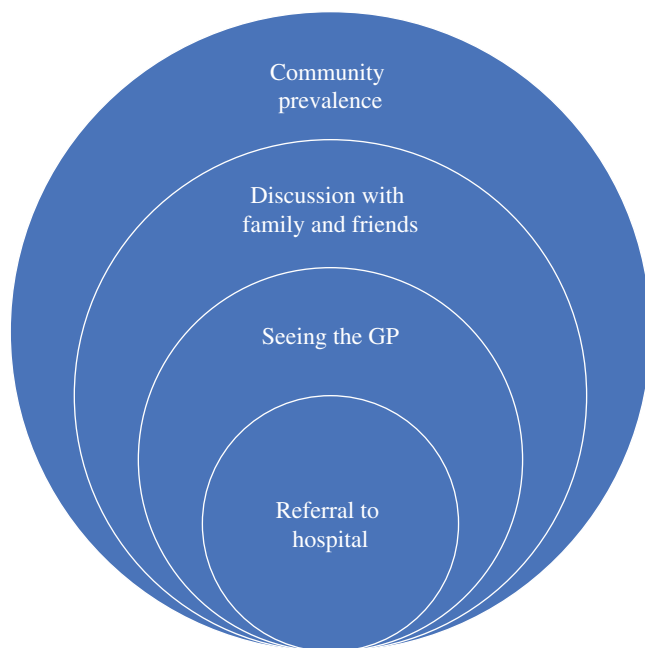


Figure 1.1 The 'life' of a symptom. The patient experiencing a symptom out in the community will be one person among many with the same symptom. Presentation to a clinician will be based on many factors. At each stage, the patient has reasoned the impact of their symptom(s) are such in terms of their function and wellbeing that they have reached the threshold for presenting their symptom for assessment. As they move from each level to the next, their probability of serious disease increases. Prevalence of similar symptoms at each level is important for how we think about pretest probability of a disease.

1.2.1 Community Prevalence of Symptoms

Symptoms are not just present in patients at the doctor's, the emergency department or sitting in a hospital ward. Many people living in the community in good health are experiencing symptoms regularly (Figure 1.1). For example, prevalence studies show almost two-thirds of people are living with gastrointestinal symptoms at any given time [24]. 70% of people living in the community experience urinary frequency [25]. Yet not everyone with these symptoms presents to a clinician.

As Rasmussen suggests, patients reflect on their experience of their symptoms across several domains to determine their significance (Table 1.2) [19]. Patients reason clinically to determine their need to present to a clinician for diagnosis and treatment.

1.3 What Do Patients Want from Their Clinicians?

Patients who present to a clinician are asking:

I have a symptom. Can you tell me?

Is it normal variation? Is it my body changing as I'm getting older? Or is it because I have a disease?

If it's a disease, will it get better? Will it be permanent and, if so, will it affect my function and quality of life?

Or will it shorten my life and bring about my death?

Of course, patients will have already answered some of these questions, from their own reasoning, from talking to friends and family and from online sources. Models of clinical communication reflect these concepts of ideas, concerns and expectations [26]. However, the use in interviewing and teaching, and demonstration in assessment, can overlook the complexity of what is happening in the patient's mind [27]. Patients will attend not only with

concerns and expectations but also an idea or several ideas about diagnosis without which misdiagnosis may occur (Boxes 1.2–1.4).

For this reason, concepts such as diagnostic co-production and inductive foraging have risen to prominence in thinking about the medical history and communication with patients [28].

Box 1.2 A Patient-Centred Approach to Differential Diagnosis

Agreeing the differential diagnosis

Patient's differential

- Leading hypothesis
- Alternative 1
- Alternative 2
-
- 'Must not miss'



Doctor's differential

- Leading hypothesis
- Alternative 1
- Alternative 2
-
- 'Must not miss'

Where is the common understanding?

'Let us think about this together'.

Eventual diagnosis must explain both parties' data

The history, or patient interview, is a discussion of the patient's ideas and insights into their symptoms and diagnosis. The clinician's role is crucial to the correct synthesis of this information, but this must be done with a complete dataset elicited from the patient.

Box 1.3 Doctor, My Differential Diagnosis Is.....

I have had this sore throat for a couple of days now and I assumed it was viral (my leading hypothesis), I thought I could see some spots on my tonsils when I looked in the mirror this morning (alternative diagnosis 1 = bacterial tonsillitis), I have also felt chesty and have a bit of a cough (alternative diagnosis 2 = lower respiratory tract infection), one of workmates tested positive for Covid last weekend. We had been working quite closely together, I could not smell my coffee this morning so now I am also worried about Covid ('must not miss' diagnosis).

It is quite usual for patient's to have reasoned through a differential diagnosis for their symptoms by the time they present to a clinician.

Box 1.4 Patients are Experts in Their Own Experience of Symptoms

Patients often arrive in clinic having had multiple assessments, having researched their own condition to a very high level and having worked hard to understand what is going on with their own body. Even if I think they have got something wrong in their analysis, it behoves me to question my own assumptions and misconceptions as much as theirs ... entails accepting they are often expert diagnosticians in their own right. (Ppt 158, psychiatrist, Wales)

Source: Sloan et al. [23]/Oxford University Press.

1.4 The Structure of a Medical History

While 80% of medical diagnoses are made from the patient's history, incomplete and inaccurate history-taking is a leading cause of diagnostic errors [29]. A history requires the collection of a comprehensive biopsychosocial dataset. Collecting this dataset requires communication skills including:

- Listening
- Eliciting an opening statement from the patient
- Agreeing a problem list
- Exploring the patient's problem list using:
 - Open questions
 - Closed questions
- Reviewing the background to the patient's condition

The resultant dataset has a structure to it, which provides the basis for record keeping, presentation of the patient's history and referring to colleagues for further management.

Establish the patient's:

- 1) Name (including preferred name, pronouns)
- 2) Date of birth (confirm the patient's age in years)
- 3) Occupation

1.4.1 Presenting Symptom (or Presenting Complaint)

This is usually one to two symptoms for which the patient has attended. It can be more than this.

1.4.2 History of the Presenting Symptom or Complaint

This section explores each of the patient's presenting symptoms in detail using open questions such as:

- Where is it?
- What is it like?
- How bad is it? [1–10]
- When did it start, how long does it last and how often does it come?
- Environmental factors, personal activities, emotional reactions
- Does anything make it better or worse?
- Have you noticed anything else that accompanies it?
- How is it affecting your everyday life and work?
- What are you really worried about?
- What would you like us to do for you today?

Open questions encourage the patient to elaborate in their own words and in detail. They also allow the doctor to listen to the emerging data and to reason and interpret the history.

Mnemonics like SOCRATES can also help elicit this kind of detailed information. Though commonly used to analyse pain, it can be adapted for other types of symptoms.

- Site
- Onset
- Character
- Radiation (e.g. of pain)
- Alleviating factors

- Timing
- Exacerbating factors
- Severity

1.4.3 Review of Symptoms

Having explored the patient's presenting symptoms, you should also ask about other symptoms associated with the presenting symptom in the same system of the body (e.g. in the patient with cardiac chest pain in Box 1.1 you should ask about the presence of breathlessness, palpitations and swelling [oedema]). You should also ask about symptoms in anatomically or functionally related symptoms. For example, in a patient presenting with chest pain, you should screen for symptoms in the respiratory and upper gastrointestinal systems and for musculoskeletal causes of chest pain (Box 1.5). In a patient with joint symptoms, you should screen for neurological symptoms such as sensory change and weakness.

Box 1.5 Key Symptoms of Symptoms by Body System

General	Respiratory	Genitourinary
Fatigue/malaise	Pain	Frequency
Fevers/rigors/night sweats	Breathlessness	Dysuria
Weight/appetite	Wheeze	Incontinence
Sleep disturbance.	Cough	Change in volume.
Rashes, bruising	Sputum/haemoptysis	Polyuria
		Menstrual symptoms
Cardiovascular	Nervous system	Gastrointestinal
Pain	Headaches	Difficulty swallowing
Breathlessness	Loss of consciousness/seizures	Nausea/vomiting/haematemesis
Palpitations	Dizziness	Indigestion/heartburn
Swelling	Visual disturbance	Pain/distension
Syncope	Hearing weakness	Change in bowel habits.
	Numbness/tingling	Bleeding
Musculoskeletal	Mental health	
Pain	Anxiety	
Stiffness	Low mood/depression	
Swelling	Withdrawal	
Loss of function	Behaviour change	
Activities of daily living	Lack of play	
	Lack of social interaction	
	Self-harm/suicide	

A disease of any system arises from one to two symptoms within that system as the main presenting feature, but other symptoms from that system may be associated with the presenting symptom to give the disease its characteristic features in the patient's history. For example, a patient with heart failure may present with breathlessness. This is also a respiratory symptom. The patient's associated symptoms of ankle swelling and palpitations on exertion should lead the clinician to a diagnosis of congestive heart failure with an underlying arrhythmia.

1.4.4 Background

When you start taking histories, you should ask about each of the following areas. With experience, you will learn to seek out background information that focuses on the presenting problem.

1.4.5 Past Medical History

Enquire about each of the following:

- Serious illnesses, operations, hospital admissions
- Continuing effects of illness
- Establish evidence for previous diagnoses
 - e.g. ‘heart attack’ – What exactly do they mean by this? How was this diagnosed
- Arrangements for follow-up?

1.4.6 Medication and Allergies

- ‘Do you have your repeat prescription slip with you?’
- Tablets
- Liquids
- Inhalers
- Implants/patches
- Method of contraception
- Over-the-counter medications
 - e.g. Non-steroidal anti-inflammatory drug (NSAIDs)

1.4.7 Personal and Social History

- Smoking
- Alcohol
- Occupation
- Educational attainment
- Overseas travel and immunisation
- Marital status
- Social history
 - Activities of daily living
 - Social support

1.4.8 Family History

- Health of parents and siblings
- Which relatives are affected by illness?
- Age at diagnosis
- Age at death
- History of cancer, epilepsy, mental health, diabetes, coronary heart disease

1.4.9 Review of Other Body Systems

- In a complete history, you should screen for symptoms in other systems of the body
- Important in identifying previously undisclosed disease
- Disease in another system may affect function in the main presenting system

1.4.10 Differential Diagnosis

On conclusion of the history, you should formulate your ideas about diagnosis. The safest way to do this is to formulate a differential diagnosis as follows:

- 1) Leading hypothesis – which condition most closely explains the patient's history
- 2) Alternative hypothesis 1
- 3) Alternative 2
- 4) Alternative 3
- 5) 'Must not miss' – are there any conditions that if undiagnosed, would result in serious harm or death?

A 'must not miss' diagnosis may also be your leading hypothesis or one of the alternative hypotheses.

1.4.11 Presenting Your History

You can use the above structure to present your history. Presenting a history well is an important clinical skill. Take every possible opportunity to present and obtain history. Remember, you are the patient's advocate. Your presentation will tell the listener:

- Whether you have gathered a comprehensive dataset
- Whether you can organise this data into a structure that suggests:
 - You understand the significance of what you have gathered
 - You are developing clinical reasoning
 - You are starting to formulate ideas about differential diagnosis

We will discuss presenting the history in Chapter 15.

1.5 Clinical Communication

Doctors tend to overestimate their communication skills [30]. A study of communication in orthopaedic surgeons reported 75% of the surgeons believed their communication to be excellent, while only 21% of their patients felt communication was satisfactory [30]. Patients judge a doctor's 'bedside manner' as a major indicator of competence [31]. Patient-centred communication results in increased patient and doctor satisfaction [32]. They are also more likely to share and disclose information relevant to an accurate diagnosis of their symptoms [33].

As well as improved history-taking, Hampton recommended research into communication between clinicians and patients [2]. This has been much researched in the last half-century, with several models being proposed [34, 35]. The model most widely used is the Calgary–Cambridge [36]. This can be used easily in the development of an organisation-specific clinical communication curriculum [37]. The model consists of 5 phases, encompassing a total of 70 skills (Figure 1.2).

The Calgary–Cambridge model may be summarised as follows: [38]

- Listening to patient's opening statement
- Identifying the patient's problem list
- Agreeing what will be discussed with the patient
- Exploring each symptom experienced by the patient
 - Patient and clinician agreeing on definition of each symptom present
 - Gathering data for each symptom using open questions
 - Completing details using closed questions
 - Establishing a sequence of events

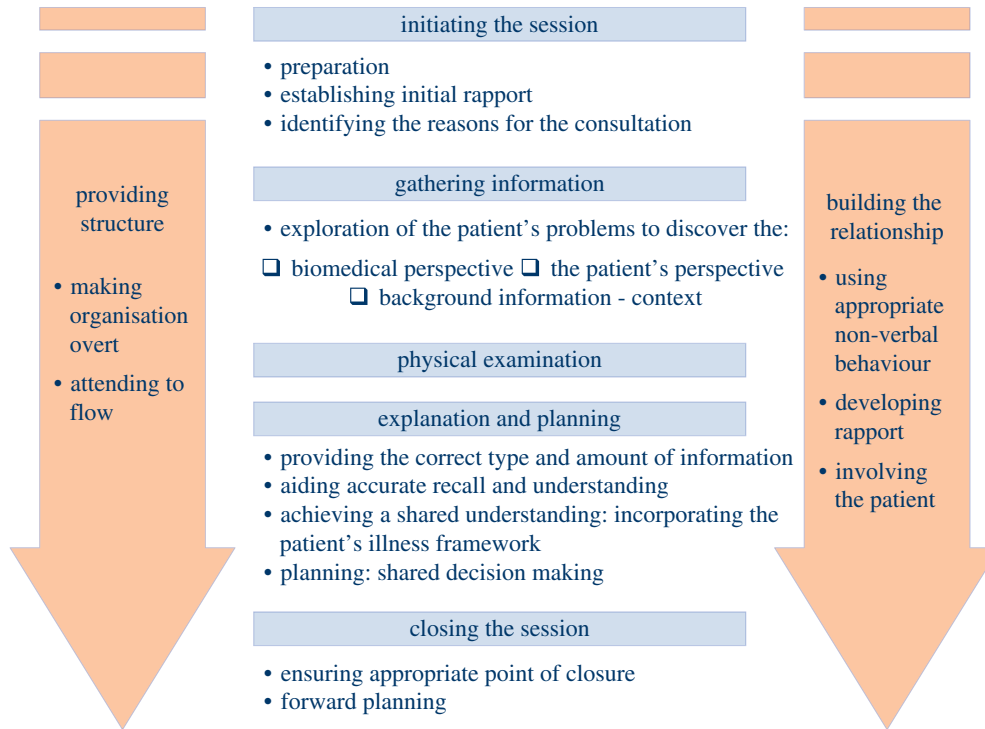


Figure 1.2 The Calgary–Cambridge Guide – the expanded framework.

- Attentive listening
- Picking up cues
- Exploring the patient's relevant background information
 - Relevant systems review
- Ensuring all the patients concerns have been addressed
- Explanation and planning
- Shared decision-making
- Closing the session

Not all the skills identified in the model are relevant to every consultation.

1.6 The Opening Statement and Agreeing the Agenda

Clinicians assume often allowing the patient to talk at length will lead to overrunning and getting behind [38]. If left to talk, patients will usually complete their opening statement about their presentation within 60seconds (range 30–150seconds). Moreover, more problems will emerge if the patient is given time. Far from wasting time, establishing the patient's problem list at the outset is time efficient. Patients attend a consultation with a clear idea of their expectations.

1.6.1 Open Questions

An open question is designed to encourage a full, meaningful response using the respondent's own knowledge of the subject and feelings about it [38].

Open questions often begin with ‘Why...’, ‘How...’, ‘Tell me about...’, or ‘How do you feel about that?’ These terms encourage the respondent to elaborate and expand in their own words.

1.6.1.1 Clinical Reasoning and Open Questions

Doctors begin problem solving early in the consultation [38]. Information gathered in the history is compared with the doctor’s previous experience based on underlying knowledge and patients he has seen before with similar symptoms. Further questioning is then directed to prove or disprove these initial thoughts [39]. Open questions allow the doctor more time for these thought processes and provide him with more clinical information from which to generate diagnostic theories.

On average, doctors elicit only 50% of the information considered important by expert consensus (with a range of 9–85%). The amount of information gathered at interview is related to the use of open and closed questions, with open questions generating significantly more information than closed questions [40, 41]. Patients are also more likely to disclose serious problems early in the consultation [41].

Key benefits of open questions are [42]:

- Patient satisfaction is higher if allowed to express themselves in their own words
- Doctor effectiveness is increased by open questions moving only gradually to closed questions
- Patients are more likely to bring up problems spontaneously
- Expression of emotion and gathering of sensitive data is facilitated by open questions

1.6.1.2 Inductive Foraging

Diagnostic reasoning begins soon after hearing the patient’s first description of their symptoms [43]. Allowing the patient an opening statement and following up with open questions enables the patient to disclose a greater amount of detail, not only a presenting symptom but also the associated symptoms that are essential to the clinicians’ formation of diagnostic ideas. Few patients are diagnosed solely on the disclosure of a single symptom described by one or two words. It is the mix of symptoms, the patient’s description of them, and their perspective on the impact of the symptoms that assist in robust diagnostic ideas. Patients are interrupted during their opening statement after a mean of 6.5 seconds [44]. Over half of patients are unable to complete their opening statements [44]. Early interruption of the patient increases the risk of premature closure and diagnostic error.

1.6.1.3 Getting Started

The following is a list of open questions that can be used to explore any of the symptoms in this book and more besides. The aim of exploring a symptom and the associated symptoms is to build a data set that is so rich in detail, you understand completely the patient’s experience. Your understanding is based on your knowledge and by listening to how the patient experiences this.

- Where is it?
- What is it like?
- How bad is it? (score out of 1–10)
- When did it start?
- How long does it last?
- How often does it occur?
- Environmental factors, personal activities, emotional reactions
- Does anything make it better or worse?
- Have you noticed anything else that accompanies it?
- How is it affecting your everyday life and work?
- What are you really worried about?
- What would you like us to do for you today?

1.6.1.4 Benefits of Closed Questions

These include: [38]

- More detailed information is obtained when the interviewer makes more specific, detailed probes.
- By raising additional topics, the interviewer can exclude the presence of certain symptoms. This can be important information in constructing the differential diagnosis and planning treatment.

1.6.1.5 Disadvantages of Closed Questions

Use of closed questions too early in the consultation can prevent the doctor from considering the wider picture and lead to premature closure of a particular line of inquiry [38]. This is an important source of diagnostic error.

1.6.1.6 Using Closed Questions – The ‘Open to Closed Cone’

Once in progress, your conversation with the patient should move between open and closed questions, preferably allowing the patient to do most of the talking whilst the clinician actively listens and reasons through the data (Figure 11.2).

- Start with an opening statement and open questions
- Do not move too soon to closed questions
- Gradually become more focused on the specific symptom
 - ‘Can you tell me more about your chest pain?’
- Continue with focused open questions
 - ‘What brings your chest pain on?’
- Finally, use closed questions to obtain very specific information
 - ‘Do you get chest pain when you exert yourself?’

1.6.1.7 Moving Back to Open Questions

Closed questions can be used to complete a particular line of inquiry (e.g. a history of chest pain) or they can be used to open another. For example:

‘When you have chest pain, do you ever get breathless?’
 then
 ‘Tell me about your breathlessness’

This approach can also be used in gathering background information. For example:

‘Is there any history in your family of early heart disease?’
 then
 ‘Can you tell me a bit about how each person is affected?’

You can appreciate that it would take many more closed questions than open questions to obtain the same amount of information. Once you have obtained information from a closed question, you should move back to exploring the line of inquiry using open questions. This will allow the patient to express what is important to them and allow you to reflect on what you have heard.

Use open questions – closed questions to fill in detail – further open questions to explore a positive response to a closed question – and so on. Together with encouraging an opening statement and summarising back to the patient, the open-to-close cone is the approach most positively associated with the amount of data gathered from the medical history [45].

1.7 How Does the History Work?

If the diagnostic accuracy is a ‘diagnostic technology’ [10], it is important to know how and why. If we consider each question or piece of information asked in the history as a simple binary diagnostic test; positive or negative, we can appreciate the history as a series of diagnostic tests that add up to give us the diagnosis. Unfortunately, it is not so simple. A review of 491 clinical findings in the history and examination of 67 distinct diagnoses found positive findings to be more informative than negative ones [46]. 88% of negative findings are not diagnostically helpful [46]. Only 28% of positive findings were diagnostically helpful [46]. Few symptoms are diagnostic on their own and even fewer definitively exclude a diagnosis. How we hear and associate symptoms from patients is crucial to making a diagnosis.

1.7.1 Pretest Probability and Bayes’ Theorem

In clinical practice, the diagnostic process is filled with uncertainty. Textbook presentations of disease in books are rare to non-existent in practice. They do help us learn knowledge about disease, but they do not teach us how to apply it. Progress from knowing to understanding requires us to see and talk to patients. For a clinician assessing a patient, the probability of a disease is continuously shifting, up or down, with each specific piece of information gathered during the history and examination [47]. The goal of the diagnostic testing provided by a history is to gather enough information to correctly diagnose the patient’s disease. Hence the need to understand symptoms, recognise our own biases and respect the patient’s prior knowledge, history and culture to fully appreciate the data we are being offered.

1.7.1.1 Pretest Probability

Important here is the concept of pretest probability. We will return to this in Chapter 15 when we discuss teaching and learning about symptoms. Diagnostic testing (e.g. a history) is required to move from the probability of a disease posed by the patient’s statement:

I have a symptom. Can you tell me?

Is it normal variation? Is it my body changing as I’m getting older? Or is it because I have a disease?

If it’s a disease, will it get better? Will it be permanent and, if so, will it affect my function and quality of life?

Or will it shorten my life and bring about my death?

to a probability of a particular condition about which the patient is worried, based on the combined test result of the history (post-test probability). The concept of pretest probability is helpful and important here as it enables us, without prejudice, to take the history appropriately for the patient. Key to this is understanding symptom and disease prevalences based on the age, gender, risk factors and current diseases for the patient in front of us (e.g. likelihood of upper respiratory symptoms being COVID-19 during a community outbreak or of a 65-year-old male, smoker and diabetic having ischaemic heart disease when they present with chest pain). This probabilistic reasoning is explained by Bayes’ rule [48, 49]. Clinicians often express discomfort when confronted with the mathematics underlying diagnostic reasoning [50]. However, all clinicians learn to engage in the probabilistic reasoning demonstrated in Figure 1.3 [51]. A doctor taking a good history and making the correct diagnosis is a natural Bayesian [52].

1.7.2 Symptom Scripts

In Chapter 15, as we move towards making diagnoses, we will discuss illness scripts and their importance to clinical reasoning. Understanding symptoms helps address the issue of pretest probability. Understand the patient’s

Imagine you are in an outpatient clinic, and the next patient presents to you with a cough for many months. The scenario in Figure 1 provides a perfect example of how the Bayes theorem works.

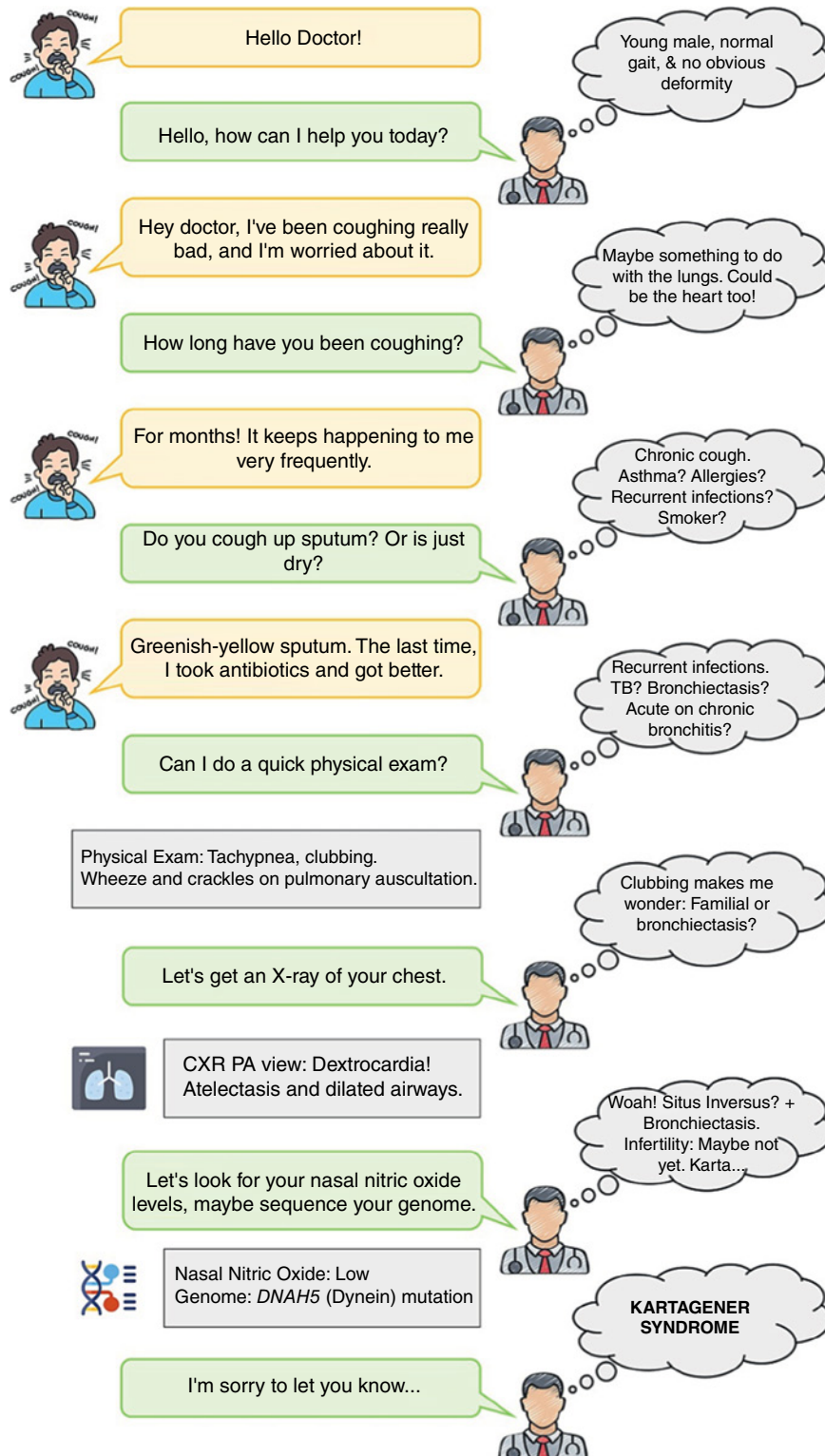


Figure 1.3 Bayesian reasoning in medical diagnosis. *Source:* Ananda Rao et al. [51]/National Library of Medicine/CC BY 4.0. This is an open access article distributed under the terms of the Creative Commons Attribution Licence CC- BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

symptoms, and we will understand better the possible range of diseases from which they may be a risk. So, the purpose of this book is to present a script for each common symptom based on the following domains:

- Definition
- Anatomical site
- Pathophysiology
- Epidemiology
 - Community prevalence
 - Thresholds to presentation
 - Clustering with other symptoms
 - Aspects of gender, ethnicity and sexuality
- *How do patient's experience the symptom?*
 - *What words do they use?*

Symptoms are not simply additive to one another (i.e. 1 + 1 does not equal 2). Symptoms interact with one another since they reflect events in a complex biological system. They interact, amplify and diminish one another to produce different diseases. They occur in different patient contexts meaning no two patients ever give identical histories even when they share the same diagnosis. So, we must learn to recognise patterns, and this starts with understanding symptoms.

1.7.3 Red Flags

Initial presentation of a condition may occur early in its natural history. Symptoms may not yet be indicative of a specific condition, and there may not yet be physical signs of disease on examination. It is challenging for the clinician to identify patients whose symptoms may be self-limiting from those at risk of serious or life-threatening diseases. The red flag, first described in relation to low back pain, is a symptom or symptom cluster that suggests the possibility of serious underlying disease [53].

Red flags may be general symptoms (e.g. unintentional weight loss); single symptoms (e.g. difficulty swallowing [dysphagia]), combinations of symptoms (low back pain, 'saddle' anaesthesia and bladder/bowel dysfunction). Red flags do not all have high diagnostic power. For patient safety, a serious pathology should be considered until proven otherwise. They need only to be suggestive of serious pathology to require exclusion of a serious condition (e.g. coughing up fresh blood) [53].

A review of eight back pain guidelines found none of the guidelines endorsed the same set of red flags [54]. There is limited evidence on the diagnostic power of individual red flags. Red flags serve as alerts or alarms for the clinician. They do not replace the need for clinical reasoning and judgement [53]. Red flags may apply in the following situations:

- General
 - Unintentional weight loss
- Single symptoms
- Combinations of symptoms [55]
 - Age over 40 years
 - Abdominal bloating
 - Pain
 - Early satiety
- Physical signs
- Signs and symptoms
- Investigations

1.8 Sources of Bias in the History

Biases in cognitive functioning occur in the whole of healthcare [56]. This includes the history. Many sources of bias are described [56]. Those relevant to history-taking include: [57]

- Confirmation bias – selectively gathering and interpreting evidence to confirm one’s beliefs as well as neglecting evidence that contradicts them
- Anchoring bias – prioritising information and data that conforms to one’s initial impressions even when those impressions are incorrect
- Affect heuristic – a clinician’s actions are swayed by emotional actions. They may occur when a clinician has positive or negative feelings towards a patient

These, and others, may lead to premature closure, a tendency to close the history and assessment and accept the current diagnostic hypothesis before all others have been thoroughly explored and excluded. Together they increase the possibility of diagnostic errors.

1.8.1 The History and Diagnostic Error

Diagnostic error is widespread in healthcare and harms thousands of people every year. Some recover, but many are left permanently disabled. Unfortunately, patients die due to diagnostic errors made by those caring for them. There are many sources of diagnostic errors. Many of these can be attributed to errors in how the history is elicited and the information from it is interpreted (Table 1.3): [29].

1.8.2 Inclusive History-Taking

Marginalised groups around the world have a poorer experience of healthcare and worse healthcare outcomes. The chapters in this book highlight disproportionately high rates of illness for groups based on their ethnicity, gender identity, sexual orientation and socioeconomic status. Individuals from these groups experience bias and discrimination, which then dissuades them from engaging with services in the future [58, 59]

The Association of American Medical Colleges has developed a collection of clinical vignettes to explore history-taking with lesbian, gay, bisexual, transgender, queer or questioning (LGBTQ) patients [60]. These are open access

Table 1.3 Types of diagnostic error due to data gathering.

• Incomplete history of present illness • Ineffective questioning • Failure to gather useful information to verify diagnosis • Faulty detection • Excessive data gathering • Failure to validate findings with patient • Misidentification of symptoms or signs • Faulty or improper physical examination techniques • Failure to screen • Overreliance on someone else’s history and physical • Poor etiquette leading to poor data quality • Misled by the way information presented itself

Source: Bordage [29]/with permission of Wolters Kluwer Health, Inc.

and include exploring domains such as experiences of bullying, coming out, family life and the sexual history. The LGBTQ Healthcare booklet published by University of Birmingham gives practical advice on making clinical environments more inclusive of LGBTQ patients [61].

Patient histories should encourage patients to share details of their lives openly when it is relevant to their care. The history may include information that is sensitive for the patient. Choice of language is important to avoid patients shutting down or not sharing personal information [62].

- Ask open ended questions. Follow the patient's lead.
- Be respectful and non-judgemental.
- Make no assumptions.
 - Do not assume you know the patient's gender identity.
 - Do not assume you know the patient's sexual orientation.
 - Do not assume that patients' reported relationship status defines their choice of partners.
 - Do not assume that patients' sexual orientations determine whether they want to parent a child.
 - Do not assume that patients' sexual orientation determines whether they may be affected by domestic/relationship violence.
- When you do not know, ask.

1.8.3 Emotional and Behavioural Health

Domains to explore with the patient include:

- 1) Marginalisation and Stigmatisation
- 2) Anxiety, depression and suicide
- 3) Smoking, alcohol and substance misuse
- 4) Partner and relationship violence
- 5) Sexual health

1.9 Ethnicity and Health

The 'healthy migrant' hypothesis suggests migrant communities do not bring poor health with them but acquire it from the host countries they live in. Ethnic communities living in Western countries are now in their second and third generations. They often have poorer health outcomes across many measures as is demonstrated here. Genomic medicine has highlighted the variation of human complexity. Genetic clustering of disease traits is not synonymous with traditional definitions of race. Self-reported ethnicity is a poor marker of genetic variation and thus, of disease risk. More consequential are the social determinants of health as often the poorer health outcomes experienced by marginalised groups are due to the circumstances in which they live and the discrimination they experience including from healthcare services (Figure 1.4).

Within healthcare, the experiences of individuals from ethnic and differing cultural backgrounds range from unempathetic to discriminatory. Patients may experience lower rates of referral, investigation and treatment as well as management, which is contrary to their cultural beliefs and values [64]. There is no shortage of evidence for this. Cultural factors potentially influencing racial disparities in healthcare include: [64]

- Clinician factors
 - Communication
 - Stigma

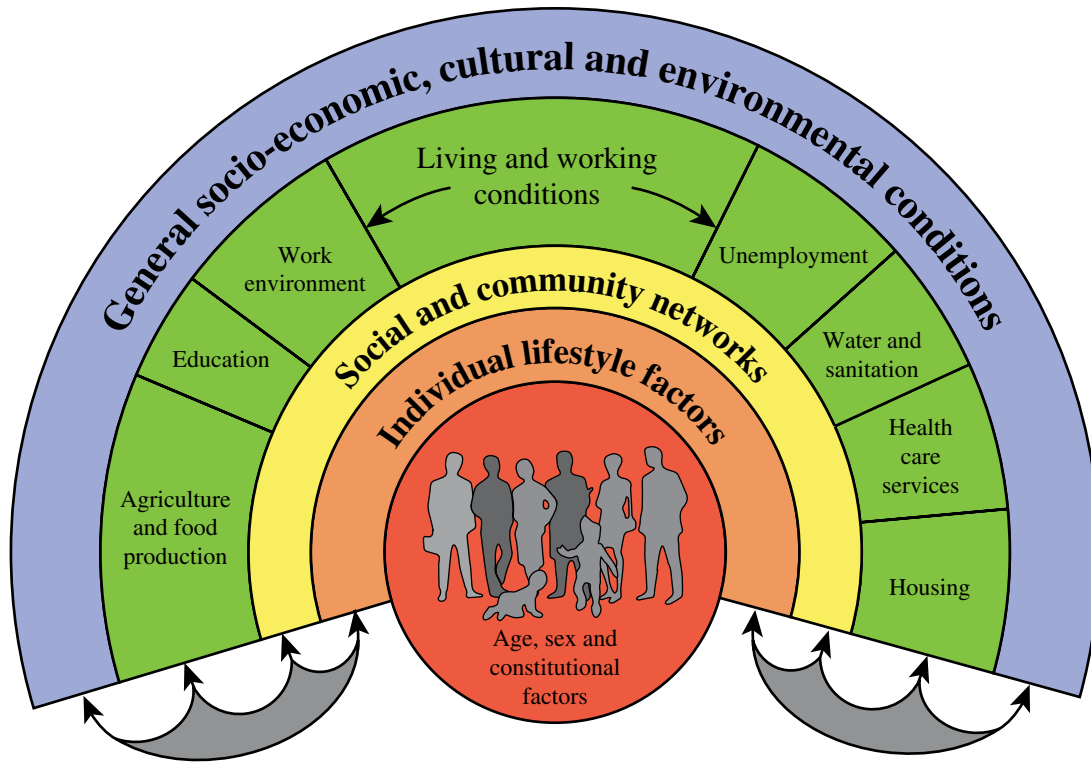


Figure 1.4 Social determinants of health. *Source:* Dahlgren and Whitehead [63]/Institute of Future Studies.

- Bias
- Approaches to the consultation
- Lack of awareness of cultural differences
- Organisational factors
 - Communication
 - Stigma
 - Bias
 - Lack of awareness of cultural differences

It is imperative, our lifelong learning and self-improvement as clinicians and as citizens addresses our lack of understanding for our patients' backgrounds and cultural values (Boxes 1.6–1.8).

Medical ethics is sometimes taught in the abstract. This can make it difficult for learners to understand how the four ethical pillars are applied in practice. An inclusive approach to the patient history and to clinical reasoning clarifies that everything, all our knowledge and all our skills, come together in how we treat each individual patient:

- Beneficence – do good
- Non-maleficence – do no harm
- Autonomy – self-determination, shared decision-making
- Justice – fairness to all

Box 1.6 Fozia

There is a blurring of culture and religion – at least within Pakistani communities. Many still follow practices that are cultural rather than those prescribed in Islam (the latter are more sensible in my opinion).

Culturally, doctors are perceived as knowledgeable and 'know best' and many still see doctors as being of 'higher' status than the lay person. Still applicable to first and second generation UK Pakistani communities, perhaps less so beyond this.

Hence, expectations are:

- Doctors will 'fix' the problem.
- Doctors 'know best'.
- An understanding that faith is a way of life, not just certain practices. This includes for example, knowing when Ramadan is and that most Muslims (even with health problems) will do their best to fast (as fasting is one of the pillars of Islam).
- A knowledge of which medicines are halal – i.e. those containing animal-based gelatine. Note that Islamically, if there are no alternatives to a particular medicine/ treatment and it is of clinical benefit, it is permissible to take it (though some will choose against this or demand an alternative).
- Same gender doctor:

From experience, many would prefer someone from their own cultural background – again more likely for first and second generation.

From an Islamic perspective, women and men should be seen by a doctor of the same gender if possible. If not possible (due to availability or emergency), then it is permissible to be seen by a doctor of the opposite gender. Though there are differences based on sect.

(Note, if a practicing Muslim sees a doctor of the opposite sex, you may find that their gaze is lowered for modesty [rather than trying to avoid eye contact] and will not shake hands).

Just to mention:

There is the practice of traditional prophetic medicine – and these are not seen as 'medicines' as such, but more remedies and Muslims may not consider mentioning these routinely. Examples are black seed oil, wet cupping (hijama), fennel/ajwain seeds (colic in babies/indigestion).

Both culturally and Islamically, communities are generally quite close-knit and health beliefs (good as well as misplaced) often are challenging to correct – a good example of this (in Pakistani communities) is avoiding COVID-19 vaccinations (and avoiding hospitals during the pandemic as there was a conspiracy theory that Pakistanis would not be placed on ventilation despite need and would die if they went to hospital – many chose to stay at home despite severe symptoms).

Box 1.7 Prathishta

In South Asian communities, there are heterogeneous guidelines on diet and lifestyle. My family, as 'Saivite Hindus', are vegetarians (no meat/egg but dairy is allowed) on Tuesdays and Fridays. We do not eat beef. This unique diet is found only in parts of the South Asian community. Some of my extended family members have been vegetarian their entire lives but eat eggs. Others eat meat excluding beef. Preconceptions about South Asian diets should be avoided to get an accurate picture of the presenting patient. Even just considering the lexicon variations between western and other cultures regarding what constitutes 'vegetarian' is important. This is necessary when considering pathologies affected by personal dietary restrictions and guidelines. South Asian festivals including Navarathri, Sivarathri and Kandashashti, commonly include Hindu participants being

either vegetarian or fasting for lengthy periods of time. Treatments, and personalised management plans need to accommodate the dietary practices of individuals of South Asian descent.

Another factor is how different pathologies may present in people of different ethnic backgrounds. My father looks physically young due to his many years as an athlete and perhaps genetics. This has negatively impacted his medical care as he has grown older. He has intermittent chest pain, exacerbated on exercise with a myriad of other symptoms that have eventually led to a possible differential of angina. It has taken four years to receive this diagnosis, despite consistent symptoms – due to perceptions/bias that he looks strong and in good health. Medical professionals have joked how he looks healthy, fit, and like a ‘gym-regular’. Everyone ages differently and we cannot compare people of the same age, background or ethnicity as one entity. Everyone has different factors contributing to their phenotypical/genotypical identity.

As a child, I had a rare systemic form of eczema, which was very unresearched. We faced insinuations of abuse by various doctors – as an under-researched disease many healthcare professionals made assumptions about my ethnic background, prejudices around my culture and about the presentation of the eczema. A South Asian doctor recognised the heterogeneity of eczema and understood there were no indications of any kind of abuse, but a pathology presenting differently on different skin tones. This was a highly traumatic experience for my family and one that we still reflect on to this day. It is important to build a rapport with the family and child, whilst also reading their relationship and body language – which in my situation was clear. It is crucial to leave prejudices about ethnic cultures behind and to listen to the patient.

Many of the South Asian community have emigrated from other countries. This should be considered when explaining treatment plans to avoid patronising behaviour towards individuals who just want to understand what is happening to them and why they are being given certain therapies. It is of utmost importance to treat individuals as exactly that, individuals, rather than using blanket ideas and generalisations.

Box 1.8 Isabel and Leo

Three underlying principles form the basis of the Jewish perspective on healthcare:

- God owns everything
- The body is fully integrated into what it is to be a person, and thought morally neutral; morality is determined by our actions
- Human beings have both the obligation and permission to heal.

We should care for our bodies, as they are on loan to us. Self-care extends to maintaining health: quality of sleep, exercise, diet. Emphasis on good health finds its way into Jewish law, such as with Maimondes, and his directives for good health, which are as imperative obligations as caring for the poor. Medical care is seen as a ‘mitzvah’, a commandment of doing good deeds.

Acts harming the body are sinful. Smoking is prohibited as an unnecessary risk. Self-harm or suicide is seen as a terrible sin. For a medical practitioner, this could be a difficult subject to approach in orthodox communities.

Generally, Jews will treat everyone the same regardless of gender identity, sexual orientation, ethnicity or any anthropometric. God does not make mistakes after all, so why would we assume that someone is wrong because they are different.

Medical advancement is looked on as good provided the basic principles are followed, will it prolong life in a good way, will it reduce a person’s pain and suffering and is it for the benefit of the patient? If yes, then it is embraced. All the elders including our Rabbi encourage each other to take advantage of medicines or treatments that would prolong their health and lifespan, so long as the quality of their life remained good.

If preserving life is supreme, then a patient is not free to autonomously decide to refuse treatment that may benefit or save their life. This makes end-of-life care difficult, and the western view of 'quality of life' over 'duration' is often seen as lesser. If there were times when they felt that no medicine or treatments would support or benefit their lives for good purposes, a person has the right to refuse treatment because it would not benefit them or that it would not enhance their health situation for the better. The community would support whoever had made their choice, through to the end of their life.

At the time of death, a Jew should not be touched for 20–30 minutes. If possible, a window should be opened. The family will most likely observe a shiva (the week-long mourning period in Judaism for first-degree relatives). This could make it difficult to get in touch with the family of a recently lost loved one.

1.10 Statistical Concepts

Statistics is relevant to evidence-based medicine, as it is to this book, which is presenting the evidence necessary to facilitate deeper understanding of the patient's symptoms and how they are described in the medical interview. Statistics help us focus our understanding and allow us to critically appraise the data being presented to support or refute a line of argument.

There are three main types of statistics relevant to health care. In the context of this book, they are:

- Descriptive
 - How many of this group of people have raised blood pressure?
- Exploratory
 - Is raised blood pressure a risk factor for myocardial infarction?
- Confirmatory
 - What level of raised blood pressure is associated with myocardial infarction?

Table 1.4 summarises the main statistical information you will encounter in the following chapters.

Table 1.4 Common statistical tests used in epidemiological studies of symptoms and the patient history.

We will use descriptive statistics to present population-based data on rates of death from disease in each system together with years of life lost and years living with disability	
Likelihood ratio (LR)	The likelihood that a test result would be expected in a patient with the target disorder compared to the same result being expected in a patient without the target disorder.
Odds ratio (OR)	A measure of an association between an exposure and an outcome. The OR value is the odds an outcome will occur given the exposure compared to the odds of the same outcome in a patient without the exposure.
Hazard ratio	A measure of how often an event happens in one group compared to how often it happens in another group over time.
Confidence interval (usually set at 95%)	A range around a measure, the parameters of which convey the precision of the measurement.
Uncertainty interval (usually set at 95%)	Essentially the same as a confidence interval; the wider the interval for both the greater the uncertainty about the true value of the measurement.

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2

The Skin

KEY POINTS

- Although the physical examination is essential for the diagnosis of skin conditions, patients do experience symptoms from their condition
- Treating symptoms as well as the appearance of lesions is part of patient management
- With remote consulting now common, accurately exploring skin symptoms is essential for patient safety
- Historically, education and research have been orientated towards diagnosis of conditions in lighter skin tones
- People of colour are disproportionately affected by some skin conditions
- Many doctors feel uncertain about accurate diagnosis in skin of colour

2.1 Symptoms of Skin Disease

- Itch – ‘an unpleasant cutaneous sensation which provokes the desire to scratch [1].
- Skin lesion – an area of skin which is different to the normal surrounding skin.
- Pain – if the skin is painful to touch, nerves may be overstimulated, or the brain is overreacting to a stimulus.
- Rash – an area of irritated or swollen skin. The skin may change colour being red or pink on lighter skin and purple, grey or white on darker skin tones.
- Bleeding – bleeding from the skin occurs if there is an injury to the skin surface or it may occur spontaneously.
- Discharge – the skin may ooze clear or straw-coloured fluid, or if infected, it may contain pus.
- Blistering – small pockets of fluid that form in the upper layers of skin after it has been damaged.
- Systemic symptoms – patients with generalised conditions also affecting the skin may be systemically unwell and present with symptoms, including fever, malaise, weight loss and arthralgia.

It is outside the scope of this book to provide a comprehensive account of the range of skin conditions. This chapter introduces the main symptoms and concepts relevant to history-taking in dermatology as well as an overview of some common skin conditions.

2.2 About Dermatology

Dermatology is the study of both normal and abnormal skin and associated structures such as hair, nails and oral and genital mucous membranes [2]. Since the diagnosis of skin conditions greatly depends on examination, it might be considered that history has less importance compared to other specialities. However, patients also

experience symptoms of skin disease. Since we cannot self-examine the whole of our bodies, symptoms (e.g. itching, bleeding) may be the only way to detect an important skin condition.

The history remains important when establishing the aetiology of a skin condition, its progression and chronicity, the patient's experience of the disease and efficacy of treatment and whether the condition is a localised problem or part of a systemic disease affecting a person's health more generally. Given the variety and visibility of skin diseases, pattern recognition in both the history and examination is critical.

Undergraduate training in dermatology is often brief, and a majority (83%) of internal medicine trainees feel uncomfortable managing dermatology conditions [3]. In the United States in 2013, half of medical schools provided fewer than 10 hours of training with 8% of schools providing none at all [4]. Clinicians lack confidence in diagnosing and treating skin of colour (SOC) [5]. A survey of internal medicine trainees in southwest England found the common conditions of eczema, psoriasis and melanoma were misdiagnosed by 100%, 80% and 60% of respondents, respectively [6]. Referral rates for lesions in patients with SOC are lower than in White patients [6].

2.3 Burden of Skin Disease

Of the data in skin and subcutaneous disease identified in the Global Burden of Disease Study 2019, the burden in Disability Adjusted Life Years (DALYS) was 42888.695.48 of which 5.26% were years of life lost and 95.74% were lives lived with disability [7, 8]. Most new cases are occurring in the age group of 0–4 years [8]. Commonest causes are fungal (34.0%) and bacterial (23.0%). The incidence is slightly higher in men than in women [8]. The highest regional number of new cases and deaths from skin disease is in South Asia [7].

Common conditions worldwide are acne, eczema, xerosis, psoriasis, skin cancers and warts with infections predominating in less developed countries [9]. Acne affects 85% of people in developed countries. Acne in African American populations is likely to show more inflammation [9]. Eczema affects about 20% of populations in Western nations with genetic, environmental and cultural factors all aetiological. Black and Asian children have an adjusted odds ratio of 2.4–2.6 for developing atopic dermatitis in the first 6 months of life [9]. Rosacea affects 5–10% with a greater prevalence in middle-aged fair-skinned women of northern European and Celtic ancestry [10]. Ageing populations, particularly in developed countries, are leading to rising rates of skin cancers with around 10% estimated to be affected during their lifetime [9].

Skin diseases affect the physical and mental health of patients. They may also affect patient's families' well-being and socioeconomic health [11, 12]. The impact on quality of life is not necessarily related to the severity of the disease itself. A study in Poland found employability and family finances of patients were also affected [13].

2.3.1 Ethnicity

A cross-sectional descriptive study of a multiethnic cross-sectional population in north-west London, UK, reported the prevalences presented in Table 2.1 [14].

Members of the Asian and African/African Caribbean communities were significantly more likely to have a 'diagnosis unknown' than White British patients (4.8%, 3.3% and 0.09%, respectively; $p < 0.001$) [14].

2.3.2 Lesbian, Gay, Non-Binary, Transgender, Queer+ (LGBTQ+)

Skin conditions have an impact on well-being and mental health. The effects are disproportionately high among sexual minority (SM) groups (e.g. for acne) [15]. Patients with psoriasis have higher rates of mental and physical distress attributable to their condition with high odds of both in SM patients [12]. Transgender patients have skin conditions related to hormone therapy and gender-affirming procedures [16]. For transgender men, there are concerns with acne vulgaris and male pattern hair loss, while for trans women, problems may arise with hirsutism, pseudofolliculitis barbae and melasma [16]. Scarring and other skin complications may arise following surgical procedures [16].

Table 2.1 The top 10 leading diagnoses in three ethnic groups attending a hospital-based dermatology clinic in Northwest London.

Top 10 diagnoses	WB	AS	A/AC
1	Basal cell carcinoma	Eczema	Eczema
2	Seborrhoeic keratosis	Psoriasis	Seborrhoeic keratosis
3	Actinic keratosis	Acne	Psoriasis/acne
4	Eczema	Pruritis (includes nodular prurigo/ lichen simplex chronicus)	Pruritis/acne
5	Benign naevi	Seborrhoeic keratosis	Acne keloidalis Nuchae/folliculitis/hyperpigmentation (NOS, includes post inflammatory, melasma)
6	Squamous cell carcinoma	DU	DU
7	Malignant melanoma	Hyperpigmentation (NOS, includes post inflammatory, melasma)	Alopecia/scars (includes hypertrophic and keloid)/ Seborrhoeic dermatitis/NS
8	Psoriasis	Lichen planus	Lichen planus
9	Acne	Alopecia/Benign naevi	Keratoderma/urticaria
10	Lentigo/Bowen's disease	Folliculitis	Pseudofolliculitis barbae/Hidradenitis suppurativa

A/AC, Africans/African Caribbeans; AS, Asians; DU, diagnosis unknown, reflecting cases in which the clinicians were not able to make a diagnosis; NS, nil specific diagnosis or nil abnormality; NOS, non-otherwise specified; WB, White British.

The diagnosis of seborrhoeic keratosis in the A/AC group also includes dermatosis papulose nigra.

Source: Banner et al. [14]/Oxford University Press.

2.4 Skin Anatomy

The skin is the largest organ in the human body (Figure 2.1) [2, 17]. The main layers are the epidermis and dermis which overlie connective tissue. It is a barrier against infection, ultraviolet (UV) light, chemicals and mechanical injury [17]. Hair, nails, sebaceous glands and sweat glands are appendages of the skin. They all develop from skin-derived cells.

2.4.1 The Epidermis

The epidermis consists of five layers [2]. Each layer represents a different stage of maturation of the keratinocytes. The average epidermal turnover time (with cells moving from the basal to the most superficial layer [stratum corneum]) is 30 days.

The following are the four cell types in the epidermis [2, 17]:

- Keratinocytes: They produce keratin as a protective layer and secrete lipids to provide a water barrier. This layer is involved in the regulation of calcium absorption and vitamin D synthesis.
- Langerhans cell: This cell presents antigens and activates T lymphocytes for immune protection.

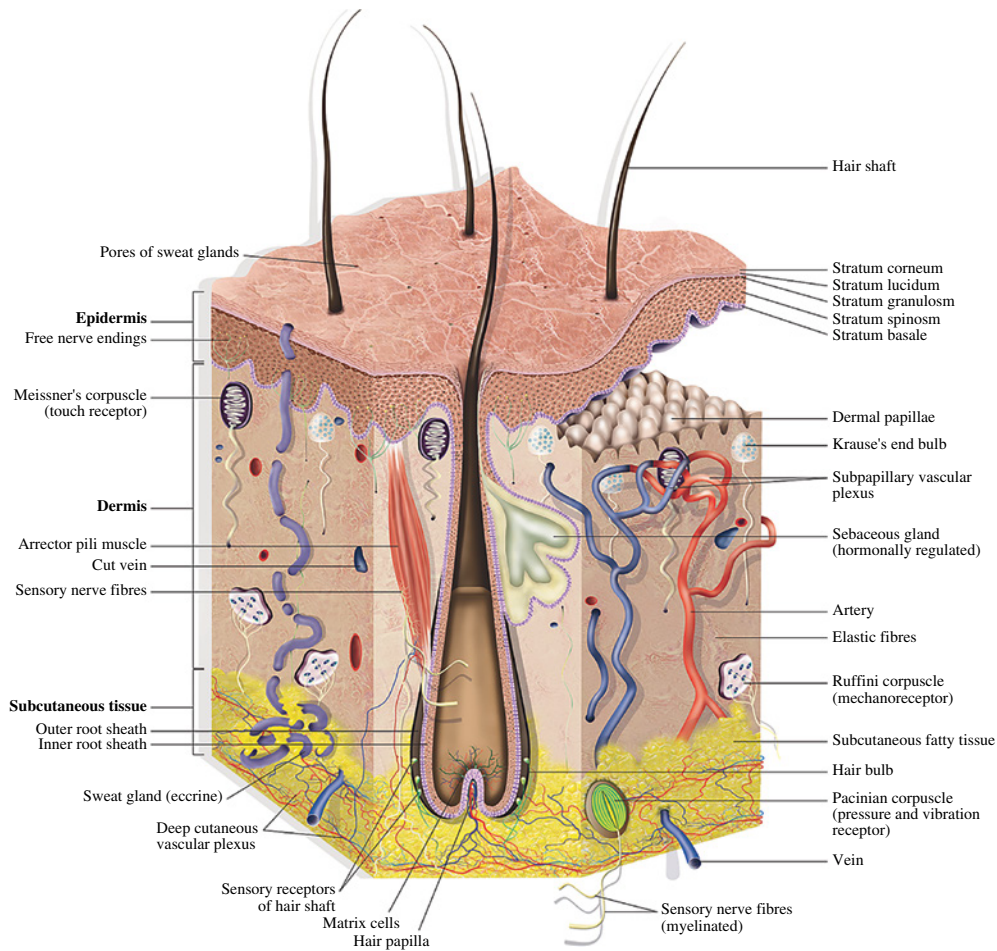


Figure 2.1 Cross section of healthy skin showing main layers. *Source:* Dr Joanna Butler, 2024 /with permission of Medical Artist Limited (Image may be resized as necessary).

- **Melanocytes:** They produce melanin, which gives pigmentation to the skin and protects cell nuclei from UV-radiation-induced DNA damage.
- **Merkel cells:** These cells contain specialised endings for the sensation of light touch. They are most numerous in the fingertips and in the palms, soles, mouth and genital mucosal surfaces.

2.4.2 Structure of the Epidermis

- **Stratum basale (basal cell layer):** The deepest layer, it contains actively dividing cells and melanocytes [2, 17].
- **Stratum spinosum (prickle cell layer):** Contains differentiating cells.
- **Stratum granulosum (granular cell layer):** Cells lose their nuclei and contain granules of keratohyaline. They secrete glycolipids into the intercellular spaces. The glycolipids function as glue that sticks the cells together.
- **Stratum lucidum:** This is present in thicker skin on the palms and soles of the feet. It consists of a thin, clear layer.
- **Stratum corneum:** This is a layer of keratin and horny cells, the most superficial layer. This is the layer which varies most in thickness, more so in callused areas.

The three main types of pathologies arising in the epidermis [2] are changes in epidermal turnover time (e.g. psoriasis – reduced epidermal turnover time), changes in the surface of the skin or loss of epidermis (e.g. scales, crusting, exudates, ulceration) and changes in pigmentation of the skin (e.g. hypo- or hyper-pigmented skin).

2.4.3 Skin of Colour

Melanin is the main determinant of skin colour [6]. Following synthesis in melanocytes in the stratum basale of the epidermis, it is stored in melanosomes. Melanosomes are distributed into the surrounding keratinocytes. Everyone has approximately the same number of melanosomes. The level of skin pigmentation is determined by the size and distribution of melanosomes. Melanocytes synthesise both eumelanin (black and brown) and phaeomelanin (red and yellow). A greater proportion of eumelanin produces darker skin, while increased levels of phaeomelanin give a fairer skin (Figure 2.2). Higher levels of melanin and large melanosomes provide greater photoprotection. This results in a lower incidence of skin cancers in individuals with darker skin tones. However, higher levels of melanin also correlate with increased post-inflammatory pigmentation. This causes darkening of the skin where there has been previous inflammation and trauma.

Correct understanding and assessment of skin tone is important clinically. Conditions such as hyperpigmentation and keloid formation are more frequent in darker skin tones [18]. Artificial intelligence (AI) is a potentially useful tool, but the algorithms on which AI is based need to be accurate to ensure safe patient outcomes [19].

2.4.4 Dermis

The dermis comprises collagen, elastin and glycosaminoglycans, which are synthesised by fibroblasts [2, 17]. The dermis also contains immune cells, nerves and skin appendages as well as blood vessels and lymphatics.

Dermis pathologies may involve [2] changes in skin contour or loss of dermis e.g. formation of papules, nodules, skin atrophy and ulcers, disorders of skin appendages –hair, nails and sweat glands and changes relating to lymphatic and blood vessels e.g. erythema (vasodilatation), urticaria (increased permeability of capillaries and small venules), purpura (capillary leakage).

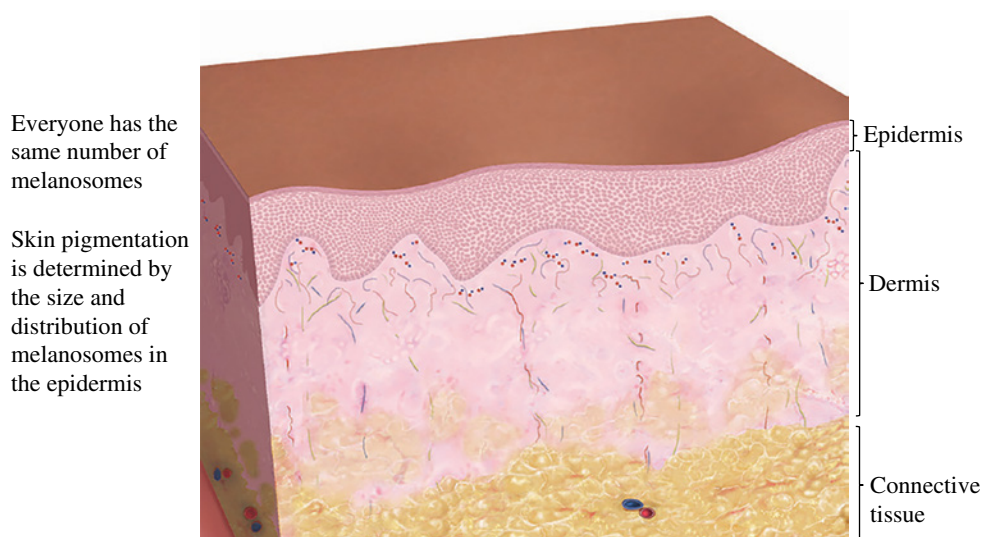


Figure 2.2 Pigmentation of the skin occurs due to the size and distribution of melanosomes in the keratinocytes of the epidermis [6]. Source: Dr Joanna Butler, 2024/with permission of Medical Artist Limited (Image can be resized as necessary).

2.5 Skin Physiology

The main functions of the skin include providing a protective barrier, temperature regulation, sensation, vitamin D synthesis, immunosurveillance, appearance and cosmesis [2].

2.6 Assessing Skin of Colour (SOC)

Skin colour is often incorrectly associated with race [6]. The inclusion of assessment of SOC in medical education is an issue of justice as well as accurate diagnosis of all patients. SOC is under-represented in images used in training. The analysis of 4000 images in four US medical textbooks contained only 4.5% of images showing dark skin [20]. An American dermatologist developed skin colour phototypes in 1975, leading to the Fitzpatrick classification of skin types scale (Figure 2.3). There are biases associated with this scale. It fails to differentiate between people with moderately and darkly pigmented skin [21]. There is only one type that encompasses all people with black skin compared to three types for white skin and two types for brown skin. This has perpetuated biases in subsequently developed AI diagnostic algorithms [22]. The Monk skin tone scale, which has 10 skin tones, has been created to better represent the skin tones of ethnic minorities.

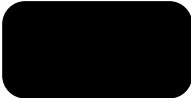
Research and validation are ongoing for alternative scales such as the eumelanin human skin colour scale and the colorimetric scale for SOC [23, 24]. Clinicians need to familiarise themselves with the presentation of skin conditions in all skin tones (Figure 2.4).

2.7 Key Points of the History

2.7.1 Patient Demographics

This includes age, gender, race and ethnicity [2, 25]. Infections are more common in children, while malignancy increases with age. In infectious diseases, consider who is in the household.

Table 1 Fitzpatrick classification of skin types I–VI

Type I	Type II	Type III	Type IV	Type V	Type VI
White skin. Always burns, never tans.	Fair skin. Always burns, tans with difficulty.	Average skin color. Sometimes mild burn, tan about average.	Light-brown skin. Rarely burns. Tans easily.	Brown skin. Never burns. Tans very easily.	Black skin. Heavily pigmented. Never burns, tans very easily.
					

From: Chapter 6. Clinical Presentation and Staging of Melanoma

The Authors.

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#f6ede4 Monk 01	#f3e7db Monk 02	#f7ead0 Monk 03	#eadaba Monk 04	#d7bd96 Monk 05	#a07e56 Monk 06	#825c43 Monk 07	#604134 Monk 08	#3a312a Monk 09	#292420 Monk 10

Monk Skin Tone Scale 1

Figure 2.3 The Fitzpatrick and Monk skin tone scales. *Source:* National Library of Medicine/CC BY - 4.0 / <https://www.ncbi.nlm.nih.gov/books/NBK481857/table/chapter6.t1> / Last accessed at 21 May 2024; Dr. Ellis Monk/Google AI/CC BY - 4.0 / <https://skintone.google/get-started> Scale Usage Citation / Last accessed at 21 May 2024. This figure was used in chapter 4 of the author's ABC of Equality, Diversity and Inclusion in Healthcare. Wiley, 2023.

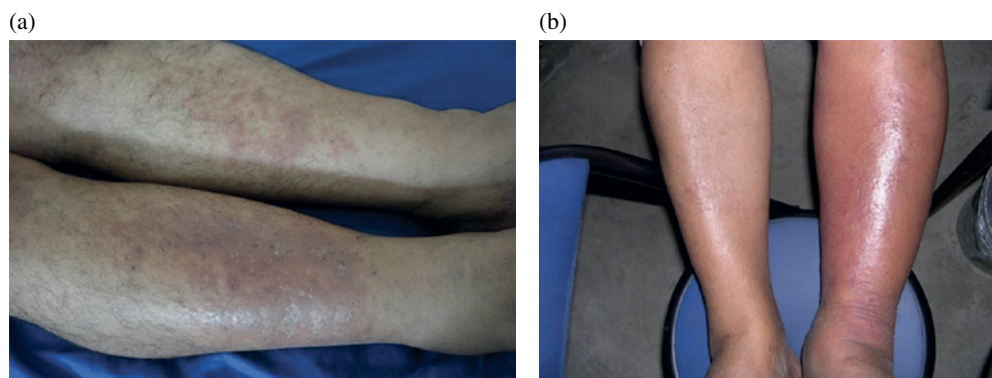


Figure 2.4 Venous eczema and cellulitis. (a) Venous eczema in skin of colour (SOC), (b) cellulitis in SOC. *Source:* Hutchison et al. [6]/with permission of Elsevier.

2.7.2 Presenting Problem

Establish a timeline

Is the problem acute or chronic and assess symptom progression and associated symptoms?

Previous episodes

Consider events, seasons, triggers and how they have resolved previously.

Change

Is the condition fluctuating, persistent or occupational (improves when away from work)?

Location

Establish all the areas affected e.g. eczema is often flexural with psoriasis arising on extensor surfaces (e.g. elbows, knees). Also, is it spreading?

Provoking or relieving factors

Heat and cold may exacerbate or relieve symptoms, and medication may cause drug rashes.

Associated symptoms

These include itch, tenderness (inflammation may be tender), bleeding (possible malignancy), discharge (possible infection) and systemic symptoms, including fever, malaise, joint pain, swelling or weight loss. Skin symptoms can indicate underlying malignancy (e.g. itching, dryness, rash, non-healing or recurrent lesions).

Response to treatment

Partially treated lesions may be more difficult to diagnose. Patients have often tried an antiseptic cream or a moisturiser bought over the counter.

2.7.3 Past Medical and Social History

Pre-existing conditions

These may be aetiological for skin involvement such as diabetes and necrobiosis lipoidica, erythema nodosum and Crohn's disease or ulcerative colitis and dermatitis herpetiformis and coeliac disease.

Family history

Genetic predisposition is relevant in eczema and psoriasis.

In familial atypical mole and melanoma (FAMM) syndrome, family history may be relevant where multiple members have melanocytic lesions and at least one has melanoma.

Occupation and leisure

This includes exposure to chemicals, animals, plants or noxious agents.

Travel

Assess the risk of tropical diseases, cumulative exposure to sunlight, sunbeds and history of sunburn.

Drugs

Consider prescribed and over-the-counter remedies. Illicit drugs can also have dermatological manifestations (e.g. anabolic steroids and acne).

Smoking and alcohol

Alcohol is associated with psoriasis. Smoking increases the risk of some malignancies and is associated with palmoplantar pustular psoriasis.

Allergies

Do these have any impact on the current problem?

2.7.4 Psychological and Social

People with skin disease may suffer from anxiety, depression and social isolation. Psychological distress may also lead to skin conditions (e.g. dermatitis artefacta).

2.7.5 Examination

Examination is essential for all skin conditions and at follow-up is necessary to ensure efficacy of management. This includes not only the lesion itself but also its distribution and evidence of systemic illness (e.g. vital signs, lymphadenopathy). Clinicians will often examine and feel the skin in tandem, or even before formally taking a history, to help establish diagnostic hypotheses to explore during the interview.

2.8 The Patient Experience of Skin Disease

Patients will often notice others reacting to the appearance of their skin condition. Some may experience stigma and discrimination as a result. Even for common diseases such as eczema, psoriasis, acne, rosacea and vitiligo, there may be a significant effect on a patient's quality of life. Besides the diagnosis itself, the symptoms may cause both physical and psychological discomfort. High levels of self-care or family care are needed with the application of creams and treatments sometimes several times a day. Some treatments may have odours or appearances which cause social embarrassment. Individuals at risk of psychological sequelae should be identified at the outset or time of diagnosis [26].

Chronic skin conditions (e.g. acne vulgaris and psoriasis) disproportionately affect the mental health of SM people though they are less likely to receive psychological support than heterosexual patients [15].

2.9 Itch (Pruritis)

Localised itching is usually due to skin conditions; generalised may be due to systematic conditions such as renal, kidney or haematological disease (Table 2.2). Where due to infestations, other household members may be affected. Itching may be associated with pain or altered sensation due to inflammation, and oedema can cause

Table 2.2 Systemic conditions which may present as generalised pruritis.

Haematological	Cholestatic	Kidney
Conditions such as polycythaemia vera, myeloproliferative disorders or myelofibrosis – the itch may be worse after a warm shower	Seen in a wide variety of hepatocellular disorders – thought to be due to bile salts accumulation triggering histamine and lysophosphatidic acid release. Higher levels of endogenous opioids may contribute to itch.	More than 40% of patients with chronic kidney disease present with itch though to originate from endogenous opioid upregulation.

Source: Adapted from Rinaldi [27].

pain in the skin. Diseases involving neurovascular bundles can produce burning or anaesthesia (e.g. leprosy, syphilis, cutaneous neural tumours). Associated symptoms such as fever, headache, fatigue, anorexia, weight loss and depression should also be sought.

2.9.1 Itch

Around 80% of skin-related conditions presenting in UK primary care have itch as a symptom. It can be very difficult to control [27].

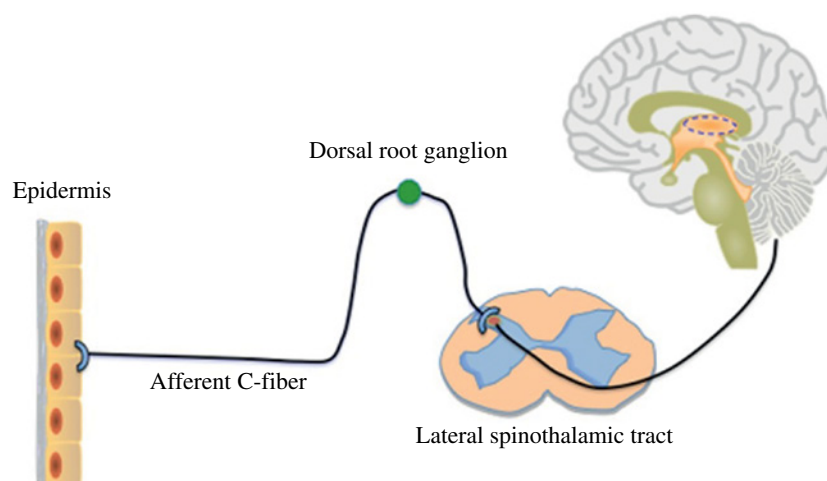
2.9.2 Anatomy and Pathophysiology

Itch can be experienced anywhere on the body. Itch is mediated by slow-conducting C-fibres via the spinothalamic tract [28] (Figure 2.5). There are four identified aetiologies [29]: pruriceptive (dermatological), neurogenic (systemic), neuropathic and psychogenic.

2.9.2.1 Pruriceptive

Mechanisms arising in the layers of the skin produce this type of itch. It is the commonest cause of pruritis in dermatology [27]. Histamine is the most researched mediator. However, antihistamines give poor relief to chronic itch found in conditions such as atopic dermatitis [30]. This suggests other mediators may also be present.

Figure 2.5 Itch pathway from skin to brain. Source: Garibyan et al. [28]/with permission of John Wiley & Sons.



2.9.2.2 Neurogenic (Systemic) Itch

This itching originates in organs other than the skin in which there is no evidence of peripheral nerve damage or psychiatric factors [28].

2.9.2.3 Neuropathic Itch

This occurs due to damaged central or peripheral nerves. It is often accompanied by other localised neuropathic symptoms such as pain and paraesthesia or as part of a neurological condition such as multiple sclerosis [31]. There are many manifestations of neuropathic itch (Table 2.3).

2.9.2.4 Psychogenic Itch

This tends to be a diagnosis of exclusion. Patients may hallucinate in parasitosis, depression or compulsive disorders. It may occur during stress-related exacerbations of conditions such as eczema, urticaria or psoriasis. The mechanism may be due to imbalances between serotonin, opioids and dopamine. Opioids may mediate responses to social pain. Patients with depression may also have elevated level of substance P in their cerebrospinal fluid. Ultimately, patients are experiencing a stimulation of their afferent itch fibres.

Table 2.3 Neuropathic pruritic conditions.

Disease	Aetiology	Clinical features
Peripheral nervous system		
Small fibre neuropathy	Metabolic, drug-induced, infectious or genetic origin	Itch starts distally and may generalise
Scars and burns	Iatrogenic or traumatic	Itch on lesional tissue
Radiculopathies	Compression of a peripheral nerve by degenerative alterations or space-occupying lesions	Itch and dysesthesias at the affected dermatome
Postherpetic neuralgia	Damage of peripheral nerve by the varicella zoster virus	Itch and dysesthesias at the affected dermatome
Trigeminal trophic syndrome	Injury of the sensory fibres of the trigeminal nerve	Unilateral dysesthesia and hypoesthesia of the central face
Central nervous system		
Space-occupying lesions	Tumours, abscesses, vascular lesions, syringomyelia	Clinical features according to affected neural structures
Stroke	Ischaemic or stroke	Generalised or unilateral itch
Multiple sclerosis	Demyelinating disease	Generalised itch or localised at the head and the upper back
Neuromyelitis optica	Demyelinating disease	Depending on the injured spinal level
Infectious diseases	Meningitis, encephalitis, prion disease	Depending on damaged neural structures
Traumatic brain or spinal cord lesions	Accidents or iatrogenic disease	Depending on damaged neural structures

Source: Pereira et al. [32]/Frontiers Media/CC BY - 4.0. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

2.9.3 Scratching

Scratching is usually considered a mechanical protection and inflammatory response against harmful substances on the skin. However, it disrupts the epidermal barrier and facilitates infection. Relieving an itch produces a feeling of pleasure, possibly due to the release of serotonin [33]. Although there is a seeming reward, with activation of the reward and motivation centres of the brain, prolonged scratching is damaging to the skin [34]. Scratching increases at night due to higher circadian skin temperature, increased trans-epidermal water losses, reduced corticosteroid levels and disinhibited scratch response [35].

2.9.4 Patient Experience

‘Sometimes I get this itching all over my arms and shins. I can’t think of any triggers... whether it’s something I eat or drinking too much red wine, I don’t know. I think my skin gets dry but I’m very careful to use only hypoallergenic products. I always ask for a hypoallergenic pillow when I’m staying in a hotel. I use a skin cream to relieve the itching sometimes as it can stop me sleeping. My partner says I’ve got a lot of scratch marks all over my back, but I don’t realise I’m doing it that much. The scratching helps to relieve the discomfort... at least at first it does.’

The severity of pruritis can be assessed using quality of life tools such as the visual analogue scale and the Dermatology Life Quality Index (DLQI) [36, 37].

2.9.5 Evidence Base

Pruritic skin conditions are commonplace and constitute a significant burden to patients and services. Up to 20% of children in Britain suffer from eczema and 3% from psoriasis [38]. Ten per cent of patients with chronic psoriasis, hand eczema and atopic dermatitis have signs of depression [39].

2.9.5.1 Past Medical History

Include a personal or family history of rashes and allergic medical conditions. A history of asthma, eczema or hay fever suggests atopy. Systemic disease in the past may be important in patients with a rash (e.g. diabetes, connective tissue disorder, inflammatory bowel disease).

Social history, occupation and hobbies, chemical exposure and contact with plants or animals all induce dermatitis. Medication includes oral, topical and over-the-counter agents.

2.10 Colour of Skin When Inflamed

Redness of the skin or more accurately ‘erythema’ is often used to describe the skin and its appearance in different skin conditions. This is problematic as, like some symptoms, ‘erythema’ has different meanings to different people – both patients and clinicians [40]. Ascribed meanings include pink, dusky red, persisting redness, new redness, colour change, colour difference, inflammation (rubor), redness without inflammation and sunburn [41]. Redness shows most easily in lighter skin tones, but the other markers of inflammation – heat (calor), swelling (tumor) and pain (dolor) – occur in the skin of all tones [40]. Inflammation of the skin results in increased blood flow to the affected area and also affects melanocytes [40]. Inflammation of the skin changes the skin’s appearance – redness in lighter skin tones and violaceous, grey, brown-dark or black colour change in darker skin tones as well as redness [40]. It is inappropriate therefore to ask about redness of the skin in acute inflammatory conditions but rather whether there is any colour change at all [40].

2.10.1 Inclusive Questions about the Skin

Rather than asking about redness and judging the presence or absence of disease based on this answer, the following questions are relevant for all patients [42]:

- What is your skin or wound like compared to the skin around it?
- Are there any differences in colour?
- Does the skin feel warm or cool?
- Have you noticed any temperature changes?
- Does your skin feel spongy or firm to the touch?
- Does your skin look or feel shiny or tight?
- Is there any swelling?
- Do you have any pain, itching or change in sensation?

2.11 Description of Skin Lesions

Figure 2.6 and Tables 2.4 and 2.5 display the definitions of common skin lesions. Lesions are classified as primary or secondary. Primary lesions arise at the onset of a condition, while secondary lesions develop as the disease progresses. Sometimes the lesion will be identifiable from the patient's description. More often, it will be a combination of examination, palpation and talking to the patient. Increasingly, dermoscopy is available to clinicians in both primary and secondary care, and diagnosis may be possible via telemedicine. Dermoscopy is a non-invasive tool which increases diagnostic accuracy for many conditions [44].

2.12 Assessing Conditions in Skin of Colour

In SOC, there is an increase in the following conditions: eczema, pityriasis alba, tinea capitis, pseudofolliculitis, acne keloidalis nuchae, scars, acanthosis nigricans, lichen planus, fixed drug eruptions and sarcoid.

2.12.1 Symptoms of Skin Cancer

Skin cancer is less common in SOC [45]. While White patients are likely to develop melanoma in sun-exposed areas, 75% of melanomas in Black and Asian Indians are acral lentiginous melanoma (ALM) affecting the palms, soles and nails (Figures 2.7 and 2.8) [45]. Patients of colour are also more likely to present with advanced disease and have lower survival rates than white patients [47].

2.12.2 ABCDE and 'Ugly Duckling Sign'

Malignant melanoma (MM) accounts for over 80% of skin cancer in Europe and 1–2% of all cancer deaths [48]. The asymmetry, border, colour, diameter, and evolution (ABCDE) rule and 'ugly duckling sign' ('pigmented lesions clearly different from others in a given individual and therefore deserving of suspicion') are highlighted to patients and clinicians to increase awareness of the possibility of melanoma [49]. In 1985, Robert Friedman described the ABCD rule which states asymmetry (A), border irregularity (B), colour variegation (C) and diameter greater than 6 mm (D) are helpful in early diagnosis of MM [50] (Figure 2.9). E for 'evolution' was added to recognise size, shape, colour and surface and symptoms may change over time highlighting the risk of MM (Figure 2.8) [52]. Public health campaigns mean patients may self-diagnose possible MM with around a quarter (23.6%) of patients presenting this way, and their own interpretation of their signs will be the patient's history [48].



Figure 2.6 Appearance of common skin lesions. *Source:* Christiana and Vyas [43]/with permission of Elsevier.

Table 2.4 Definitions of primary skin lesions.

Primary lesions	Defining characteristics	Seen in
Macule	A change in colour or texture of the skin that is flush with the adjacent skin and <1 cm in diameter	Solar lentigo
Patch	A change in colour or texture of the skin that is flush with the adjacent skin and >1 cm in diameter	Melasma
Papule	A raised dome-shaped lesion that is <1 cm in diameter	Rosacea
Nodule	A firm dome-shaped lesion >1 cm in diameter	Basal cell carcinoma
Plaque	A raised lesion with a flat top, with a clearly defined border and >1 cm in diameter	Psoriasis
Vesicle	A clear, fluid-filled lesion <1 cm in diameter. Occurs alone or in groups depending in cause	Herpes zoster
Pustule	A vesicle filled with pus	Palmoplantar pustulosis
Bulla	A fluid-filled lesion >1 cm in diameter	Bullous pemphigoid
Comedone	A small, raised, dome-shaped lesion centred on a skin pore. It can be open (blackhead) or closed (whitehead)	Acne, hidradenitis suppurativa
Cyst	A fluctuant fluid-filled lesion under the skin that is >1 cm in diameter	Epidermoid cyst
Purpura	Extravasation of blood that does not blanch on pressure. 'Petechiae' refers to lesions 1–2 mm and ecchymoses are large lesions	Henoch-Schoenlein purpura, bruises
Telangiectasia	Dilated small blood vessels on the surface of the skin. These blanch on pressing and refill when released	Basal cell carcinoma, sun-damaged skin
Wheal	Central swelling of variable size surrounded by reflex colour change. Usually fleeting in nature	Urticaria

Source: Christiana and Vyas [43]/with permission of Elsevier.

Table 2.5 Definition of secondary skin lesions.

Secondary lesions	Defining characteristics	Seen in
Excoriation	Linear abrasion in the skin that is secondary to shearing traumatic forces	Eczema (scratching)
Lichenification	Thickening of the epidermis caused by excessive rubbing or scratching of the skin, often seen as accentuation of skin markings	Eczema
Scale	Flakes of stratum corneum	Psoriasis
Crust	Dried exudate or blood	Impetigo
Erosion	Superficial break in the skin involving a loss of the epidermis	Pemphigus vulgaris
Ulcer	Loss of the epidermis and dermis. Usually heals with scarring	Venous ulcers, arterial ulcers
Fissure	Linear break in the skin with fibrous tissue replacing injured skin	Hand eczema
Scars	Healing of the skin with fibrous tissue replacing injured skin	Surgical incision
Keloid	Scar that occurs after trauma or friction and grows to become larger than original wound	Acne keloidalis nuchae
Atrophy	An area of thinned, wrinkled skin	Corticosteroid overuse

Source: Christiana and Vyas [43]/with permission of Elsevier.

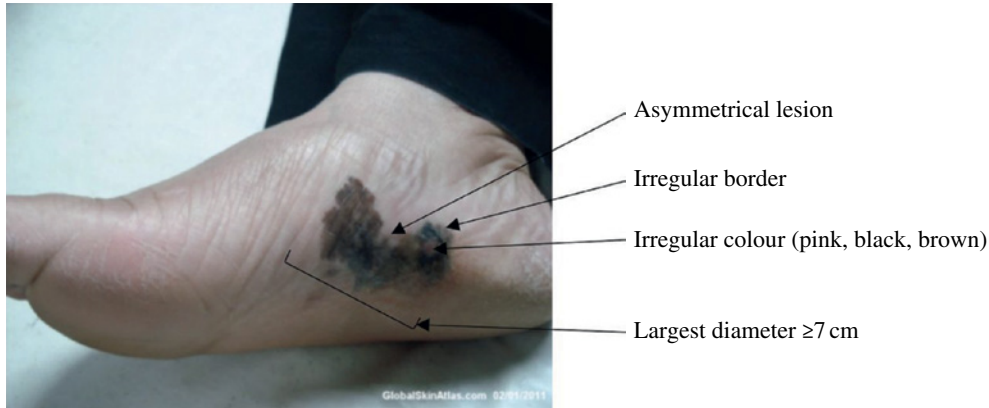


Figure 2.7 Acral lentiginous melanoma in skin of colour (SOC), with concerning features labelled. *Source:* Reproduced with permission from Global Skin Atlas (globalskinatlas.com). Hutchison et al. [6]/with permission of Elsevier.

Figure 2.8 Acral lentiginous melanoma presenting on the right great toe. *Source:* Howard et al. [46]/with permission of John Wiley & Sons.



Figure 2.9 The ABCDE rules for diagnosis of pigmented skin lesions. E = the lesion is evolving in any one or a combination of ABCD. *Source:* Aljanabi et al. [51]/IOP Publishing/CC BY 3.0. Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI. Published under licence by IOP Publishing Ltd



A higher number of ABCDE signs are associated with a greater chance of MM [48]. The ABCDE rule is less effective for early MM or MM in situ [48].

Exposure to UV light is the most significant risk factor for skin cancer. Incidence is highest in those living near the equator, history of direct exposure to sunlight, use of tanning beds and sunburn in adolescence [53]. Due to the protective effect of melanin, the disease is rare in African Americans though prognosis is poorer [53]. Trunk melanomas are more common in White patients (34.5%) with lower extremity melanomas more common in African Americans (56.1%) [53]. Nodular and acral lentiginous subtypes are more common in African Americans [53]. ALM occurs commonly on the palms, soles and digits (Figure 2.7) [46].

2.12.3 Patient Experience

‘I used to really enjoy getting out in the sun. When we were young we used to compete to see who could look the best for a night out. I definitely overdid it a few times. One year we were in Ibiza, first morning straight out there to grab a sun lounger, don’t use the sunscreen, but not too worried. With my skin being dark, I’ve always assumed I didn’t need to put any sun block on but apparently that’s not true or have I got that wrong? I really burnt up and spent the next three days in bed, blisters, and everything. I’ve obviously been more careful since then, always use factor 50. We’ve been keeping an eye on a spot on my right shoulder for the last few months. We both think it’s getting bigger now, and the shape is changing....that’s why I’m here to get it checked like they say you should.’

2.13 Eczema

Symptoms of eczema include dry, itchy, red and inflamed skin (erythema), usually in the flexures or skin folds. Areas of patchy skin with thickening, with blistered and weepy skin during exacerbations as well as secondary infection.

Exacerbations may last weeks (Figure 2.10). Children under 5 years of age are most affected. In SOC, there may be increased follicular involvement as well as skin involvement on the extensor surfaces rather than solely in the flexures.

2.13.1 The Eczema Area and Severity Index (EASI)

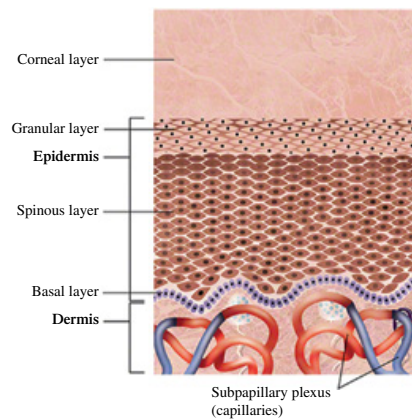
The Eczema Area and Severity Index (EASI) has been developed over the past 25 years to provide a tool for assessing the extent of the body surface and severity of lesions [54]. It is helpful in diagnosis and monitoring the progress of treatment. The tool can be applied to both adult and paediatric patients. There is some ongoing discussion on how it should be interpreted in clinical practice, particularly by non-experts [54]. The body is considered as four regions – head and neck, upper limbs, trunk and lower limbs. Each area is assessed for the extent of involvement on a scale of 1 (1–9%), 2 (10–29%), 3 (30–49%), 4 (50–69%), 5 (70–89%) and 6 (90–100%) [54]. Each area is then assessed for intensity of lesions as 0 (absent), 1 (mild), 2 (moderate) and 3 (severe) [54]. Maximum severity over the whole body would produce a score of 72. The final score is then compared with the scale (Table 2.6).

2.13.2 EASI and PASI Scores and Skin on Colour

These scores rely on the redness of the skin discriminate against people of colour. The reliance on redness for assessing the degree of inflammation means patients with SOC receive lower scores. Subsequently, their lower scores lead to less effective treatment for the severity of their skin condition. Research is ongoing to improve rule inclusivity.

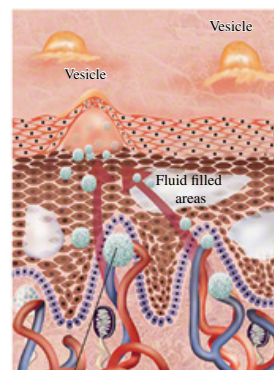
Healthy skin

Healthy skin shown as a cross section through the epidermis and dermis layers



Acute

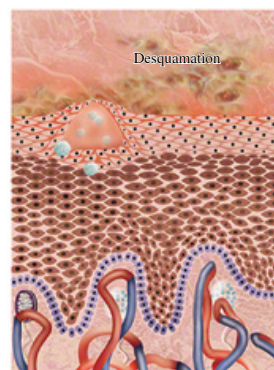
Erythema and vesicles (intercellular edema of the epidermis, or spongiosis, determines formation of vesicles, dilation of vessels of the papillary dermis and perivascular lymphocytic infiltration)



White blood cells or lymphocytes infiltrate infected areas in order to defend against infection. Carried by the capillaries

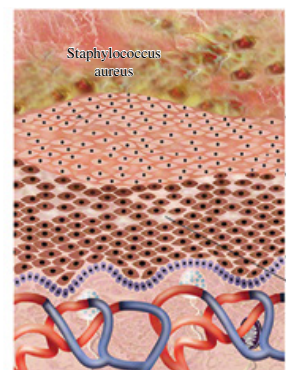
Subacute

Erosions, exudation, squamae and scabs (slight hyperkeratosis, parakeratosis, acanthosis, less spongiosis, less vascular dilation, lymphocytic infiltration, and perivascular macrophages)



Chronic

Lichenification a thickening of the skin with exaggerated markings: hyperpigmented plaques with marked skin striae (evident hyperkeratosis)



Hyperkeratosis a thickening of the stratum corneum
Acanthosis an increase in the thickness of the stratum spinosum
Leaking tissue fluids called oedema, creates spaces between the cells

Figure 2.10 Stages of eczema. *Source:* Dr Joanna Butler, 2024/Medical Artist Limited. Image can be resized as necessary.

Table 2.6 Eczema area and severity index (EASI).

Score	Description
0	Clear or no lesions
0.1–1	Almost clear
1.1–7	Mild disease
7.1–21	Moderate disease
21.1–50	Severe disease
>50.1	Very severe disease

Source: Adapted from Hanifin et al. [54].

2.14 Psoriasis

In contrast to eczema, psoriasis presents on the extensor surfaces. Other sites include plaques into the hairline, on the torso and around the umbilicus. Nails may be involved. Joint symptoms may herald psoriatic arthritis, and a full musculoskeletal history should also be taken (see Chapter 7). Psoriasis also carries an increased risk for inflammatory bowel disease and metabolic syndrome [55].

Plaques in White patients have a red–pink appearance with silvery/grey scales. In SOC, they may have a dark purple colour together with thicker scaling [6]. Active lesions may be harder to diagnose in darker skin and may be misdiagnosed as post-inflammatory hyperpigmentation [6]. A psoriasis area and severity index (PASI) was developed before EASI and was modified to produce the latter tool [56]. PASI is well-understood and accepted by different patients and has some use as a self-administered monitoring tool under supervision [57].

2.14.1 Patient Experience

A correlation study of the PASI with the DLQI reported an association between psychological distress with the condition and stigmatisation. Almost half of psoriasis patients feel physically unattractive and sexually undesirable [55]. Thirty per cent of patients have anxiety and depression irrespective of the severity of the disease [55]. Patients have higher rates of divorce relative to other chronic disease [55].

2.15 Skin Appendages

2.15.1 Hair

Hair loss affects around 50% of people [2]. Hair is an important aspect of identity and self-esteem. Loss can be very distressing. Anatomical and physiological sites involve diseases of the hair follicle, systemic disease, hormonal changes and vitamin deficiencies [58].

Each hair consists of modified keratin and is divided into the hair shaft (a keratinised tube) and a hair bulb (actively dividing cells, and melanocytes which give pigment to the hair) [58].

Each hair follicle enters its own growth cycle of three main phases: anagen, the long growing phase; catagen, the short regressing phase; and telogen, the resting/shedding phase.

2.15.1.1 Pathology of Hair

This may involve reduced or absent melanin pigment production e.g. grey or white hair, changes in duration of the growth cycle e.g. hair loss (premature entry of hair follicles into the telogen phase) and shaft abnormalities [2].

There are two main types of hair loss: loss associated with the destruction of the follicle and a second type where the follicle is preserved. The first type is referred to as scarring, and the latter is referred to as non-scarring. Scarring disorders require prompt intervention to mitigate hair loss.

2.15.1.2 Key Points in the History

Consider the pattern of hair loss and the onset and duration [59]. Is there loss of whole hair or breakage? What is the practice of hair care? Remember associated symptoms and review of systems.

2.15.1.3 Red Flags

These include itching, pain, crusting, bleeding, pustulation and scaling of the scalp [59].

2.16 Nails

The nail is made up of a nail plate (hard keratin) which arises from the nail matrix at the posterior nail fold and rests on the nail bed [2]. The nail bed contains blood capillaries which give the pink colour to the nails. In SOC, along with the palms, soles of the feet and mucosal surfaces, the nail beds are usually lighter in tone than the rest of the skin. Even so, care should be taken when assessing signs like peripheral cyanosis or using a pulse oximeter which has not been properly calibrated for different skin tones.

Pathology of the nails may involve:

- Abnormalities of the nail matrix e.g. pits and ridges.
- Abnormalities of the nail bed e.g. splinter haemorrhage.
- Abnormalities of the nail plate e.g. discoloured nails, thickening of nails.

2.16.1 Sebaceous Glands

Sebaceous glands produce sebum via hair follicles (a pilosebaceous unit) [2]. This is then secreted onto the skin surface to lubricate and waterproof the skin. Sebaceous glands are stimulated by the conversion of androgens to dihydrotestosterone and become active at puberty. Pathology may develop from increased sebum and bacterial colonisation e.g. acne and sebaceous gland hyperplasia.

2.16.2 Sweats Glands

The sweat glands regulate body temperature [2]. Nerve supply is via the sympathetic system. Functionally, they divide into eccrine and apocrine sweat glands. Eccrine sweat glands are distributed throughout the skin. Apocrine glands are found in the axillae, areolae, genitalia and anus. Modified apocrine glands are found in the external auditory canal. They function only from puberty onwards and the action of bacteria on the sweat produces body odour.

Pathologies of sweat glands include inflammation or infection of apocrine glands e.g. hidradenitis suppurativa and overactivity of eccrine glands e.g. hyperhidrosis.

2.17 Wounds

The appearance of wounds similarly can differ across skin tones. Table 2.7 summarises key points in an inclusive assessment [42].

Table 2.7 Assessment of wound types across skin tones.

Wound type	Possible presentations
Pressure ulcer	• Change of skin colour may present as redness, darkening, lightening or grey/blue/purple tone • The skin may feel tight, spongy or look shiny • Check for a change in temperature relative to other areas • Pain or numbness in the affected area
Leg ulcer	• Change in colour – red/purple or blue tones • Check for warmth and swelling • Check for skin tightness and shininess • Look for evidence of itching – scratch marks • In venous disease – feel for hardening of the skin due to lipodermatosclerosis and haemosiderin staining
Diabetic foot ulcer	• Change in colour – red/purple or blue tones • Pain and swelling – check pulses • Tight and shiny skin • Signs of scratching due to itch • Assess temperature change and compare with the opposite side • Diagnostic pitfall with darker tones – eschar or necrosis
Skin tear	• Monitor for skin fragility and changes predisposing to tears • Darker skin tones may be drier – ensure moisturising is advised or applied
Moisture-associated skin damage (MASD)	• Change in skin colour – redness, darkening, lightening or blue/purple tones • Inspect the skin regularly to prevent maceration
Medical adhesive-related skin injury (MARS)	• Do not just look for redness but all possible colour changes • Be vigilant

Source: Adapted from Wounds UK [42].

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3

Respiratory

KEY POINTS

- The respiratory system is divided into upper (ear, nose and throat) and lower (airways and lungs) tracts
- Respiratory symptoms are common in the community
- Hearing impairment is a major cause of disability worldwide
- Infections are the commonest cause of respiratory tract pathology
- Rates for respiratory conditions are higher in minoritised groups
- The social determinants of health impact respiratory symptoms and diseases

3.1 Ear, Nose and Throat

The upper respiratory tract includes the nose, nasal cavity, paranasal sinuses, pharynx and the larynx above the vocal cords. These areas are in communication with the pharynx via the eustachian tubes. Functionally and in terms of the management of pathology, the system is referred to as ear, nose and throat (ENT).

3.1.1 Burden of Ear, Nose and Throat Disease

Upper respiratory tract disorders are common. The majority are infections. Prior to Covid-19, the global incidence in 2019 of upper respiratory infections was 17.2 billion (95% uncertainty interval: 15.4–19.3 billion) [1]. Between 1990 and 2019 the age-standardised incidence has remained stable. Mortality and the disability adjusted life year (DALY) rate have decreased. Males are affected more than females. Children under 5 years have the highest incidence and DALYs. Mortality occurs mostly in the elderly and children under 5 years [1]. Low-socio-demographic index (SDI) countries have the highest mortality rates for chronic respiratory disease while high-HDI countries have the highest prevalence [2]. Smoking, air pollution, occupation, non-optimal temperature and body-mass index are the main risk factors [2]. Covid-19 suppressed other forms of respiratory infection such as rhinoviruses though these have been increasing again subsequently [3].

The commonest symptoms of upper respiratory symptoms are cough, sore throat, nasal obstruction and headache [4]. Though usually self-limiting, these infections can predispose to complications including pneumonia, otitis media, glomerulonephritis and myocarditis [5]. Causes of infection are usually viruses including rhinovirus, coronavirus and respiratory syncytial virus. Secondary bacterial colonisation may also occur.

Hearing impairment is a leading contributor to disability worldwide. Globally, 5% (360 million) people live with disabling hearing loss [6]. Otitis media is the commonest cause of hearing impairment in children [7] (see Chapter 12).

3.1.2 Anatomy

The respiratory tract is usually considered as upper and lower parts. The upper respiratory tract extends from the nostril openings to the larynx. It consists of three parts – the nose, pharynx and larynx (Figure 3.1).

The nasal openings (anterior nares) are the narrowest part of the respiratory tract and account for 40–50% of total respiratory resistance [8]. During exercise, muscles of the nares and nasal vasoconstriction reduce nasal resistance allowing greater ventilation (up to 30/min before mouth breathing becomes necessary [8]. The nose filters incoming air, removing large particles, as well as warming and moistening the air [8]. Smell enables avoidance of potentially noxious substances [8]. The turbinate bones enable this by presenting a large surface area covered with mucous to which adhere large particles [8]. This is gradually moved back to the pharynx to be swallowed.

3.1.3 Symptoms

Upper respiratory symptoms are considered usually in relation to the ENT (Table 3.1). Symptoms may occur either in the ear, nose or throat or in all parts of the tract.

3.1.4 Sore Throat

No single symptom or sign is diagnostic of the cause of a sore throat. A combination of symptoms and signs is most accurate. Most infections are viral but streptococcal infections should always be considered in the differential diagnosis. The risk of progression is low (1%), though antibiotics are prescribed for 60–70% of patients [10]. Antibiotics are prescribed inappropriately for sore throats more often than any other condition [11].

Associated symptoms may include headache, nausea, vomiting and abdominal pain in children with pharyngitis and all patients with tonsillitis. Enquiry should include asking about fever, (a temperature of $>38^{\circ}\text{C}$ is common in tonsillitis), runny nose (rhinorrhoea), blocked nose, cough (usually present in viral pharyngitis) and dehydration – in babies and children ask about number of wet nappies [12].

Several guidelines exist for sore throat including clinical prediction rules. These assist in both diagnosis and prescription of antibiotics (Table 3.2). NICE UK recommends use of either the Centor or FeverPAIN criteria [12]. The Centor criteria are best used in a high-prevalence setting. Their utility in children aged 2–4 years needs further research [14].

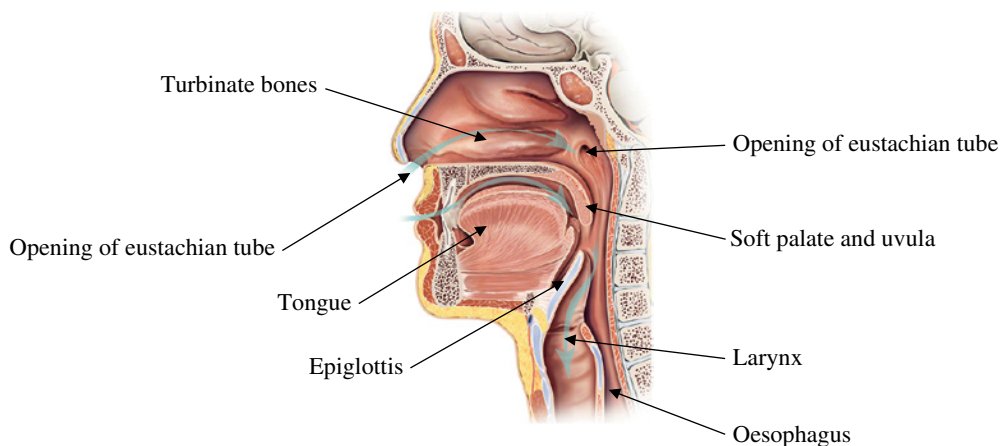


Figure 3.1 Anatomy of the upper respiratory tract. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence (Image may be resized as necessary).

Table 3.1 Symptoms of the upper respiratory tract [9].

	Symptom	Medical definition
Ear	Pain	Otalgia
	Itching	Pruritis
	Discharge	Otorrhoea – may be purulent, mucoid or bloodstained
	Deafness	
	Noise in the ears	Tinnitus – no external source of noise is present
	Vertigo	A sensation of rotation
	Dizziness	A sensation of being ‘light-headed’ or unsteady
Nose	Blocked up nose	Nasal obstruction
	Discharge	
	Nosebleed	Epistaxis
	Sneezing (cough)	when due to postnasal drip
	Change in shape	Trauma
	Pain	
Throat	Soreness	
	Stridor	
	Ulcers	
	Hoarseness	

Table 3.2 Comparison of the Centor criteria and FeverPAIN clinical prediction scores.

Centor criteria	FeverPAIN criteria
Tonsillar exudate	Fever during previous 24 h
Tender anterior cervical lymphadenopathy	Purulence (pharyngeal/tonsillar exudate)
Fever greater great than 38 °C	Attend rapidly (within 3 d after onset of symptoms)
Absence of cough	Severely inflamed tonsils
	No cough or coryza
Each item scores 1 point with maximum score of 4	Each item scores 1 point with maximum score of 5
A score of 3 or more has a sensitivity of 49%, a specificity of 82%, a positive LR of 2.68 and negative LR of 0.62 for streptococcal pharyngitis. A score of 4 has specificity of 95% (LR+ 3.85 and LR– 0.86)	A FeverPAIN score of 4 or more has low sensitivity (3.7%) but specificity of 98.1%

Source: Adapted from Seeley et al. [13].

3.1.5 Patient Experience

‘I felt slightly ‘off it’ at first and fluey before my throat began to feel dry. Gradually, it felt more uncomfortable, and my ears began to feel blocked. Throat sweets didn’t help. I ended up taking some paracetamol and going to bed with a hot water bottle. When I woke up this morning, it was agony. Every time I swallow it’s really painful and dry. I feel flushed and hot though my temperature is not particularly high...37 and a half I think. I tried looking at my tonsils, they looked red, but I could see any spots. It’s been too painful to eat anything’.

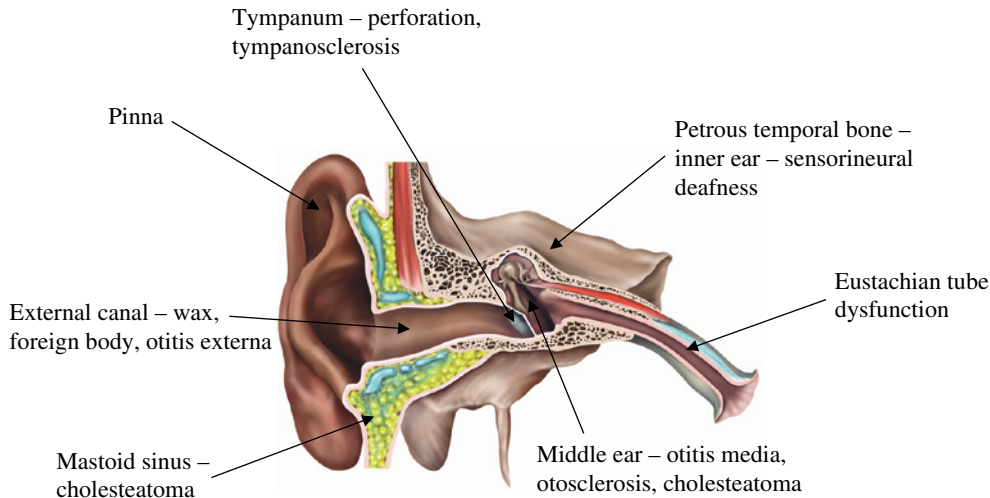


Figure 3.2 Sites and main causes of hearing loss. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence (Image may be resized as necessary).

3.1.6 Hearing Impairment and Ear Disease

Hearing loss may be permanent or transient. It results from disease affecting the middle ear, inner ear, or both (Figure 3.2). Even a mild or unilateral hearing loss may result in significant disability. It is associated with other health conditions, social isolation and increased cognitive load. Mobility may be affected resulting in risk of falls [15]. Ear wax impaction is a common and reversible cause and should be excluded first. Hearing loss is usually conductive. It may be present with sensorineural deafness as a mixed presentation [16].

The WHO defines hearing impairment in the better ear as mild (26–40 dB hearing loss [HL]), moderate 41–60 dB HL), severe (61–80 dB HL), profound (81 dB HL or greater) [17]. Hearing levels of 35 dB HL in children and 40 dB HL for adults in the better ear are regarded as disabling [18]. The main causes of hearing loss are indicated in Figure 3.3 [18].

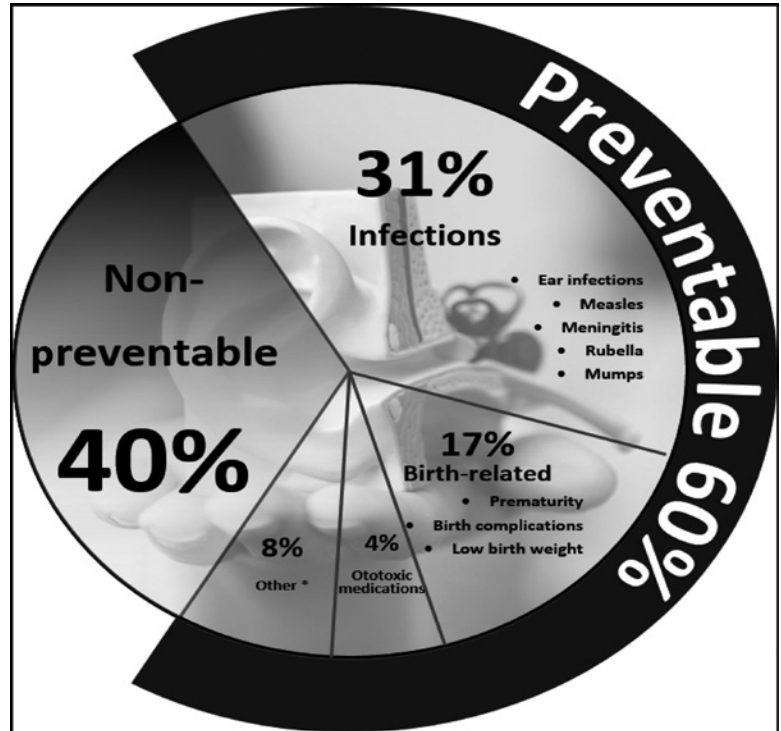
3.1.7 Presbycusis

This is progressive and irreversible age-related hearing loss. It is usually bilateral, symmetrical and affects high frequencies [19]. Patients have trouble hearing speech particularly when there is background noise (e.g. social situations). The patient's quality of life may be affected. There is a higher incidence of presbycusis in men than women. Hearing impairment affects around 50% of people aged over 49 years increasing to around 63% in the 60–69 years age group [20, 21]. Presbycusis is commoner in low and middle-income countries possibly due to reduced access to services [18]. Smoking cessation, and control of hypertension and diabetes delay onset of presbycusis [21].

3.1.8 Patient Experience

'My hearing loss has come on gradually. I used to go lots of gigs when I was young, and always had the music up loud to get the full effect. My family used to joke that I could hear if I wanted to. Now it's quite difficult in some situations. I tend to have the TV up quite loud, and my family come in and ask me to switch it down. The main problem is when I'm out at the pub or in a meeting. If there's a lot of background noises I really struggle to make out what's being said. I almost have to try and lip-read the person speaking. I think it's both ears because when I turn my good ear towards someone it seems to be bad on both sides'.

Figure 3.3 Main causes of hearing loss.
 Source: Graydon et al. [18]/with permission of Cambridge University Press.



History tips:

Consider lifetime exposure to noise, exposure to ototoxic drugs, smoking, diabetes and cardiovascular disease.

3.1.9 Noise-induced Hearing Loss

Exposure to excessive noise causes fatigue of cochlear hair cells with temporary shift of hearing threshold and tinnitus [18]. Prolonged exposure leads to irreversible cochlear damage and sensorineural deafness [22]. Noise-induced hearing loss is highest in factory workers particularly in low- and middle-income countries [23].

History tips:

Consider noise trauma, nutrition and diet (deficiencies of magnesium and B12), pre-existing sensorineural loss, medication, exposure to solvents, age, diabetes and hypertension.

3.1.10 Ototoxicity

Use of medications or exposure to other agents may result in hearing impairment and/or vestibular disturbance [24]. Ototoxicity is usually permanent because of damage to outer hair cells. Recognised causes include platinum-based chemotherapies, aminoglycoside antibiotics salicylates and anti-malarial drugs, loop diuretics, industrial solvents and nitriles [18]. Ototoxic hearing loss is more prevalent in people with pre-existing hearing loss, renal conditions or a genetic predisposition [18].

3.1.11 Tinnitus

Tinnitus is the perception of sound despite the absence of a sound stimulus outside of the patient [25]. Patients may perceive internal sounds such as a carotid bruit or movement of bone. Tinnitus is more likely to present in older people. Sensorineural deafness caused by presbycusis or noise exposure is the commonest association with

tinnitus [26]. It may also be caused by impacted wax, otosclerosis and middle ear effusion. Other causes include Meniere's disease, acoustic neuroma (vestibular schwannoma), cholesteatoma, ototoxic medication, temporomandibular joint dysfunction, multiple sclerosis, idiopathic cranial hypertension, vestibular migraine and infection.

Meniere's disease is also associated with vertigo, intermittent hearing loss and sensation of eustachian tube blockage. Asymmetric hearing loss with tinnitus, with or without vertigo should raise suspicion of acoustic neuroma though only 1% of patients will prove to have the condition [27]. Key points to consider in the history include whether unilateral or bilateral, if there is a hearing change, vertigo, headache, infection, head and neck changes including trauma, ototoxic medication and onset – gradual or abrupt [25].

3.1.12 Snoring

Prevalence of snoring is highest between 45 and 54 years of old though it is common at younger ages (20–26% of adults) [28]. There are possible negative effects on the cardiovascular system though this is not well established [28]. Validated measures including the Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) are useful for selecting patients for further investigation [29, 30].

3.1.12.1 Key Points in the History

These include increase in weight or collar size, alcohol intake, sedating medication before sleep and effect of sleeping position [31]. A history of nasal obstruction or polyps or symptoms of hypothyroidism is important. Ask for a bedpartner or witness history: does the patient appear to stop breathing, wake with choking or have excessive daytime sleeping? Is sleep non-refreshing? Ask about nocturia, morning headaches and poor concentration.

3.1.13 Red Flags

Upper respiratory tract disease is usually self-limiting, benign and requires only symptomatic measures. Particularly when they persist beyond the normal natural history of the condition, the following symptoms should alert you to the possibility of more serious causes (Table 3.3).

Table 3.3 'Red flag' symptoms for the upper respiratory tract [9].

	Symptoms	Consider as a possible cause
Ear	Pain	Cancer is a rare cause
	Discharge	In the absence of pain, consider cancer or cholesteatoma
	Vertigo	Inner ear disease
	Unsteadiness	Vestibular or central nervous system disease
	Lesions on the pinna	Cancer
Nose	Deformity	Trauma, cocaine use, Wegener's granulomatosis, syphilis
	Nasal/facial pain	Trigeminal neuralgia
	Discharge	Cancer
Throat	Painless mass	Cancer
	Hoarseness	Cancer
	Ulceration	Crohn's disease, lichen planus, cancer
	Oral thrush	Immunodeficiency

Any upper respiratory tract symptom presenting with lymphadenopathy in the neck, progressive difficulty in swallowing (dysphagia), pain in swallowing (odynophagia), hoarseness or other change in speech and/or weight loss also merits serious consideration of an underlying cause.

3.2 Lower Respiratory Tract

The lower respiratory tract extends from the vocal cords to the alveoli and includes the trachea, main bronchi and progressively smaller airways created through 23 divisions leading to the alveoli in which gaseous exchange (oxygen and carbon dioxide) takes place between the inhaled air and the blood. Also involved in respiratory function are the diaphragm, ribs and intercostal muscles and the accessory muscles of respiration in the neck. Together these muscles ensure the ventilation of the alveoli is sufficient to the necessary level of oxygenated air to meet metabolic demand.

3.2.1 Burden of Lower Respiratory Tract Disease

Five conditions contribute significantly to the global burden of respiratory disease (asthma, chronic obstructive pulmonary disease (COPD), acute respiratory infection, tuberculosis and lung cancer) [32]. Four million people die prematurely from chronic respiratory diseases each year [33]. Respiratory infections are the leading cause of death in developing countries. In 2019, 454.56 million people (95% uncertainty interval: 417.35–499.14) globally had a chronic respiratory disease, a 40% increase since 1990 [34]. COPD is the main driver of DALYs for respiratory disease worldwide [34]. Smoking remains a leading risk factor though it is declining [34]. Air pollution is a growing risk factor, particularly in low-SDI countries [34]. Though mortality rates for lower respiratory infections are declining, infants and young children remain susceptible. Around three million children die annually of pneumonia or other lower respiratory infections [35]. Millions die due to lack of access to immunisation, health care and treatment [36].

3.2.2 Ethnicity

In the United Kingdom, preliminary 2021 Census data reported higher mortality rates for White British from COPD than for other ethnic groups [37]. The Bangladeshi and Pakistani groups had the highest age-standardised mortality rates (ASMRs) for asthma, pneumonia and Covid-19 [37]. Differences exist also between male and females within ethnic groups. For example, Bangladeshi males have the highest ASMRs for COPD and lung cancer but this is not so for females [37].

In the United States, African American women are 20% more likely to have asthma than non-Hispanic whites [38]. African Americans are almost three times more likely to die from asthma-related causes than white people [38]. Black children are four times more likely to be admitted to hospital for asthma and have a 10-fold higher death rate from asthma compared to non-Hispanic white children [38]. Data is limited but Asian Americans appear to have lower rates for asthma than the white population.

3.2.3 Lesbian, Gay, Non-Binary, Transgender, Queer+ (LGBTQ+)

Many studies report a difference between rates of asthma in lesbian, gay, non-binary, transgender (LGBT) and heterosexual respondents [39]. After controlling for other associated variables including younger age, lower income and being overweight, a correlation remains. Rates differ more for women than for men (Table 3.4) [39].

Table 3.4 Comparison of rates of asthma in LGBT and heterosexual respondents to a national survey in the United States.

Asthma	Same-sex partner men (%)	Opposite-sex partner men (%)	Same-sex partner female (%)	Opposite-sex partner female (%)
Lifetime	16.6	11.4	26.1	14.6
Current	12.3	5.9	21.4	9.5

Source: Adapted from Blosnich et al. [39].

3.2.4 Social Determinants

Children exposed to tobacco smoke have higher rates of lower respiratory infection while children living at or below the poverty line are likely to have higher levels of cotinine, a breakdown product of nicotine [38]. In the United Kingdom, the largest differences in mortality by deprivation occur for COPD, lung cancer and asthma [37].

3.3 Anatomy and Physiology of the Lower Respiratory Tract

The lower respiratory tract consists of the airways and the lungs. The airways convey air to the lungs (ventilation). Gas exchange occurs in the alveoli of the lungs. The trachea is a ciliated pseudostratified columnar epithelium-lined tube which bifurcates at the level of the sternal angle of Louis (usually T4-5) into two main bronchi, one for each lung. Further division generates the lobar bronchi, two on the left and three on the right, for each lobe. Segmental bronchi then supply the individual bronchopulmonary segments in each lung (Figure 3.4a,b).

Below this are the bronchioles which lack cartilaginous skeletons [40]. The terminal bronchioles are the last division of the airways without surface area for gas exchange. These lead into the alveolar sacs which connect to the alveolar clusters. Together with capillaries, the clusters form the air-blood barrier.

The airways must contribute to homeostasis by maintaining the temperature and moisture of the airways. Mucosa-associated lymphoid tissue (MALT) in the airways together with macrophages provides an early barrier to pathogens [40].

The lower airways form a bronchial tree of 23 generations [40]. The number of airways increases much faster than the decrease in their diameter. Total cross-sectional area increases very rapidly. By the time, it enters the lungs the air has slowed down to almost a stop. The lungs contain the alveoli in which gas exchange occurs. There are three lobes in the right lung and two in the left (Figure 3.4b).

3.4 Symptoms

The symptoms of lower respiratory tract disease are:

Cough – a protective reflex occurring when sensory receptors are stimulated by inhaled, aspirated or endogenous substances. It is a forced expulsion of air against a closed glottis.

Sputum – an increase in the volume of mucous produced in the airways such that the patient must expectorate it to clear from the respiratory tract.

Breathlessness – awareness of breathing in the sense the breathing is different or inadequate.

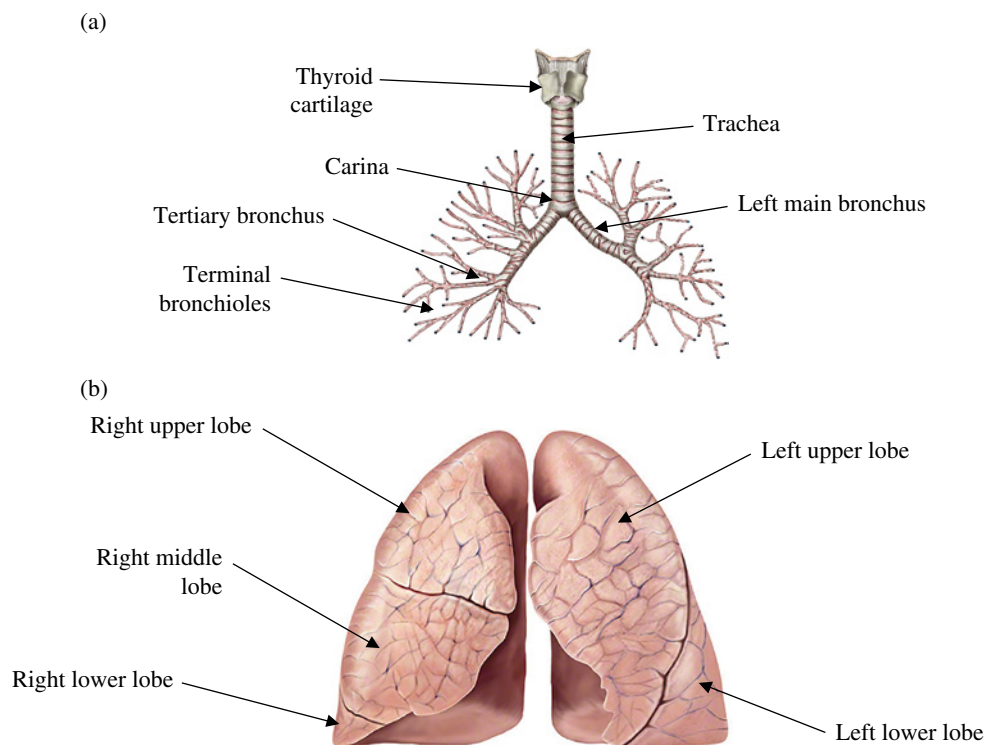


Figure 3.4 (a) and (b) Anatomy of the lower respiratory tract. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence (Image may be resized as necessary).

Wheeze – a high- or low-pitched ‘whistling’ sound which occurs when air flows through narrowed airways. It occurs most commonly in expiration but can occur also in inspiration. It may be a single note (monophonic) or multiple notes (polyphonic wheeze).

(Chest) pain – pain arising from any structures within the thorax including the walls and between the neck and upper abdomen.

Haemoptysis – the expectoration of blood resulting from haemorrhage into the lower respiratory tract. It is an important sign of underlying disease.

3.5 Cough

Coughing is a protective reflex which clears airways of mucus and irritants. It occurs when sensory nerve receptors are stimulated by inhaled aspirated or endogenous substances. Most coughs clear up within 3 weeks and do not require any treatment. A dry cough does not produce any sputum.

3.5.1 Anatomy and Physiology

Coughing occurs due to irritation at nerve receptors in the trachea, carina and branching points of large airways, and in distal smaller airways. These are also present in the pharynx. Cough receptors are present also in the oesophagus, diaphragm and stomach. Coughing represents forced expulsion of air against an initially closed glottis (Figure 3.5).

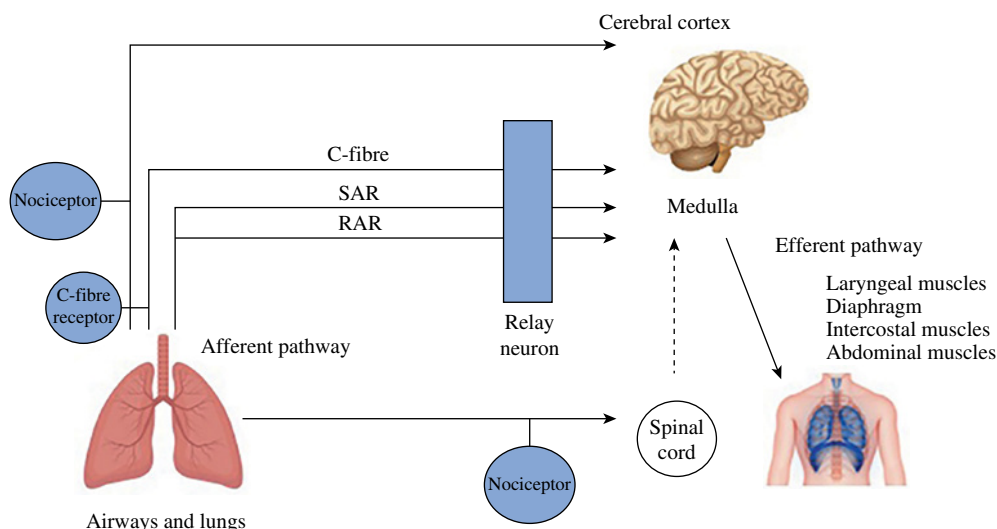


Figure 3.5 The cough reflexes. *Source:* Mann et al. [41]/Frontiers Media/CC BY - 4.0. Copyright © 2021 Mann, Goh, Holland and Khor. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

3.5.2 The Patient Experience

'I've had coughs before. I had a scare 10-15 years ago when I had a cough which wouldn't go away, and the doctor sent me for an x-ray. So many sleepless nights waiting for the result,.... I just gave up smoking then and there. Not touched one since. I have coughs and colds. The cough is always the last thing to go....this one started when I had covid at the beginning of last year. Such a sore throat, and it went on my chest. The cough has been terrible....dry, comes on when I'm doing something...worse in the cold. Sometimes I cough so much I think I going to be sick. I know it really irritates people around me. It gets worse at night and stops me and my partner sleeping. The inhaler they gave me hasn't helped'.

Severe cough can impair patient quality of life. It is linked to depression, urinary incontinence, syncope, social embarrassment and sleep disturbance [42, 43].

3.5.3 Evidence Base

There is a natural background of coughing. The prevalence and incidence of cough are high and show regional variation [44]. Almost everyone will experience a cough during their lifetime. In Europe and the USA, the community prevalence of cough is between 9% and 33% [45]. This figure is higher than the number presenting to primary care and suggests many coughs are self-limiting without the need to see a doctor and/or can be managed symptomatically. Prevalence and incidence vary regionally with rates of 3.8–4.2% and 12.5% in Western primary care and higher prevalences (10.3–13.8%) and lower incidences (6.3–6.5%) in Asia, Africa and South America [44]. Findings from studies in Zimbabwe with a human immunodeficiency virus (HIV) prevalence of 83% and Malaysia showed high prevalences of tuberculosis (6.0–43.0% and pneumonia (2.8–16.0%) [46, 47].

Most cough is due to self-limiting viral or bacterial upper respiratory tract infection. Definitions of cough are acute less than 3 weeks, subacute 3–8 weeks and chronic more than 8 weeks [48]. Allergy is associated with acute and subacute cough, asthma and chronic rhinitis with subacute cough and oesophageal reflux and advanced age

Table 3.5 Causes of acute cough and causes of cough of all durations.

Cause	Acute (%)	Cough of all durations (%)
Respiratory tract infections	73	91.9
Influenza	6	15.2
Asthma	3.2	15
Laryngitis/tracheitis	3.6	9
Pneumonia	4.0	4.2
COPD	0.5	3.3
Heart failure	0.3	—
Suspected malignancy	0.2	1.8

Source: Adapted from Bergmann et al. [44].

with chronic cough [48]. Chronic cough with sputum production is likely due to intrapulmonary disease such as chronic bronchitis or bronchiectasis. Abnormal sensitisation of sensory nerve endings by local inflammation may produce chronic cough. A minimally productive cough may be due to extra-pulmonary factors (e.g. angiotensin-converting enzyme (ACE) inhibitor, anxiety).

A prediction rule has been developed for risk of poor outcomes from cough on the basis of interference with daily activities, number of years stopped smoking, severity of sputum, presence of lung crackles and diastolic blood pressure greater than or less than 85 mmHg [49]. However, it achieves only moderate sensitivity (62%) and specificity (59%); area under the curve (AUC) = 0.63 [49]. Duration of cough is a strong diagnostic tool to distinguish between benign courses and more serious causes. Most acute coughs are benign with a self-limiting course. Eight percent of these patients show improvement within 3 days and 79% complete recovery within 4 weeks [44]. This supports a ‘wait and see’ approach. There is substantial variation of causes with serious diseases, malignancy and pneumonia, accounting for less than 5% (Table 3.5) [44].

The median time for recovery is 9–11 days. Complete recovery occurs in 40.2–67% in two weeks; 79% after 4 weeks. One in five patients’ re-attends of whom 1% will need hospital admission [44]. A telephone study in Italy reported 23% of patients used home remedies, 21% would consult a pharmacist and only 33% consult a doctor [50]. When doctors are consulted, it will usually be the General Practitioner (GP) (69.6–73.7%) [50]. In developing countries with higher rates of uninsured people and fewer providers, there are fewer consultations for self-limiting acute respiratory cough. Environmental factors such as cooking on an open fire or increased burden of HIV and tuberculosis may increase the prevalence of chronic cough [44].

3.6 Breathlessness

A sensation of uncomfortable breathing or awareness of breathing in the sense the breathing is different or inadequate for the demands being placed on the respiratory system by the patient’s activity.

3.6.1 Anatomical Site

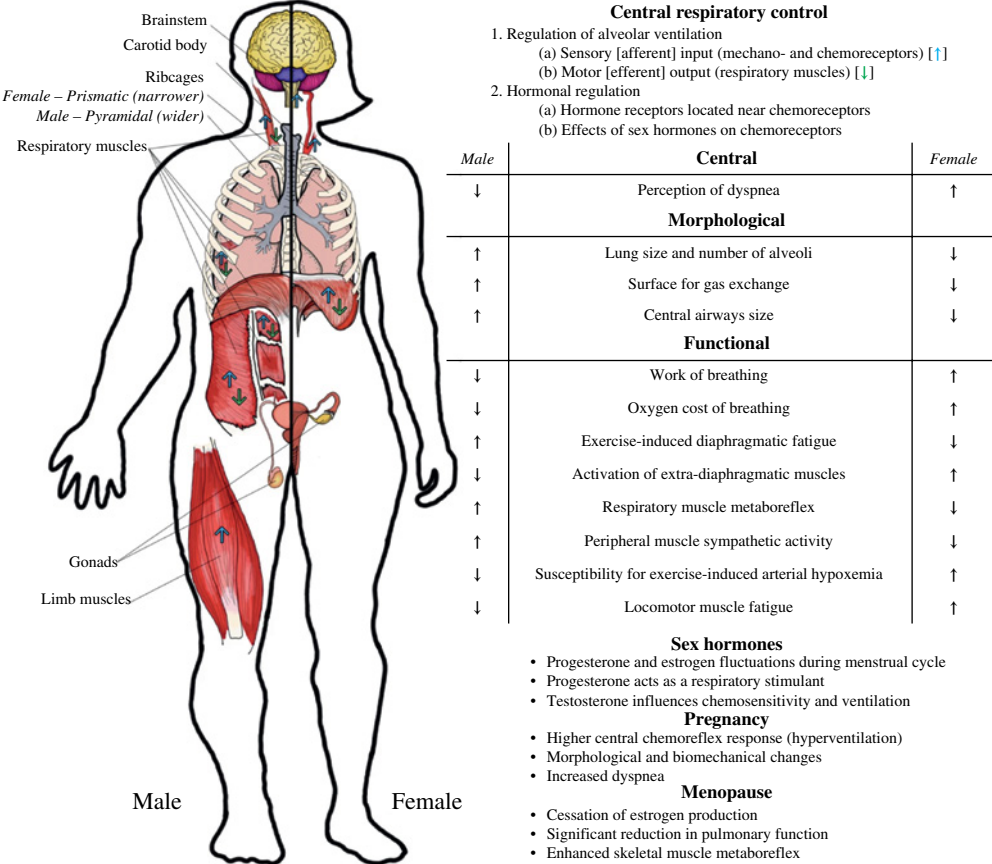
Breathlessness commonly indicates cardiac or respiratory disease or both (see also Chapter 4). Adequate breathing requires a functioning central nervous system control of breathing, a patent airway, adequate ventilation of the lungs and sufficient area for gas exchange in the alveoli to meet the patient’s level of demand.

3.6.2 Pathophysiology

Although there are identical mechanisms for breathing, there are nonetheless differences across the genders in terms of average response to exercise and exertion. This has an impact on disease states and includes (Figure 3.6) [51]:

- Average lung and large airway capacity – differences between genders in capacity may affect how dyspnoea is experienced
- Ribcage geometry
- Mechanics of breathing – respiratory muscles, mechanical work of breathing, oxygen cost of breathing
- Fatigue – central fatigue, diaphragmatic fatigue
- Physiological response to exercise – cardiopulmonary response, exercise-induced arterial hypoxaemia, neuro-vascular interactions, neuromechanical interactions, hormonal influence
- Other – pregnancy, menopause

From: An integrative approach to the pulmonary physiology of exercise: when does biological sex matter?



Schematic depicting multiple structures contributing to the control of breathing and the differences between healthy adult males and females. Details in text

Figure 3.6 Differences in the control of breathing between healthy adult males and females. *Source:* Archiza et al. [51]/ with permission of Springer Nature.

The pathophysiology of dyspnoea is complex and involves the activation of several pathways that lead to increased work of breathing, stimulation of the receptors of the upper or lower airway, lung parenchyma or chest wall and excessive stimulation of the respiratory centre by central and peripheral chemoreceptors [52]. Breathlessness is a symptom of a wide spectrum of diseases from self-limiting (e.g. common cold) to life-threatening (e.g. pneumonia) [53].

There is a paucity of evidence of the aetiology, prevalence and prognosis of breathlessness in primary care [53].

The diseases which cause shortness of breath do so in a variety of ways. It helps to understand this as the patient's experience of respiratory causes of breathlessness can be different from cardiovascular causes. This produces different features in history which should be carefully elicited. For example, changes in the neurochemical drive to breathe, mechanical limitations on ventilation of the lungs and the individual's perception may all cause the breathlessness. In asthma, as an example, there will be increased work of breathing due to airway narrowing, gas exchange will be impaired by air trapping resulting from hyperinflation of the lungs, and there may be irritation of bronchial cough receptors and anxiety due to patient perception.

A patient's breathlessness is often graded using the Medical Research Council's (MRC) scale [54]:

- 0 = not troubled by breathlessness except on strenuous exercise
- 1 = short of breath when hurrying on the level or walking up a slight hill
- 2 = walks slower than most people on the level, stops after a mile or so or stops after walking 15 minutes at own pace
- 3 = stops for breath after walking about 100 yards or after a few minutes on level ground
- 4 = too breathless to leave the house, or breathless when undressing.

3.6.3 Patient Experience

'The problem began with the colder weather. I'm normally quite fit and enjoy walking and exercise. During the pandemic, work was very intense, and it was exhausting so I stopped exercising. I've tried to get fit again now. There is a hill I walk up near where we live. It used to be a one puff hill (on my blue inhaler); recently though I've been using a couple of puffs most days when I've walked it'.

3.6.4 Evidence Base

Causes of breathlessness are often divided into acute and chronic. This is useful. However, even the apparently sudden onset has often been developing over the preceding few hours or days, if not weeks. There is a tendency to over-diagnose cardiovascular disease as a cause and under-diagnose respiratory causes [55]. The main causes of breathlessness presenting in primary care are acute bronchitis/bronchiolitis (27%), asthma (10%), heart failure (9%), hyperventilation (8%), upper respiratory tract infection (7%), COPD (4%), acute laryngitis (3%), pneumonia (3%), ischaemic heart disease (2%), anxiety/stress (1%), sinusitis (1%) and atrial fibrillation (1%) [55].

Prevalence of dyspnoea worldwide is around 27% [56]. A systematic review of nine studies of breathlessness in the community using the MRC scale found 40–57% of causes were respiratory [57]. Asthma was the most common condition and COPD was particularly strongly associated with breathlessness [57]. Discriminating between these causes will often depend on eliciting relevant associated symptoms:

- Asthma – cough, wheeze, diurnal variation of symptoms, allergen exposure
- Respiratory infection – cough, fever, sputum
- Heart failure – cardiovascular risk factors, evidence of fluid overload on clinical examination
- COPD – chronic sputum production, smoking.

Table 3.6 The CURB-65 mortality prediction tool for patients with community-acquired pneumonia.

The selected patient for the rule is aged 65 years over.		
A score of 1 point is given for each of the following variables:		
Confusion; Urea level of greater than 20 mg per dl (7.14 mmol per l); Respiratory rate equal or greater than 30 breaths per minute; Blood pressure less than 90 mmHg or diastolic 60 mmHg or less.		
Score	Inpatient versus outpatient	30-day mortality (%)
0 or 1	Treat as outpatient	0.7–2.1
2	Treat as inpatient	9.2
Equal to or greater than 3	Treat intensive care	15–40

The sensitivity and specificity of CURB-65 in predicting mortality were 100% and 82.3%, respectively. The sensitivity and specificity rates of CURB-65 in predicting mortality and need for ICU admission were 96.7% and 89.3% respectively.
Source: Adapted from Alavi-Moghaddam et al. [58].

The cluster of breathlessness, fever and temperature symptom should prompt calculation of the CRB-65 score to aid decision-making on admission to hospital for pneumonia (Table 3.6).

Impaired lung function and anxiety are independently related to reporting breathlessness. This suggests discomfort in breathing and anxiety related to this influences the decision to present to services [59]. Patients with type 2 diabetes are more likely to report breathlessness and chronic cough [60]. Women report more breathlessness than men [61]. A gender disparity exists in asthma prevalence with increased asthma symptoms in females following puberty [62]. Ovarian hormones increase airway inflammation in asthma while testosterone decreases it [62]. This may help anticipate changes in levels of asthma symptoms around pregnancy and the menopause.

3.7 Wheeze

A high- or low-pitched ‘whistling’ sound occurs when air flows through narrowed airways. It occurs most commonly in expiration but can occur also in inspiration. It may be a single note (monophonic) or multiple notes (polyphonic wheeze).

3.7.1 Anatomical Site

Expiratory wheeze is caused by narrowing of the bronchioles while inspiratory wheeze is more likely to signify upper airway disease. Inspiratory wheeze, in the large upper airways, may be referred to as ‘stridor’.

3.7.2 Pathophysiology

Wheezing is produced by the oscillation of the walls of an airway when it is narrowed almost to the point of closure and is transmitted through the airways. It may be heard by the patient or may be audible only on examination with a stethoscope. Although inspiratory wheeze is usually heard in the larger (greater than 2 mm diameter) airways, it may also be heard in small single airways in conditions such as asthma. Expiratory wheeze originates usually in the lower, smaller airways as these tend to narrow during expiration.

Stridor is a ‘monophonic’ sound heard mainly on inspiration though it may become expiratory during illness.

Wheezing occurs on localised or diffuse narrowing or obstruction of the airways between the larynx and the small bronchi. The airway narrowing may be caused by bronchoconstriction, mucosal oedema, external compression or partial obstruction by a tumour, foreign body or tenacious secretions.

3.7.3 The Patient Experience

'I've noticed my breathing has become noisier. I run and I'm training for a marathon so I'm out several times a week trying to build up distance. I had quite a bad chest infection in December. It left me with a tight chest, and I've struggled to get to fitness again. I'm pushing myself...I did 5k at the weekend, but I was really gasping at the end...my chest felt tight, and I could actually hear myself breathing, mainly when I was breathing out. The same thing happened when I was lying awake in bed during that recent cold snap. My partner used to have asthma and they said my breathing sounded like their asthma used to do...'

3.7.4 Evidence Base

The prevalence of wheeze among adults in Europe and Australasia is up to 17% [63]. Up to a quarter of children aged 2–3 years have wheezing [63]. A history of wheeze predicts asthma 35% of the time [64]. Wheezing should always be considered evidence of airway obstruction though it does not necessarily imply asthma. Wheeze may be found in:

Upper airway obstruction – postnasal drip, enlarged tonsils, epiglottitis, retropharyngeal abscess, malignancy, obesity.
Lower airways obstruction – asthma, COPD, pulmonary oedema, aspiration, pulmonary embolism (PE), bronchitis, cystic fibrosis, bronchiectasis.

A combination of self-reported features of COPD, wheezing and increased forced expiratory time are significantly associated with a diagnosis of COPD (likelihood ratio [LR] = 59) [65].

Wheezing is the symptomatic manifestation of any disease process that causes airway obstruction. Wheezing is commonly experienced by people who have asthma but can also be present in individuals with airway foreign bodies, congestive heart failure, airway malignancy or any lesion that causes narrowing of the airways.

3.8 Sputum

3.8.1 Definition

An increase in the volume of mucous produced in the airways which the patient must expectorate it to clear from the respiratory tract [9].

3.8.2 Anatomical Site

Mucous is produced from two sites within the respiratory tract – the goblet cells in the surface epithelium of the airways. The connective tissue layer beneath the surface epithelium contains glands which also produce mucous.

3.8.3 Pathophysiology

About two litres of mucous are produced within the respiratory tract each day. The mucous has a high-water content which helps to humidify the passing air. The mucous helps to trap dust particles, bacteria and other inhaled debris. Cilia lining the respiratory tract sweep the mucous towards the pharynx where it is

swallowed. Inflammation of the mucosal lining of the airways produces an increase in the volume of mucous produced. Sputum is associated with many lung diseases. It may also contain blood, bacteria or abnormal cells.

Smoking destroys cilia. Mucous accumulates in the bronchioles. This stimulates cough receptors and coughing results – this being the only way to remove mucous from the airways. Smoking leads to bronchiolar hypertrophy with an increase in mucous-producing cells. There is also hyperplasia of the goblet cells leading to further over-production of mucus.

3.8.4 The Patient Experience

‘I’ve coughed up phlegm virtually my whole life. I had a lot of chest infections as a child. Doctors told my mum my lungs had probably been damaged by all the bad chests and the fact we lived in a smoky, damp house. Now I start every day by sitting on the edge of the bed and clearing my chest for a few minutes. The phlegm is usually white or grey and I’m not worried about it, it’s just life. I haven’t had to go into hospital for a long time now though I did have to shield during Covid. If I’m having a flare then the phlegm goes darker, green usually. I always have some antibiotics standing by, so I know when to start them. I’m used to it’.

3.8.5 Evidence Base

It is difficult to assess the amount of sputum produced in a day, but there are many terms to describe it – mucoid, purulent, muco-purulent, frothy, viscous or bloodstained. Mucus colour also varies considerably from white or opaque to grey, orange, green and brown or, occasionally, black. Yellow, orange or green sputum is associated with bacterial infection. The more neutrophils present in sputum, the greener it becomes. However, people with asthma often have neutrophils in their sputum – the sputum may be coloured but is free from infection. Red or rusty brown sputum indicates the presence of blood. Large volumes of sputum are produced in bronchiectasis and cystic fibrosis. Chronic causes of sputum production include cystic fibrosis, asthma, bronchiectasis, COPD and eosinophilic bronchitis.

3.8.6 Key Points in the History

These include colour, presence of blood, a change from usual sputum (e.g. volume increasing), associated respiratory symptoms and being systemically unwell.

3.9 Haemoptysis

Haemoptysis is coughing up blood from the lungs (parenchymal tissue) or bronchial tubes (tracheobronchial tree) [9]. It ranges from small flecks to a lot of blood. It indicates the possibility of serious underlying disease.

3.9.1 Anatomical Site

The volume and nature of blood coughed up depends on the site and rate of bleeding. Bleeding within the lung parenchyma or a small, distal airway may produce only scanty haemoptysis while bleeding within a large, more central airway may produce a large amount of blood (Figure 3.7 and Table 3.7).

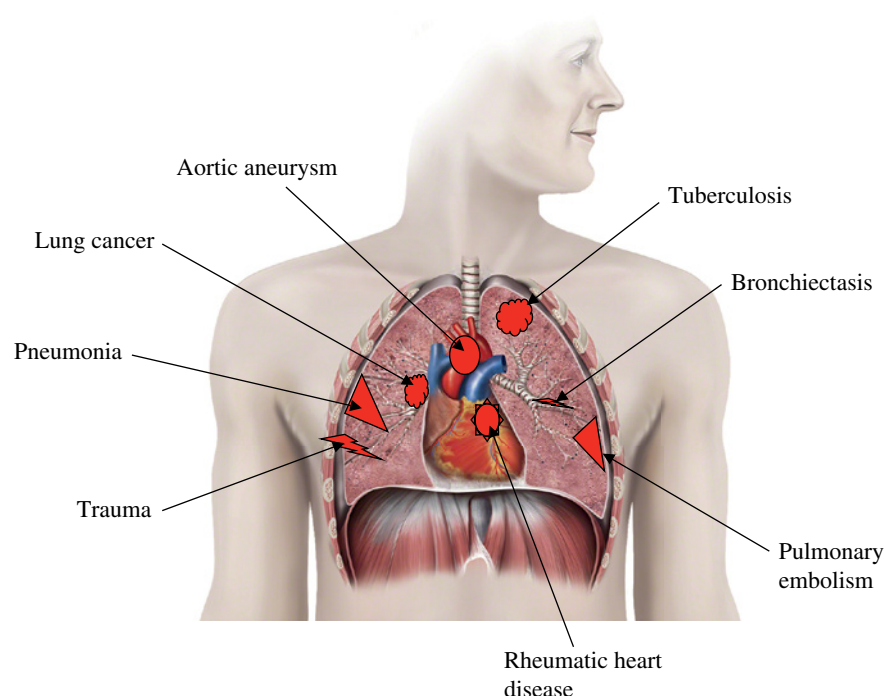


Figure 3.7 Possible sites and causes of haemoptysis. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence (Image may be resized as necessary).

3.9.2 Pathophysiology

Haemoptysis may happen following infarction and ischaemia of pulmonary parenchyma as seen in PE, vasculitis and infections. Another mechanism is vascular engorgement with erosion. This is seen in bronchitis, bronchiectasis and toxic exposure to cigarettes and other irritants. Both acute and chronic inflammation of the respiratory mucosa may result in bleeding into the lumen of an airway. Sudden, massive haemoptysis may be caused by erosion of a blood vessel by tumour or infarction due to PE. Massive haemoptysis is a volume loss of between 100 and 600ml of blood [66]. More precise definitions are loss of 200 ml over 24 hour or 50 ml per episode [67]. Massive haemoptysis occurs in 5% of patients but has a mortality of over 50% [68]. It may be seen in all healthcare settings. As well as respiratory distress, the patient may be systemically unwell with signs of shock. They may need resuscitation.

3.9.3 The Patient Experience

‘I’ve never been surprised to see blood in my phlegm. I smoke, I get chest infections, I cough up phlegm.... sometimes it has streaks of blood in it. It always goes away....it’s no big deal. This was different though. I could almost feel something coming up, not vomit....I could tell it was coming off my lungs. I coughed up into a tissue and when I looked it seemed to be just blood with some small bits in it. There wasn’t any phlegm. I don’t want to be dramatic but if someone asked me did it look like clots then I would say, yes it looked like small blood clots’.

Table 3.7 Historical features of apparent and differential diagnosis of true haemoptysis.

Upper respiratory tract

Gingivitis

Epistaxis

Pharyngitis

No history of cough or sputum

Upper gastrointestinal tract

Nausea and vomiting

Coffee grounds or frank blood

Dark stools

Malignancy

Lung cancer

Lung metastases

Bronchial adenoma

Vascular

Pulmonary embolism

Arteriovenous malformation

Infectious

Pneumonia

Bronchiectasis

Lung abscess

Tuberculosis

Auto-immune

Systemic lupus erythematosus

Diffuse alveolar haemorrhage

Goodpasture's syndrome

Wegener's granulomatosis

Others

Trauma

Anti-coagulant

Antiplatelet

3.9.4 Evidence Base

Unless there is an existing underlying cause (e.g. lung tumour, PE), it is not usually possible to locate the site of bleeding clinically. It is important to distinguish haemoptysis from blood from the upper respiratory or gastrointestinal tracts.

3.9.5 Key Points in the History

Underlying respiratory conditions, associated respiratory symptoms, volume of blood, (fresh, altered, mixed with sputum, frank), recent travel and exposure to tuberculosis.

3.10 Chest Pain

Chest pain arises from any of the structures within the thorax [9]. This includes the skin, intercostal muscles, ribs and pleural membranes. Since there are many causes of chest pain, it is important to establish the site of origin and to characterise the site of pain.

3.10.1 Anatomical Site

Respiratory system sites include the parietal pleura, major airways, diaphragm and mediastinum. Lung parenchyma and the visceral pleura are insensitive to pain stimuli.

3.10.2 Pathophysiology

Inflammatory conditions involving the lung periphery, or the diaphragm may also involve the parietal pleura or stimulate the intercostal nerves. Inflammation of the pleura covering the central diaphragm may also stimulate the phrenic nerve and cause shoulder or neck pain. Stretching of the inflamed pleura during inspiration may cause the patient to complain of pain on breathing deeply (pleuritic pain).

Occlusion of a central pulmonary artery by a pulmonary embolus distends the vessel wall causing pain. Subsequent infarction of the lung may inflame the adjacent parietal pleura producing pleuritic pain. Pulmonary hypertension may produce chronic chest pain due to an imbalance between right ventricular oxygen supply and physiological demand.

Respiratory disorder may produce musculoskeletal chest wall pain. The costochondral and chondrosternal junctions are particularly susceptible to disruption by coughing or local trauma. A Pancoast tumour at the apex of the lung may invade local C8, T1 and T2 nerve roots producing lateral chest wall and upper arm pain (medial surface).

3.10.3 The Patient Experience

‘I was running late and had to be at work. Knowing the traffic was going to be bad with schools going back, I half ran/half jumped down the stairs. I missed my footing and just flew into the post at the end of the stairs. I just felt this thud in my left side, and it’s been painful ever since. I thought I could work through it but to be honest it’s getting worse. Something changed about my breathing: I don’t seem to be able to take deep breaths, so I feel my breathing has speeded up. It’s because it hurts every time I try and take a deep breath in’.

3.10.4 Evidence Base

The most serious causes of respiratory chest pain are PE and pneumothorax (Figure 3.8). History is essential as the physical examination may often be normal in these conditions. A study of non-cardiac causes of chest pain included [69]:

• Musculoskeletal pain	45%
• Chest infection	22%
• Pneumothorax	7%
• Pleurisy without pneumonia	6%
• PE	1%
• Acute pericarditis	7%
• Carcinoma	
• Shingles (herpes zoster)	
• Lost to follow-up	12%

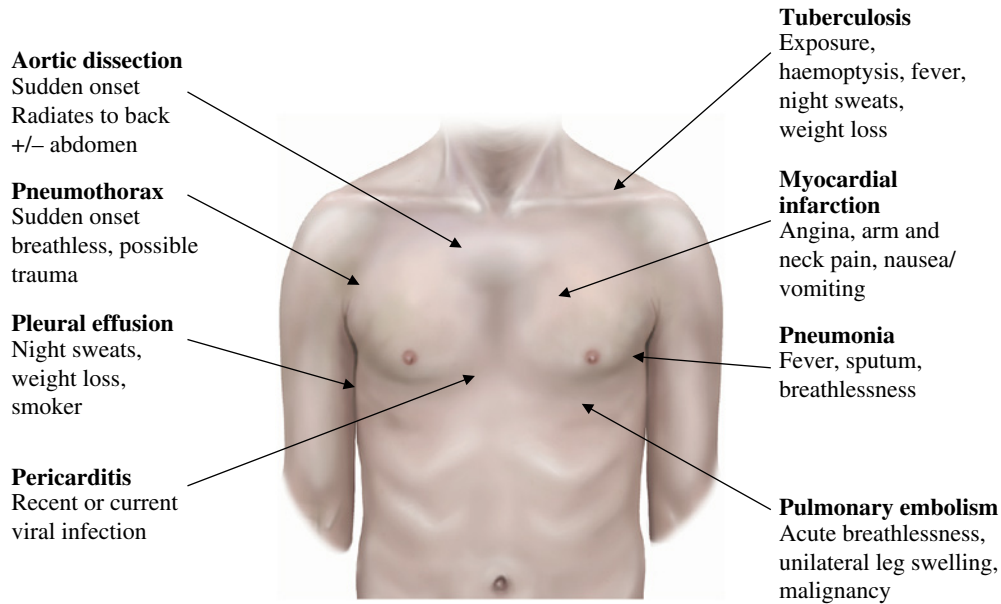


Figure 3.8 Differential diagnosis of pleuritic chest pain. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence (Image may be resized as necessary).

Table 3.8 Wells score for pulmonary embolism.

Clinical feature	Points
Clinical signs of lower extremity DVT	+3
Alternative diagnosis less likely than PE	+3
Heart rate > 100/min	+1.5
Surgery or immobilisation within 4 wk	+1.5
Previously objectively diagnosed PE or DVT	+1.5
Haemoptysis	+1
Active cancer	+1

DVT, deep venous thrombosis; PE, pulmonary embolism.

Score 0–4 PE unlikely; Greater than 4 PE likely.

Source: Van Es et al. [70]/with permission of Elsevier.

Muscular pain is worse on bending, twisting or lifting. There is usually a history of trauma or sudden onset when lifting or coughing. PE should be suspected where there are risk factors and accompanying breathlessness without clinical signs. The Wells prediction score can be used to assess risk of PE (Table 3.8) [70]. In a study of 200 in-patients at risk of deep venous thrombosis (DVT), the Wells score achieved sensitivity of 77.33% (95% confidence interval [CI] 44.9–99.21%) and specificity of 61.7% (95% CI 46.38–75.49%) [71]. Serious causes should be considered from the beginning. Associated symptoms for PE are apprehension, cough and diaphoresis. Up to 90% of patients with PE have some difficulty breathing and a raised respiratory rate.

3.11 Symptoms Clusters in Respiratory Disease

Three symptom clusters have been identified in COPD patients: respiratory-related symptom cluster (shortness of breath, weakness, drowsiness and poor mobility); psychological symptom cluster (anxiety and depression); and cough-insomnia-related symptom cluster (cough, dry mouth, poor appetite and insomnia) [72].

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4

Cardiovascular

KEY POINTS

- Cardiovascular symptoms are usually related to exertion though when severe they also present at rest.
- Patients at risk of cardiovascular disease (CVD) are identifiable from factors in their background history.
- The pathophysiology of cardiovascular symptoms relates often to impairment of the blood supply.
- Symptoms are frightening for patients and can be life-threatening.
- Cardiovascular risk is higher for ethnic groups than for the white population.

4.1 Global Burden of Cardiovascular Disease

CVD is the leading cause of morbidity and mortality globally with 17.9 million deaths in 2019, one-third of global deaths [1]. Eighty-five per cent of these deaths are from myocardial infarction and stroke. Three-quarters of deaths take place in low- or middle-income countries [2]. Most consultations for treatment and prevention of CVD take place in primary care [3].

The global ranking of cardiovascular death and disability-adjusted life year (DALYs) by cause in 2021 is shown in Table 4.1 [4].

4.1.1 Ethnicity and Cardiovascular Disease

Developed countries have seen a transition from deaths due to infections to non-communicable diseases [1]. Deaths in developed countries have fallen due to public health and primary prevention [5]. However, the risk of CVD remains higher for ethnic minorities in developed countries than for white populations [4]. Prevalences and incidences in low- and middle-income countries have also risen particularly for ethnic groups [5]. CVD mortality is rising in South Asia while declining elsewhere [6].

This is reflected in the UK population groups [6] (Table 4.2). In the US, Asians' incidence and mortality from heart disease is less than white people (Asian and non-Hispanic: white ratios 0.7 and 0.5). In 2010, African Americans were 30% more likely to die from heart disease than non-Hispanic whites [8].

4.1.2 Lesbian, Gay, Non-Binary, Transgender, Queer + (LGBTQ+)

This is not extensively studied and most studies rely on self-reported diagnoses. In 2018, most studies had not reported any significant differences. There may be a higher risk in bisexual men [9]. A study of transgender people in 2012 found no differences in rates of heart disease, though a subsequent study in 2019 reported transgender

Table 4.1 Global ranking of cardiovascular deaths by cause.

Rank	Cause of death	Number of deaths in 2021 (95% UI)	Number of DALYs (95% UI)
1	Ischemic heart disease	9 440 000 (8 820 000–9 960 000)	185 000 000 (175 000 000–196 000 000)
2	Ischemic stroke	3 870 000 (3 550 000–4 170 000)	70 200 000 (64 500 000–76 800 000)
3	Intracerebral haemorrhage	3 460 000 (3 210 000–3 750 000)	78 600 000 (73 300 000–84 600 000)
4	Hypertensive heart disease	1 410 000 (1 170 000–1 560 000)	24 900 000 (20 900 000–27 200 000)
5	Rheumatic heart disease	391 000 (340 000–454 000)	13 400 000 (11 600 000–15 400 000)
6	Atrial fibrillation and flutter	366 000 (313 000–396 000)	8 200 000 (6 830 000–9 940 000)
7	Subarachnoid haemorrhage	365 000 (329 000–411 000)	10 400 000 (9 370 000–11 800 000)
8	Other cardiomyopathy	320 000 (289 000–348 000)	8 450 000 (7 800 000–9 170 000)
9	Other cardiovascular diseases	232 000 (212 000–252 000)	10 100 000 (8 500 000–11 900 000)
10	Aortic aneurysm	160 000 (144 000–170 000)	3 040 000 (2 820 000–3 210 000)
11	Nonrheumatic calcific aortic valve disease	151 000 (127 000–164 000)	2 140 000 (1 950 000–2 370 000)
12	Endocarditis	81 100 (74 400–90 400)	2 040 000 (1 880 000–2 270 000)
13	Lower extremity peripheral arterial disease	71 200 (61 400–76 300)	1 520 000 (1 230 000–2 010 000)
14	Alcoholic cardiomyopathy	66 000 (55 600–74 200)	2 190 000 (1 850 000–2 460 000)
15	Nonrheumatic degenerative mitral valve disease	38 600 (33 900–43 100)	924 000 (827 000–1 070 000)
16	Myocarditis	33 600 (27 100–38 000)	962 000 (810 000–1 090 000)
17	Pulmonary arterial hypertension	23 300 (20 000–26 000)	640 000 (565 000–726 000)
18	Other nonrheumatic valve diseases	2 120 (1 580–2 690)	51 500 (37 100–66 200)

DALY, disability-adjusted life year; UI, uncertainty interval.

Source: Vaduganathan et al. [4]/with permission of Elsevier.

Table 4.2 Patterns of cardiovascular risk and disease in UK South Asian and Black populations.

South Asian

Higher clustering of risk factors for heart disease, diabetes, and stroke

Body mass index (BMI) is lower than other groups, but rates of excess abdominal fat and insulin resistance are higher

Prevalence of smoking is lower than other groups

Low physical activity rates especially among women

Black

Lower risk of heart disease compared to majority population

High prevalence of hypertension and diabetes

Lower cholesterol levels in African Caribbean heritage

Heart disease rates are low in sub-Saharan Africa and Caribbean

Higher incidence and mortality from hypertension and stroke

Higher obesity levels

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Source: Veena [7]/with permission of The King's Fund.

men to have a two to four fold increase in myocardial infarction compared with cisgender men (odd ratio [OR] = 2.53; confidence interval [CI], 1.14–5.63; $p = 0.02$) and cisgender women (OR = 4.90; 95% CI, 2.21–10.90; $p < 0.01$) [10, 11]. Transgender women had more than twice the rate of myocardial infarction compared with cisgender women (OR = 2.56; 95% CI, 1.78–3.68; $p < 0.01$) [11]. Gay and bisexual young men may have slightly higher diastolic blood pressures and faster pulse rates than heterosexual men with a further study showing doubling of the rate of hypertension in Gay men [12, 13].

4.2 Key Symptoms of Cardiovascular Disease

- Pain – due to impairment of blood supply to the organ or tissue with the result that the supply of oxygenated blood does not meet metabolic demand, particularly on exertion.
- Breathlessness – an uncomfortable awareness or discomfort in breathing due to breathing being insufficient for the patient's cardiovascular activity.
- Palpitations – an abnormal awareness of the heartbeat. It can describe missed beats, irregular beats, forceful beats and a slow or fast heart rate.
- Swelling (oedema) – enlargement particularly of dependent parts of the body secondary to fluid retention.
- Syncope – a loss of consciousness for a short time.

4.3 Prevalence of Symptoms

Chest pain has a lifetime prevalence of 20–40% in the general population [14]. Depending on study inclusion criteria, the prevalence in primary care is 0.68–2.7% [15]. Most chest pain presenting in primary care is non-cardiac (e.g. musculoskeletal, oesophageal, functional) with 8.0–14.6% being coronary heart disease [15]. A systematic review of 11 studies in 6500 patients identified the following causes of chest pain in primary care [16]:

- Chest wall syndrome: 24.5–49.8%
- CVD: 13.8–16.1%
- Stable coronary heart disease: 6.6–11.2%
- Acute coronary syndrome (ACS)/myocardial infarction: 1.5–3.6%
- Respiratory disease: 10.3–18.2%
- Psychogenic aetiology: 9.5–18.2%
- Gastrointestinal disorders: 5.6–9.7%
- Oesophageal disorders: 6.0–7.1%

4.4 Assessment of Cardiovascular Risk

Cardiovascular risk describes a person's likelihood of developing a cardiovascular condition, most often coronary (ischaemic) heart disease or cerebrovascular disease. Likelihood of CVD is increased by risk factors. Presence of risk factors may prompt investigation even when history of pain is not clear-cut.

In the Interheart study, abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, low consumption of fruits and vegetables, increased alcohol, and regular physical activity accounted for most of the risk of first myocardial infarction (90% in men; 94% in women) [17]. This data applied to all ages and in all regions of the world, to all ethnicities and to males and females. All these risk factors

are modifiable. Many cases of premature CVD are preventable. Table 4.3 shows the ORs for modifiable risk factors from the Interheart study [17]. The global ranking of CVD due to modifiable risk factors is shown in Table 4.4 [4].

4.4.1 Age and Pre-Test Probability

Table 4.5 shows the percentage pre-test probability of having coronary heart disease for each presentation of chest pain – non-anginal, atypical and typical. Even in the absence of risk factors, age alone substantially increases the risk of coronary heart disease. The presence of risk factors is particularly helpful in making the diagnosis in the middle-aged group. This correlates with the ORs in Table 4.3 where the presence of risk factors gives higher ORs in the younger versus older age groups. Women tend to lag behind men in the incidence of coronary heart disease until the menopause is reached. In the following 10 years after menopause, women start to show a more male pattern of coronary heart disease. Risk factors are similar for male and female though the impact may differ. For example, smoking has a greater impact on women than men, particularly at younger ages [19].

4.4.2 Obesity

Obesity is not an independent risk factor (i.e. it is usually present when other more significant risk factors are present, e.g. diabetes).

4.4.3 Family History

A premature family history is present if a male first-degree relative was less than 55 years of age at diagnosis and a female first-degree relative less than 65 years and other common risk factors were absent. The simple self-reporting of a parental history of myocardial infarction doubles the risk of subsequent myocardial infarction regardless of the presence of other risk factors [20].

The dietary history is an important aspect of both risk assessment and management. A further arm of the Interheart study identified three major dietary patterns – Asian (high intake of tofu, soy and other sauces), Western (high in fried food, salty snacks, eggs, meat) and prudent (high in fruit and vegetables). A prudent diet is associated with better cardiovascular outcomes with poor dietary behaviour associated with 30% of population-based risk [21].

4.4.4 Psychosocial

There is an increased risk of CVD in individuals with depression [22]. Depression and anxiety are risk factors for CVD and coronary heart disease increases the prevalence of depression [23]. There is a correlation between depression and cardiovascular mortality. Prevalence of coronary artery disease in depressed patients is 20–40%, higher in non-depressed people [24]. Causes are thought to be twofold. Psychosocial conditions may contribute to poorer diet and behaviours such as smoking. There may also be direct pathophysiological mechanisms such as neuroendocrine or platelet activation and endothelial dysfunction [25].

4.4.5 Alcohol

There is a linear relationship between alcohol intake and the prevalence of hypertension. There is extensive evidence of the associations between alcohol and coronary heart disease, stroke, peripheral vascular disease and cardiomyopathy [26]. Low to moderate intake of alcohol may reduce some risk and haemostatic factors regarding atherosclerosis and inflammation. However, there are also serious physiological effects, including

Table 4.3 Importance of risk factors in young and old individuals; men and women.

	Both sexes		Men		Women	
	Young	Old	≤55 yr	>55 yr	≤65 yr	>65 yr
Odds ratios for relative effect of risk factors (99% CI)						
Lifestyle factors						
Smoking	3.33 (2.86–3.87)	2.44 ^a (2.10–2.84)	3.33 (2.80–3.95)	2.52 (2.15–2.96)	4.49 (3.11–6.47)	2.14 (1.35–3.39)
Fruit and vegetables	0.69 (0.58–0.81)	0.72 (0.61–0.85)	0.72 (0.59–0.88)	0.77 (0.64–0.93)	0.62 (0.44–0.87)	0.55 (0.38–0.80)
Exercise	0.95 (0.79–11.4)	0.79 (0.66–0.94)	1.02 (0.83–1.25)	0.79 (0.66–0.96)	0.74 (0.49–1.10)	0.75 (0.46–1.22)
Alcohol	1.00 (0.85–1.17)	0.85 (0.73–1.00)	1.03 (0.87–1.23)	0.86 (0.73–1.01)	0.74 (0.41–1.31)	0.83 (0.49–1.42)
All four lifestyle factors	0.20 (0.14–0.27)	0.20 ^b (0.15–0.27)	0.23 (0.16–0.33)	0.21 (0.15–0.29)	0.07 (0.03–0.18)	0.16 (0.06–0.41)
Hypertension	2.24 (1.93–2.60)	1.72 (1.52–1.95)	1.99 (1.66–2.39)	1.72 (1.49–1.98)	2.94 (2.25–3.85)	1.82 (1.39–2.38)
Diabetes	2.96 (2.40–3.64)	2.05 ^a (1.71–2.45)	2.66 (2.04–3.46)	1.93 (1.58–2.37)	3.53 (2.49–5.01)	2.59 (1.78–3.78)
Abdominal obesity	1.79 (1.52–2.09)	1.50 (1.29–1.74)	1.83 (1.52–2.20)	1.54 (1.30–1.83)	1.58 (1.14–2.20)	1.22 (0.88–1.70)
Psychosocial	2.87 (2.19–3.77)	2.43 (1.86–3.18)	2.62 (1.91–3.60)	2.45 (1.82–3.29)	3.92 (2.26–6.79)	2.31 (1.22–4.39)
High ApoB/ApoA1 ratio	4.35 (3.49–5.42)	2.50 ^a (2.05–3.05)	4.16 (3.19–5.42)	2.51 (2.00–3.15)	4.83 (3.19–7.32)	2.48 (1.60–3.83)
All risk factors other than smoking	101.86 (61.22–169.46)	43.24 ^a (26.96–69.37)	59.06 (32.25–108.14)	38.88 (22.95–65.86)	473.43 (158.34–1415.5)	67.49 (21.39–212.90)
All nine risk factors including smoking ^c	216.47 (126.67–369.94)	81.99 ^a (50.02–134.40)	129.19 (68.60–243.28)	76.25 (44.07–131.93)	1100.6 ^d (342.72–3534.2)	111.45 (32.59–381.12)
Population attributable risks (99% CI)						
Lifestyle factors						
Smoking	40.7% (35.9–45.7)	33.1% (28.9–37.6)	52.0% (44.9–59.0)	39.0% (34.0–44.1)	20.8% (15.7–26.9)	8.2% (4.1–15.7)
Fruit and vegetables	16.9% (10.8–25.3)	11.9% (7.4–18.4)	15.7% (8.3–27.8)	10.1% (5.3–18.2)	18.4% (10.0–31.5)	18.7% (10.0–32.1)
Exercise	7.5% (0.7–46.9)	13.4% (5.4–29.7)	0.1% (0.0–100.0)	12.5% (4.4–30.6)	24.6% (6.8–59.2)	23.6% (4.3–67.8)
Alcohol	−4.1% (−19.8 to 11.6)	11.1% (4.7–23.9)	−9.1% (−25.1 to 6.9)	10.5% (4.3–23.6)	24.9% (3.3–76.3)	14.6% (0.5–84.6)
All four lifestyle factors	52.1% (39.5–64.4)	54.8% (46.2–63.1)	55.8% (42.1–68.7)	57.1% (48.4–65.4)	63.3% (36.8–83.6)	51.5% (21.7–80.3)
Hypertension	19.2% (16.0–22.8)	17.0% (14.0–20.5)	12.8% (9.4–17.1)	15.7% (12.7–19.4)	31.9% (25.7–38.6)	25.4% (17.1–35.8)
Diabetes	12.4% (10.3–14.9)	8.6% (6.9–10.7)	8.7% (6.6–11.5)	7.8% (6.0–10.1)	19.3% (15.1–24.5)	13.0% (8.9–18.5)

(Continued)

Table 4.3 (Continued)

	Both sexes		Men		Women	
	Young	Old	≤55 yr	>55 yr	≤65 yr	>65 yr
Abdominal obesity	24.8% (17.2–34.5)	18.1% (12.2–26.0)	23.4% (14.4–35.7)	18.3% (11.9–27.0)	24.9% (12.4–43.7)	11.8% (2.1–46.1)
Psychosocial	43.5% (32.21–55.6)	25.2% (16.0–37.2)	39.7% (25.4–56.0)	23.7% (13.9–37.4)	53.0% (35.4–69.9)	30.6% (10.6–62.1)
High ApoB/ApoA.1 ratio	58.9% (50.9–66.5)	43.6% (36.6–50.8)	59.7% (48.6–70.0)	45.3% (37.5–53.3)	56.1% (43.7–67.7)	36.3% (21.8–53.8)
All risk factors other than smoking	89.4% (84.7–92.7)	81.7% (76.4–86.1)	85.6% (77.7–91.0)	80.8% (74.8–85.7)	95.5% (90.0–98.0)	86.4% (70.8–94.3)
All nine risk factors including smoking	93.8% (90.9–95.8)	87.9% (84.1–90.8)	93.1% (88.9–95.8)	88.3% (84.4–91.4)	96.5% (92.0–98.5)	87.7% (73.1–94.9)

^a $p < 0.001$ are only provided for the overall comparison.

^b These values differ slightly but appear similar because of rounding.

^c Based on combining current and former smokers versus never smokers, top two tertiles versus lowest tertile for abdominal obesity, and top four quintiles versus lowest quintile for ApoB/ApoA1 ratio. If, however, extreme exposures (current versus never, top versus lowest tertile for abdominal obesity, and top versus lowest quintile for ApoB/ApoA1 ratio) were included, the odds ratios for all risk factors for the young group increases to 756.0 and in the old group to 160.8.

^d Unstable estimate, should be interpreted cautiously.

Source: Yusuf et al. [17]/with permission of Elsevier.

Table 4.4 Global ranking of attributable burden of cardiovascular disease due to modifiable risk factors.

Rank	Cause of death	Number of deaths in 2021 (95% UI)	Number of DALYs (95% UI)
1	High systolic blood pressure	10 800 000 (9 150 000–12 100 000)	209 000 000 (172 000 000–236 000 000)
2	Dietary risks	6 580 000 (2 270 000–9 520 000)	142 000 000 (45 300 000–200 000 000)
3	High low-density lipoprotein cholesterol	3 810 000 (2 170 000–5 420 000)	86 300 000 (54 100 000–115 000 000)
4	Ambient particulate matter pollution	3 130 000 (2 310 000–3 930 000)	62 500 000 (45 700 000–78 400 000)
5	Smoking	2 370 000 (498 000–4 410 000)	59 600 000 (13 100 000–107 000 000)
6	High fasting plasma glucose	2 300 000 (2 030 000–2 650 000)	41 200 000 (36 600 000–47 600 000)
7	High body mass index	1 950 000 (1 120 000–2 910 000)	43 900 000 (23 800 000–65 400 000)
8	Kidney dysfunction	1 870 000 (1 440 000–2 340 000)	38 200 000 (30 700 000–45 900 000)
9	Household air pollution from solid fuels	1 610 000 (904 000–2 820 000)	36 200 000 (21 200 000–61 100 000)
10	Lead exposure	1 570 000 (–139 000–3 170 000)	29 700 000 (–2 780 000–61 200 000)
11	Low temperature	1 020 000 (915 000–1 100 000)	17 700 000 (15 900 000–19 200 000)
12	Secondhand smoke	743 000 (297 000–1 070 000)	16 700 000 (6 870 000–24 300 000)
13	High alcohol use	407 000 (179 000–708 000)	9 260 000 (3 830 000–16 300 000)
14	Low physical activity	397 000 (122 000–684 000)	7 220 000 (2 870 000–11 500 000)
15	High temperature	164 000 (114 000–205 000)	3 440 000 (2 370 000–4 300 000)

DALY, disability-adjusted life year; UI, uncertainty interval.

Source: Vaduganathan et al. [4]/with permission of Elsevier.

mitochondrial dysfunction, inflammatory response, oxidative response, programmed cell death and anatomical damage to the cardiovascular system [26]. High levels of consumption, particularly binge drinking, are associated with increased risk of stroke. Heavy drinkers may have a rise in blood pressure after acute withdrawal from alcohol and are therefore more likely to be diagnosed with hypertension after a weekend of heavy drinking than at the end of the week.

4.4.6 Calculation of Cardiovascular Risk

Risk calculators such as QRISK3 are validated prediction models which use information from the patient's history to identify individuals at increased risk of heart disease and stroke [27]. Quantification of a patient's risk and discussion of other background history can be used to facilitate shared decision-making discussions and primary prevention measures.

- Age
- Gender
- Previous history of CVD
- Smoking years
- Hypertension
- Diabetes
- Hyperlipidaemia

Table 4.5 Estimating the pre-test probability (%) of coronary heart disease.

Age	Non-anginal chest pain (%)		Atypical angina (%)		Typical angina (%)	
	M	F	M	F	M	F
30–39	3–35	1–19	8–59	2–39	30–88	10–78
40–49	9–47	2–22	21–70	5–43	51–92	20–79
50–59	23–59	4–25	45–79	10–47	80–95	38–82
60–69	49–69	9–29	71–86	20–51	93–97	56–84

The figure on the left of each box shows the percentage probability at each age and by sex when the patient had no risk factors and the number on the right-hand side of each box shows the percentage probability of coronary heart disease in patients with the risk factors diabetes, smoking and hyperlipidaemia. All the patients had normal ECGs and diagnosis of the patient's chest pain is based on the history alone.

Source: Henderson et al. [18]/McGraw Hill.

- Alcohol
- Kidney disease
- Rheumatoid arthritis
- Erectile dysfunction
- Medication history

4.5 Pain

Pain as a cardiovascular symptom occurs most commonly in the chest. However, it can occur in other sites in the upper body (Figure 4.1). Since the mechanism of ischaemia in all sites is similar, ischaemia should always be considered in the differential diagnosis.

Chest pain is caused by narrowing of the coronary arteries, usually by atherosclerosis but in some patients also by spasm of the arterial walls. Ischaemic pain may occur also in the legs due to narrowing of the arteries. Referred to as 'intermittent claudication', pain is precipitated by walking and relieved by rest. Atherosclerosis of the blood vessels to the gastrointestinal tract may produce ischaemic abdominal pain which comes on after eating. The blood supply to the gut mucosa is insufficient to meet the metabolic demands of digestion.

4.5.1 Pathophysiology

Smoking, cholesterol, high blood pressure and diabetes facilitate dysfunction of the endothelial lining of arteries. Plaques of lipids, fibrous elements and calcification (atherosclerosis) form over the damaged areas with the resultant narrowing of the vessels. Turbulent blood flow occurs at bifurcations and branching points promoting endothelial dysfunction [29]. Hard, stable plaques increase the stiffness of the arteries and reduce blood flow to the myocardium, particularly during exertion (Figure 4.2).

Metabolites accumulate in ischaemic cardiac muscle leading to stimulation of the cardiac sympathetic nerves. A chronic limited oxygen supply leads to continuous hypoxia, accumulation of lactic acid and ischemic pain.

A soft plaque may rupture suddenly 'spilling' its contents. Clot formation over the plaque can completely block the coronary artery bringing on the pain of critical ischaemia (e.g. an acute myocardial infarction).

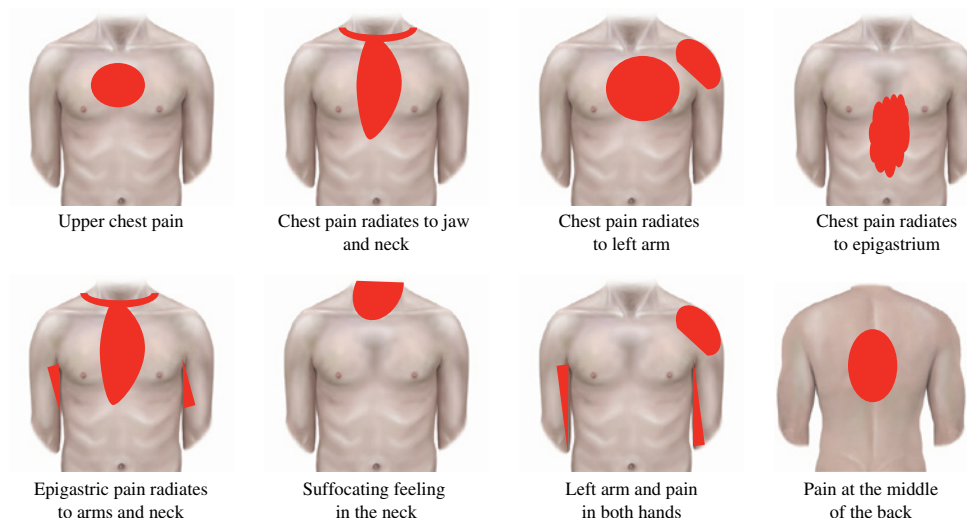


Figure 4.1 Description of location of chest pain. *Source:* Dewi et al. [28]/Journal of Clinical Medicine of Kazakhstan/CC BY 4.0. This journal is licenced under the CC-BY Creative Commons Attribution 4.0 International Licence.

Research into the pathophysiology of chest pain and atherosclerotic coronary heart disease (ACAD) has showed differences between the sexes. Young women tend to present with type II ACS characterised by coronary artery spasm and vascular dysfunction whereas younger men present more often with type I ACS due to coronary artery obstruction [19, 30]. Younger women with ACS are likely to have less plaque ruptures and more frequent plaque erosions. Post-menopause, the incidence of plaque rupture in ACS in women increases [19].

4.5.2 The Patient Experience of Pain

Heberden's original description captures precisely both the mechanism of pain and the patient experience:

'They who are afflicted with it are seized while they are walking (more especially if it be uphill and soon after eating) with a painful and most disagreeable sensation of the breast, which seems as if it would extinguish life, if it were to increase or continue, but the moment they stand still, all this uneasiness vanishes.' [31]

(Heberden, 1768)

Patients use words including 'pressure', 'fullness', 'burning', 'tightness' heaviness, tightness, squeezing, aching and strangling in the chest; a searing pain spreading to the back, neck, jaw, shoulders and one or both arms. The pain typically lasts more than a few minutes, gets worse with activity, goes away and comes back or varies in intensity. Patients may not mention pain but talk about discomfort instead. Patients may experience associated symptoms including breathlessness, palpitations and sweating.

4.5.3 Evidence Base

The diagnosis of chest pain has a wide differential. Up to 95% of chest pain presents in primary care [32]. The highest frequency of chest pain presentations is in the age 45–64 years group where there are also differences in presentation between men and women [33, 34]. The general practitioners (GPs) role is to differentiate

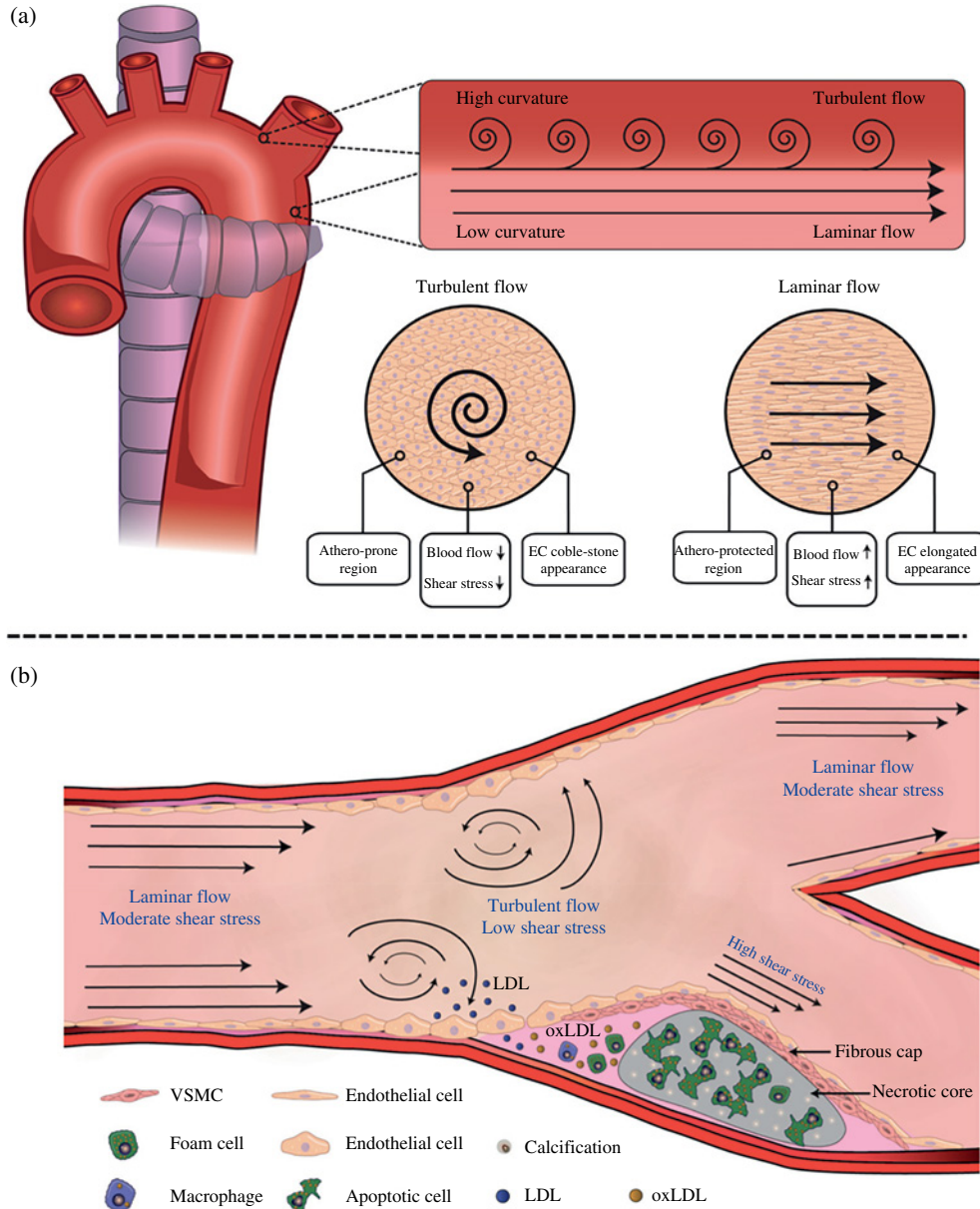


Figure 4.2 Effect of blood flow and wall shear stress (WSS) on the development of atheromatous plaque.
 Source: Jebari-Benslaiman et al. [29]/MDPI/CC BY - 4.0. This is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) licence 4.0.

life-threatening illness (e.g. ACS, pulmonary embolism) from commoner, but less urgent diagnoses (e.g. stable angina) and intermittent chest pain requiring further investigation (Figure 4.3).

Pain may occur on an incline or on a level of exertion above normal. Usually, this compels the patient to stop. Occasionally, symptoms may occur at the beginning of activity but then ease - 'walk through angina' [35]. Patients may describe and be capable of significant anaerobic exercise despite their angina (e.g. going for a run) [35]. Triggers may include cold weather or wind, after eating. Pain may be present at the beginning of the day when

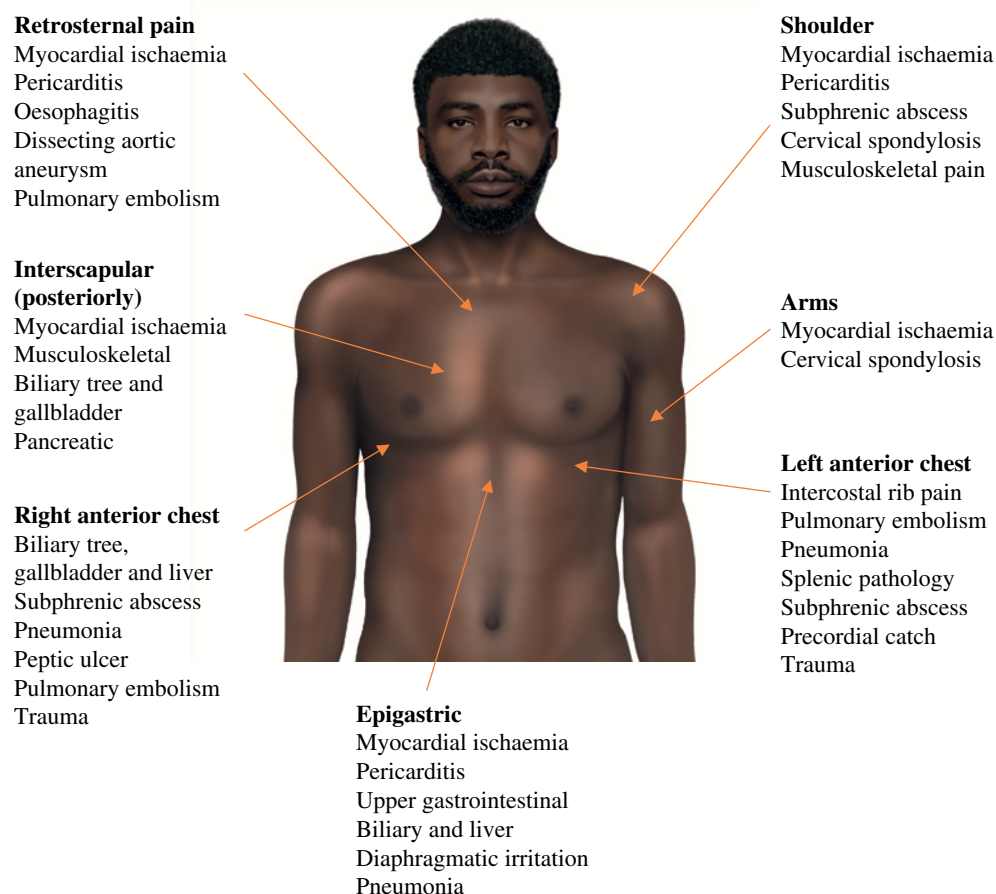


Figure 4.3 Differential diagnosis of chest pain according to initial site of onset. *Source:* Adapted from Wright [35]. Image: Dr. Joanna Butler © www.medical-artist.com (2024) Image can be resized as necessary.

shaving or brushing teeth [35]. Symptoms occurring following exertion or continuously present throughout the day are not angina. If responsive to glyceryl trinitrate (GTN), this should occur within a few minutes [35].

Chest pain is caused by coronary heart disease in 12–15% of patients in primary care [36]. In a population of patients all causes of chest pain, GPs diagnosed coronary heart disease on symptoms and signs alone with a sensitivity of 69% and specificity of 89%. Predictors of coronary heart disease were the patient's own assumption the pain was cardiac and a prior history of vascular disease. This is not sufficiently accurate for ruling out either coronary heart disease or ACS [37]. GP diagnostic accuracy in new patients can achieve up to 82% [38]. Identifying strong historical factors is challenging. Many studies have been undertaken in emergency or hospital settings and don't apply necessarily to undifferentiated primary care patients. A diagnostic accuracy study in primary care found the following ORs for features in the history associated with coronary heart disease [15]:

- Known vascular disease OR = 5.13
- Pain worse on exercise OR = 4.27
- Patient assumes cardiac origin of pain OR = 3.20
- Cough present OR = 0.08
- Pain reproducible on palpation OR = 0.27

For urgent hospital admission, criteria for admission were [15]:

- Pain radiating to the left arm OR = 8.81
- Known clinical vascular disease OR = 7.50
- Home visit requested OR = 7.31
- Known heart failure OR = 3.53

While right arm involvement may help differentiate coronary from other causes in the emergency department [39], it does not apply in primary care and may be associated more with a later stage in the natural history of acute myocardial infarction (MI).

While no single symptom can rule in or rule out the diagnosis, taken together, clusters may help to make the diagnosis (Table 4.6). The GPs impression also of the cluster ‘something is wrong with my patient’; pale, cold and clammy skin, patient unusually calm and breathlessness all achieve likelihood ratios (LRs) great or around 2 [15]. The Marburg heart score (MHS) is a simple prediction score based on five findings of the history and examination [42]. It has been externally validated [43, 44] and is the most extensively studied of its kind (Table 4.7). The thrombolysis in myocardial infarction (TIMI) score is an early risk stratification tool. Higher scores predict higher risk of adverse cardiac events and/or risk of mortality in unstable angina and non-ST elevation myocardial infarction (NSTEMI) (Table 4.8) [46].

Table 4.6 Likelihood ratios for stable, intermittent chest pain and acute coronary syndrome.

Coronary heart disease	Likelihood ratio
Typical angina	5.7
History of prior myocardial infarction	3.8
Age greater than 70 years	2.6
Hyperlipidaemia	4.0
Non-anginal chest pain	0.1
Intermittent dysphagia	0.2
Acute coronary syndrome	
ECG – new ST wave elevation	22
ECG – new Q waves	22
ECG – new ST depression	4.5–5.3
ECG – any ischaemic change	3.6
Radiation of pain to both arms	2.6
ECG – normal	0.2
Peripheral vascular disease	2.7
Chest wall tenderness	0.3
Pleuritic chest pain	0.2
Sharp pain	0.3
Positional pain	0.3
Prior abnormal exercise test	3.1

Source: Adapted from Chun and McGee [40] and Fanaroff et al. [41].

Table 4.7 The Marburg heart score for chest pain in primary care.

Score item	Assigned points
Sex/age (female 65 and over; male 55 and over)	1
Known vascular disease ^a	1
Patient assumes cardiac origin of pain	1
Pain worse with exercise	1
Pain not reproducible by palpation	1

^aIncluding coronary heart disease, cerebrovascular and peripheral vascular disease. Scoring: low risk = 0–2 points; intermediate risk = 3 points; high risk = 4–5 points.

Source: Haasenritter et al. [42]/British Journal of General Practice/CC BY - 4.0. Open-access articles are published under a Creative Commons licence that allows reuse with attribution of the article. The default license type is CC BY 4.0. The articles are fully available on publication via the BJGP website and are also sent to PubMed Central, where they are also made publicly available.

Table 4.8 The thrombolysis in myocardial infarction (TIMI) score is an early risk stratification tool to aid decision-making in secondary care.

TIMI risk score for STEMI		Risk score	Odds of death by 30 days ^a	
Historical		0	0.1	(0.1–0.2)
Age 65–74	2 points	1	0.3	(0.2–0.3)
≥75	3 points	2	0.4	(0.3–0.5)
DM/HTN or angina	1 point	3	0.7	(0.6–0.9)
Exam		4	1.2	(1.0–1.5)
systolic blood pressure (SBP) < 100	3 points	5	2.2	(1.9–2.6)
heart rate (HR) > 100	2 points	6	3.0	(2.5–3.6)
Killip II–IV	2 points	7	4.8	(3.8–6.1)
Weight < 67 kg	1 point	8	5.8	(4.2–7.8)
Presentation		>8	8.8	(6.3–12)
Anterior ST elevation (STE) or left bundle branch block (LBBB)	1 point			
Time to rx > 4 hr	1 point			
Risk score = Total	(0–14)			
	(Front)			(Back)

^aReferenced to average mortality (95% confidence intervals).

Source: Morrow [45]/with permission of Wolters Kluwer Health, Inc.

Of patients presenting with chest pain at the emergency department, almost a third have serious CVD [47]. Only 11–44% of patients referred to the cardiology out-patients have coronary artery disease [32].

In stable, intermittent chest pain the patient's own description of pain is a reliable indicator [40]. In acute pain urgent assessment is required as symptoms and signs lack sufficient sensitivity (69%) and specificity (89%) given the life-threatening nature of acute chest pain [48].

Chest pain in a young person is unlikely to be coronary artery disease but you should ask about associated dizziness, syncope and a family history of sudden death as well as screen for risk factors.

The pain of myocardial infarction is similar in character to angina but more prolonged in duration. Stable exertional angina implies narrowed but fixed coronary arteries while sudden onset pain of myocardial infarction implies plaque rupture with thrombus formation and arterial obstruction. The pain of myocardial infarction is likely to be accompanied by breathlessness, agitation and diaphoresis (nausea, vomiting, sweating and pallor) due to sympathetic stimulation. Myocardial infarction in the elderly and in diabetes may be a silent event.

Pain due to pericardial inflammation is sharp, anterior and central. It is worse on inspiration and movement particularly when leaning forward. Abrupt onset of very severe pain radiating to between the scapulae raises the possibility of aortic dissection. It may be accompanied by marked diaphoresis.

4.5.4 Chest Wall Syndrome

Chest wall syndrome encompasses conditions such as costochondritis, costosternal syndrome, Tietze's syndrome, rib-tip syndrome and xiphoidalgia [49]. It is the underlying cause in 46.6% of patients presenting in primary care with chest pain. Key features include:

- Pain localised to retrosternum – 52.0% and/or on left side 69.2%
- Persistent pain – 28.0%
- No temporal association 72.3%
- Pain still present after 6 months 55.4%

Four-point score recording presence or absence of localised muscle tension, stinging pain, pain reproducible on palpation and absence of cough showed area under the operating curve (AUC) of 0.78 [49]. Combination of the four points is crucial as none is diagnostic alone. In particular, localised tenderness is not specific and may be present in both coronary heart disease (CHD) and pulmonary embolism [50] (Table 4.9). The Bayesian approach of combining symptoms and signs to arrive at a decision is most appropriate [52].

4.5.5 Chest Pain at Rest

Chest pain at rest has a broader differential diagnosis. Causes may include myocardial infarction, aortic dissection, pulmonary embolism, arrhythmias (e.g. paroxysmal atrial fibrillation), emotional distress, Takotsubo cardiomyopathy, nocturnal angina and acid reflux.

Table 4.9 Chest wall syndrome (CWS) clinical prediction rule.

Variable	P-value	Regression coefficient	Points assigned
Pain reproducible by palpation	<0.001	1.64	2
No history of coronary heart disease	<0.001	1.25	1
Absence of general practitioner's concern	0.001	1.13	1
Pain neither retrosternal nor oppressive	0.017	0.48	1
Pain well localised (history and/or physical examination)	0.002	0.64	1
Stabbing pain	0.041	0.50	1
Total number of points attributable			7

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Source: Ronga et al. [51]/Springer Nature/CC BY - 2.0.

4.5.6 Chest Pain in Women

The presence of gender differences in presentation of ACS has been known since the early 2000s [53]. There is a higher prevalence of angina in women than men. Women can present differently to men. They are more likely than men to have pain at rest, during sleep or precipitated by stress. Delay in symptom recognition contributes to delayed treatment and poorer clinical outcomes [54]. A meta-analysis of 27 studies analysed presenting symptoms in ACS [53]. Both sexes presented most often with chest pain (men 79% versus women 74%). Pain, diaphoresis, breathlessness, left arm and left shoulder pain, nausea or vomiting were the most prevalent symptoms in both sexes. However, women had both higher and lower odds for some symptoms compare to men:

Women have higher odds of:

- Pain between the shoulder blades OR = 2.15
- Nausea or vomiting OR = 1.64
- Shortness of breath OR = 1.34

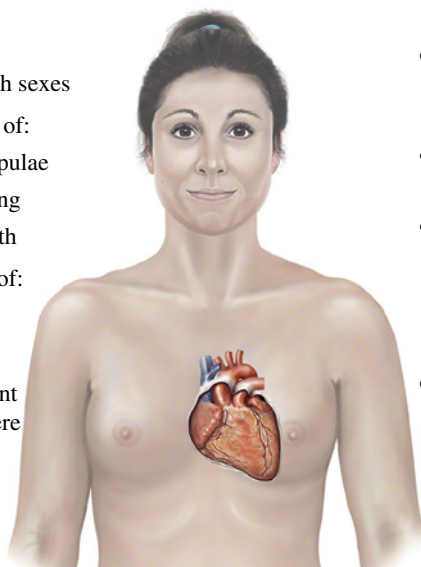
Women have lower odds of:

- Presenting with chest pain OR = 0.70
- Diaphoresis OR = 0.84

Many of the findings in the review were established prior to 2003 but have percolated into guidelines and medical education only poorly. AI and machine learning may enable greater recognition of symptoms differences and clusters relevant to diagnosis in particular population groups (Figure 4.4).

The terms ‘typical’ and ‘atypical’ angina, chest pain can sometimes reflect a discrimination between the sexes with male angina being typical and meeting the criteria for further investigation while women’s is labelled atypical with subsequent diagnostic delay [53]. This had led some to argue the terms ‘typical’ and ‘atypical’ should be abandoned [53]. In 2021, the American Heart Association published its first guideline on chest pain in women [55].

- Chest pain is the most common symptom in both sexes
- Women had higher odds of:
 - Pain between scapulae
 - Nausea or vomiting
 - Shortness of breath
- Women had lower odds of:
 - Chest pain
 - Diaphoresis
- Women can have different symptoms to men but there is substantial overlap



- Women who present with chest pain are at risk of underdiagnosis
- Potential cardiac causes should always be considered
- A history should be sought which emphasises accompanying symptoms that are more common in women with ACS
- Chest pain should not be described as atypical because it is not helpful in determining the cause and can be misinterpreted as being benign in nature

Figure 4.4 Chest pain in women – a systematic review and meta-analysis of 27 studies [53, 55]. *Source:* Kaur et al. [55]/with permission of Elsevier. Permission for use of this has been obtained from the publisher and is in the submission folder for this chapter. Image: Dr. Joanna Butler © www.medical-artist.com (2024) Image can be resized as necessary.

The guideline states ‘in women presenting with chest pain, it is recommended to obtain a history that emphasises accompanying symptoms that are more common in women with ACS’ [55].

4.5.7 Key Points in the History

- Pain is more frequent, worsening and occurring with less effort or at rest
- Characterise the pain – location, radiation, frequency, duration
- Heavy, dull, tight or sharp
- Related to exertion
- Does it stop on rest?
- Previous history of similar pain
- What are the patient’s risk factors?
 - How do these change the patient’s pre-test probability?
- Associated symptoms should be sought in both the respiratory and alimentary systems.

4.6 Breathlessness

Breathlessness commonly indicates cardiac or respiratory disease or both (see also Chapter 3). Adequate breathing requires functioning central nervous system (CNS) control of breathing, a patent airway, adequate ventilation of the lungs and sufficient area for gas exchange in the alveoli to meet the patient’s level of demand (Figure 4.5).

4.6.1 Pathophysiology

Breathlessness arising from cardiac disease occurs on exertion. The left ventricular output fails to rise with the exertion. This leads to the sequence of:

- Raised left ventricular end-diastolic volume
- Raised left atrial pressure
- Raised pulmonary venous pressure
- Interstitial fluid leakage
- Reduced pulmonary compliance
 - Reduced space for adequate ventilation of the alveoli
 - Reduced surface area in the alveoli for gas exchange

As the disease progresses, the amount of exertion necessary to produce these changes becomes less and less with the result the patient eventually becomes short of breath at rest (Figure 4.6).

Two features of breathlessness of cardiovascular origin are orthopnoea and paroxysmal nocturnal dyspnoea. These are late signs of Class III and IV heart failure (Table 4.10). They may also occur in respiratory diseases.

4.6.1.1 Orthopnoea

Since patients notice increasing breathlessness on lying flat, they begin to sleep in a more upright position. Pulmonary oedema then moves to the lower parts of the lung. This improves oxygenation of the upper lungs and the patient feels less breathless. Patients may report sleeping on three to four pillows to maintain this position.

4.6.1.2 Paroxysmal Nocturnal Dyspnoea

A patient may lie progressively flatter in bed during sleep. In addition, there may be resorption of oedema around the ankles. Both these changes lead to an acute fall in left ventricular output, a rise in pulmonary venous pressure

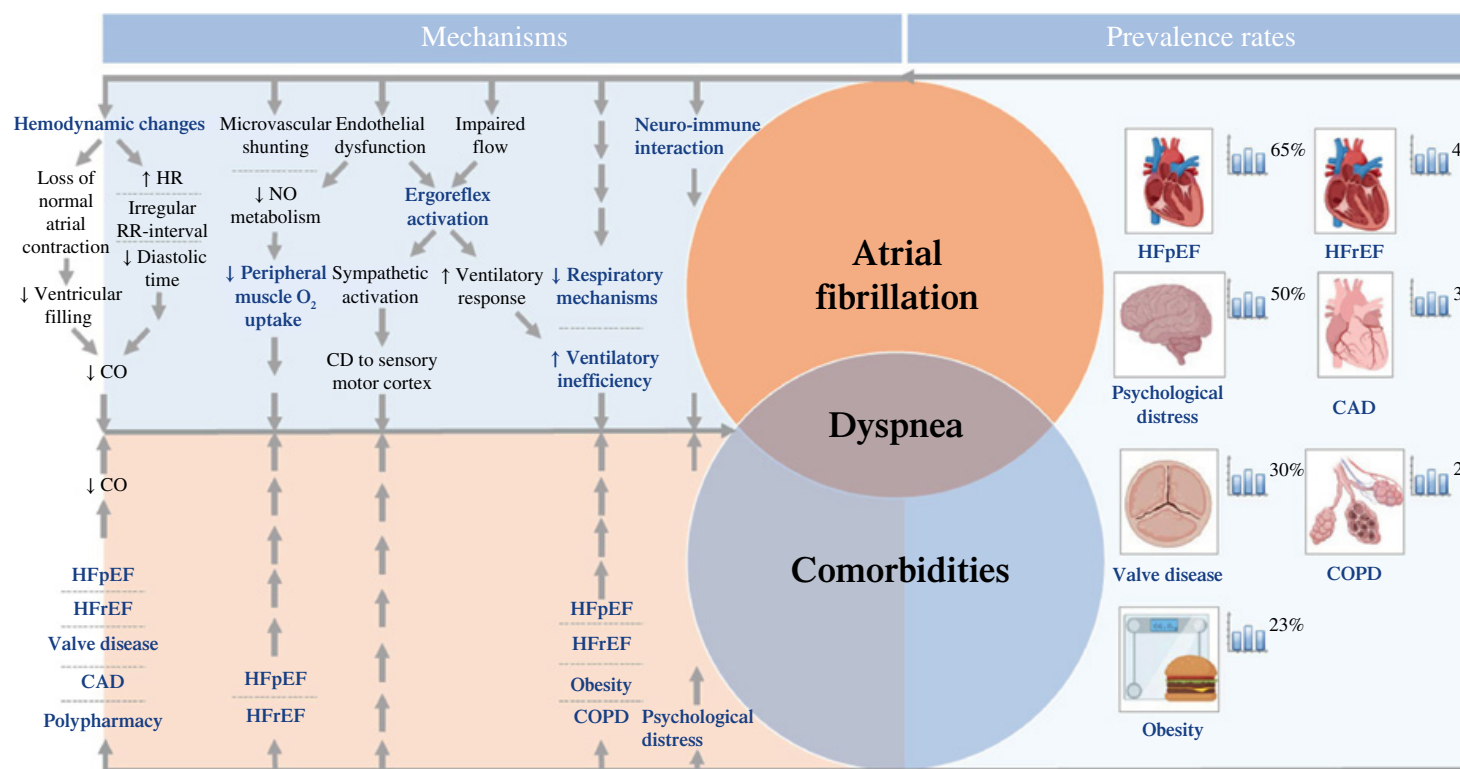
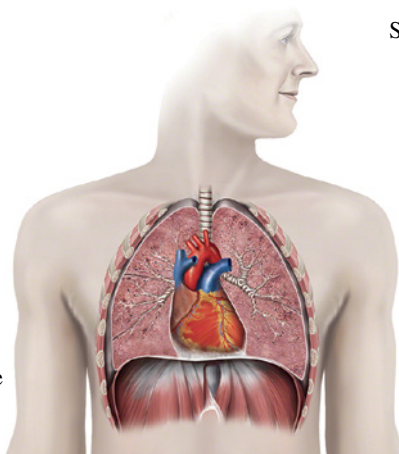


Figure 4.5 Mechanisms of dyspnoea and prevalence rates of common dyspnoea-related comorbidities and risk factors in atrial fibrillation patients. Creative Commons
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Risk factors

- Previous myocardial infarction
- Angina
- Previous heart failure
- Blood pressure > 140/90 mmHg
- Diabetes
- Left ventricular hypertrophy
- Valvular heart disease
- Dyslipidaemia
- Smoker



Symptoms

- Dyspnoea on exertion
- Rapid breathing
- Feeling of suffocation
- Air hunger
- Fatigue and weight gain
- Oedema
- Paroxysmal nocturnal dyspnoea
- Orthopnoea

Figure 4.6 Risk factors and symptoms of cardiac breathlessness. *Source:* Adapted from Wang et al. [56]. Image: Dr.Joanna Butler © www.medical-artist.com (2024). Image can be resized as necessary.

Table 4.10 New York Heart Association Functional Classification of Heart Failure – correlation of symptoms, echocardiographic findings, and therapeutic options.

Class	I	II	III	IV
Symptoms	None	On moderate activity	On mild activity	At rest and on minimal activity
Ejection fraction	40–50%	30–40%	<30%	<30%
Use these drugs	Angiotensin-converting enzyme (ACE) inhibitor Beta-blocker	ACE inhibitor Beta-blocker Low-dose diuretic Statin	ACE inhibitor Beta-blocker Diuretic Spironolactone Digoxin Statin Sacubitril/valsartan	ACE inhibitor Spironolactone Digoxin Diuretic Beta-blocker (if compensated) Sacubitril/valsartan

Source: Adapted from The Criteria Committee of the New York Heart Association [57].
Previously published in the ABC of Clinical Reasoning, 2nd Edition. Wiley, 2023.

and accumulation of fluid within the lungs. The patient awakens feeling very breathless and gets out of bed. The return to an upright posture gradually relieves the breathlessness.

4.6.2 Patient Experience

We’re keen walkers and enjoy getting out into the countryside. In fact, it was great during the pandemic because we did a lot of walking even in the streets where we live, just to keep active. Over the last few months, I feel I am struggling. I get to the top of a hill I would have managed before and I’m breathing faster. I keep pausing between words to allow myself to recover. It wears off after a few minutes, but it’s never happened before. I think it’s getting worse.

4.6.3 Evidence Base

There is correlation between the patient's description of degree of breathlessness on activity and the likely findings on echocardiogram. This helps also in the initiation and planning of treatments likely to improve prognosis. Frothy, pink sputum may occur in acute left ventricular failure. The pink colour is due to tinging of the fluid with blood from the alveolar capillaries. Patients with heart failure may describe feeling smothered or suffocated. Those with cardiomyopathy may tolerate 20–30 m of exertion before the onset of shortness of breath. Acute breathlessness with non-pleuritic chest pain is likely to be cardiac in origin. Chronic breathlessness in the absence of cough is also likely to be cardiac. It can be challenging to decide on whether breathlessness is cardiovascular or respiratory in origin, not least because cardiovascular breathlessness is a respiratory symptom caused by a cardiovascular problem.

4.7 Palpitations

Palpitations are an abnormal awareness of the heartbeat [35]. Normal sinus rhythm is not usually felt. Palpitations imply a change in heart rate or rhythm often to irregular or rapid sensations. The sensation of the palpitation is due a change in the movement of the heart within the chest.

Palpitations can occur in 'normal' circumstances including exercise, emotion, stress or on taking substances which increase adrenergic tone or diminish vagal tone (e.g. caffeine, nicotine or adrenergic drugs). Patients often recognise a trigger for their symptoms [58]. Even so, patients may be concerned about a fast heart rate even in these circumstances and consult their doctor.

Experience of normal heart rhythm can produce a sensation of palpitations. Anxiety can create a sensation of the heart beating more forcefully.

Whilst palpitations suggest the presence of arrhythmias, arrhythmias can present without palpitations. This includes presentation as syncope, cardiogenic shock, chest pain, dizziness and sudden death. Palpitations are common in the general population, more so in individuals with structural heart disease. Anxiety is the most common cause. Palpitations divide into four groups [59]:

- Extrasystolic
- Tachycardia
- Anxiety-related
- Intense

Patient descriptions of palpitations include skipped or missed beats, fluttering in the chest, a pounding sensation in the chest or neck or a flip-flopping in the chest. Palpitations are often benign. However, underlying life-threatening conditions may present with palpitations. Although widely experienced, palpitations can be a frightening symptom which is difficult to describe.

4.7.1 Pathophysiology of Palpitations

Most palpitations are produced by extra-systoles (ectopic beats) or fast heart rates (tachy-arrhythmias). Slow rates (bradycardia e.g. complete heart block) are less likely to cause a sensation of palpitations. Diagnosis may be possible from the patient's description (Figure 4.7):

- 'Flip-flopping', 'pause', 'missed beats' – supraventricular or ventricular premature contractions. These are commoner with age and if benign disappear on exercise. Persistence during exercise may suggest cardiac pathology.
- Rapid fluttering – sustained ventricular or supraventricular arrhythmia. Sudden cessation suggests paroxysmal supraventricular tachycardia.

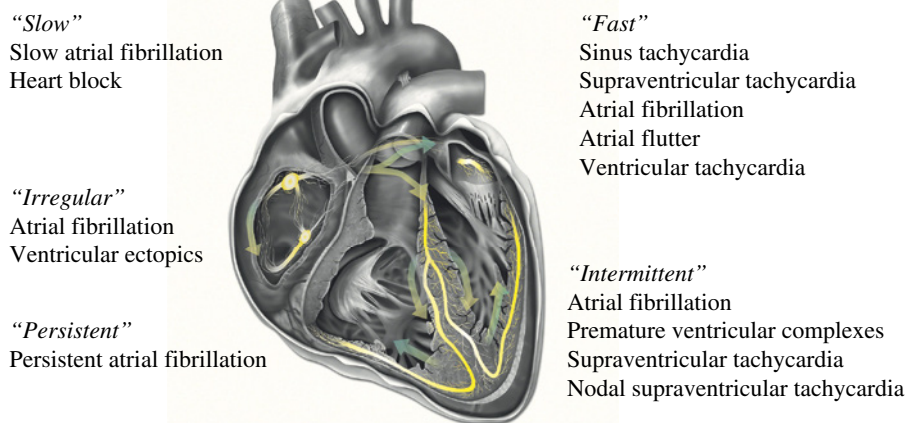


Figure 4.7 Patient descriptions and possible origins of common palpitations. *Source:* Image: Dr. Joanna Butler, 2024/with permission of Medical Artist Limited. Image can be resized as necessary.

- The rhythm of the palpitations may indicate cause e.g. irregularly, irregular in atrial fibrillation.
- A sensation of palpitations in the neck as an irregular pounding may cause distension of the neck veins ('Frog sign' during narrow QRS complex tachycardia on an electrocardiogram [ECG]). This may indicate atrioventricular (AV) dissociation with the atria contracting against closed tricuspid and mitral valves (Cannon A waves).

Palpitations produced by exercise could suggest cardiomyopathy, ischaemia or channelopathies. It is important to establish if symptoms affect the function and output of the heart overall such as pain, breathlessness, dizziness and syncope.

4.7.2 Patient Experience

The palpitations come on suddenly...like a switch. I can be sitting, resting, and relaxing. Suddenly, I get a sensation on the left side of my chest. It flutters....I'm ok if I just sit still. I don't feel unwell....but if I get up I start to feel a bit breathless. Sometimes it does come on while I'm doing something, and I do feel a bit breathless and tight chested. I just stop what I'm doing immediately, sit down and wait till it passes off....which it does do, just as suddenly as it started. Sometimes, I do have a feeling my heart had just stopped...nothing happens and 'thump, a strong beat. These only happen when I'm sitting still watching the TV. That's never happened when I've been active at all.

4.7.3 Evidence Base

A fast normal rhythm is referred to as sinus tachycardia [60, 61]. Usually this is relatively slower than true tachyarrhythmia and up to a rate of 110/min. It comes on gradually over a period of minutes and settles slowly. Like other palpitations, it may be more prominent when the patient lies on the left side. Palpitations since childhood are likely to be supraventricular tachycardia while palpitations commencing in later life are more indicative of structural heart disease (e.g. ischaemia). Rapid, regular rhythms are more likely to be paroxysmal supraventricular tachycardia while an irregular rapid rhythm is likely due to atrial fibrillation, atrial flutter or tachycardia with variable block.

Supraventricular and ventricular tachycardia often results in palpitations with abrupt onset and abrupt termination. Patients who can terminate their palpitations with a Valsalva manoeuvre are likely to have a supraventricular tachycardia. Palpitations with chest pain suggest myocardial ischaemia. When associated with light-headedness or syncope, ventricular tachycardia, supraventricular tachycardia or another arrhythmia are

likely. A slow regular thumping may occasionally occur and be due to ventricular bigeminy or more rarely to sinus bradycardia.

Forty percent have a cardiac cause with a further 30% being related to panic/anxiety. Benign palpitations are more common after exercise or when stressed. Pathological palpitations start suddenly and may last minutes or hours. There may be a history of recent ill health. There may be identifiable triggers or relieving factors. The palpitations may be accompanied by pre-syncope ('I almost passed out'), syncope ('I did pass out'), chest pain or breathlessness.

Significant associations include [62]:

● Positive association	OR
– Hypertension	1.9
– Previous arrhythmia	8.5
– CVD	3.3
– Using cardiovascular drugs	5.8
– Using diuretics	3.7
● Negative association	
– Frequent psychosomatic complaint	0.2
– Frequent attender	0.4
– Using CNS medication	0.4

The commonest pathological arrhythmia is atrial fibrillation. This is characterised by the so-called 'irregularly, irregular pulse' which is chaotic and unpredictable. It is frequently asymptomatic, being found when the patient presents following a transient ischaemic attack, stroke or thyrotoxicosis. It may be sustained or paroxysmal. Paroxysmal attacks may be accompanied by breathlessness and other features of acute left ventricular failure.

Patients often complain of missed beats. These are most frequently due to premature ventricular beats (PVB). This premature beat may not result in a ventricular contraction of normal force and thus the patient feels the heart has missed a beat. The ventricular muscle then repolarises and is then depolarised again by a normal impulse from the atrium. During this period diastole is longer than usual allowing greater ventricular filling and myocardial stretch (Starling effect). The ventricle then contracts more forcefully at the next beat. The patient describes this as a thud. Premature ventricular complexes (PVCs) are a benign phenomenon when occurring at rest and disappearing on exercise – important features of the history. They become more common with age.

4.7.4 Evaluation

Diagnosis of the aetiology will involve history, examination and investigation. Most patients will be seen at a time other than the episode of palpitations. The characteristics of the episode, history of existing cardiac pathology and previous treatments should be established. Physical examination may identify a pre-existing disease (e.g. valvular heart disease). An ECG during an episode is essential as between episodes the ECG may be normal.

Key features of onset include [63]:

- Age of onset
- Description of symptoms including rhythm
- Duration of symptoms
- Relieving factors (rest, Valsalva)
- Positions and other associated symptoms (chest, pain, light-headedness or syncope)
- Tapping out rhythm
- Medications including over the counter (OTC)
- Social history (exercise, caffeine, alcohol, recreational drugs)
- Past medical history and family history

4.8 Swelling (Oedema)

Lower limb swelling occurs when an increase of interstitial fluid exceeds the drainage capacity of the lymphatic system. Fluid may accumulate instead in the subcutaneous tissues. Swelling may occur from congenital causes or lipaemia leading to excessive soft tissue in the lower limbs [64]. The most likely single cause of unilateral lower limb swelling in patients over 50 years is venous, though the aetiology may be multifactorial [65]. Venous insufficiency affects 30% of the population while heart failure affects only 1% of the population [66]. The most likely cause of oedema in women under 50 is idiopathic oedema [66]. Pulmonary oedema and early heart failure can both present with heart failure before becoming obvious in other ways [66]. Chronic oedema impacts physical and psychological health and reduces quality of life [67].

4.8.1 Pathophysiology

There are two main types of leg oedema – venous and lymphoedema. Venous oedema comprises low viscosity, protein-poor interstitial fluid resulting from increased capillary filtration which cannot be dealt with by the lymphatic system. Lymphoedema consists of excess protein-rich interstitial fluid within the skin and subcutaneous tissue resulting from lymphatic dysfunction [68]. Lipaemia is a disorder of fat distribution rather than true oedema.

4.8.2 Patient Experience

The problem is my legs. I'm not sure if it's that new medication they gave me. My legs are really swollen by the end of the day. It's both legs. I think I must be retaining fluid. When I take my socks off in the evening, you can see where the elastic has been. It's quite worrying if I'm honest. Are my heart or my kidneys packing up? I put them up on a pillow overnight then they are back to normal the following morning. Is that a good sign? Anyway, come the evening and they back to swollen again. . .

4.8.3 Evidence Base

Sudden swelling of the leg is more indicative of deep vein thrombosis (DVT), infection, trauma, medication changes and exacerbation of chronic conditions such as congestive heart failure (Table 4.11). DVT should always be considered in acute unilateral swelling. Differential diagnosis of non-acute unilateral leg swelling should also include DVT. Chronic swelling may be due to venous insufficiency, lymphatic dysfunction or static foot disorders. Swelling due to venous insufficiency worsens with dependency during the day and is improved by elevation. It is also more associated with aching, heaviness and limb fatigue. Focal pain suggests a musculoskeletal or joint cause. Reflex sympathetic dystrophy (complex regional pain syndrome) is also a cause of painful chronically swollen limb.

Lymphoedema is usually painless. It may present with signs of foot involvement and skin changes or mild swelling which may be pitting or non-pitting [69]. Lipaemia is bilateral and spares the feet. There is disproportionate pain, tenderness and a tendency to bruise easily.

4.8.4 Venous Disorders

- Presence of varicose veins
- Prior venous thromboembolism (VTE)
- Prior triggers for VTE
- Personal or familial clotting issues
- Prior superficial and deep venous interventions

Table 4.11 Common causes of peripheral oedema.

Unilateral		Bilateral	
Recent	Chronic	Recent	Chronic
DVT	Venous disease	Bilateral DVT	Chronic venous insufficiency
Infection	Post-DVT	Heart failure	Post-DVT
Haematoma	Lymphoedema	Liver failure	Post-orthopaedic lower limb surgery
Pulled muscle	Vascular malformation	Renal failure	Heart failure
Ruptured Baker's cyst	Infection	Bilateral cellulitis	Kidney failure
Insect/animal bite	Foot disorders	Foot disorders	Liver failure
Fracture		Medications	Idiopathic oedema
Soft tissue injury			Pregnancy
			Obesity
			Spinal cord injury
			Thyroid disorders
			Obstructive sleep apnoea

Recent = acute (less than 3 d) and subacute (3 d–3 mo); chronic is more than 3 mo.

Source: Gasparis et al. [64]/SAGE Publications/CC BY - 4.0.

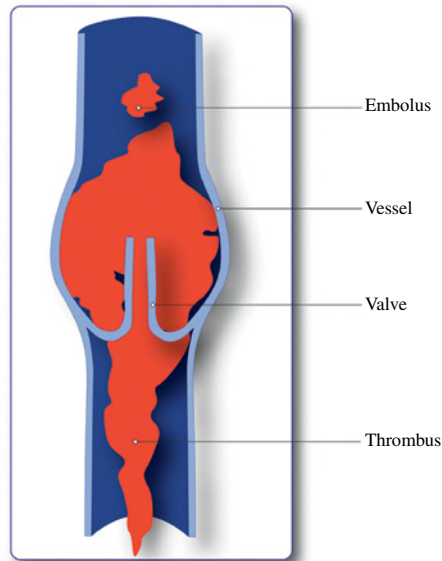
- Provoking events
 - Trauma
 - Prolonged bed rest
 - Lower limb interventions
 - Trauma
 - Prolonged bed rest
 - Joint arthroplasty
 - Arterial interventions
 - Vein harvesting for heart bypass
 - Previous abdominal or pelvic surgery
 - Malignancy
 - Radiation
- Features of sleep apnoea
 - May cause pulmonary hypertension, a common cause of leg oedema, loud snoring, apnoea, daytime somnolence, neck circumference >17 in.

The Wells score is a clinical prediction rule (CPR) for assessing the risk of DVT (Figure 4.8).

Further causes include medication such as calcium channel blockers (e.g. Amlodipine), prednisolone and non-steroidal anti-inflammatory drugs (NSAIDs). The three main systemic causes of peripheral oedema are heart failure, liver failure and kidney disorders including nephrotic syndrome.

4.8.5 Oedema in Heart Failure

Congestive heart failure is characterised by impaired ventricular function and poor peripheral arterial supply [71]. The precise mechanism of oedema formation in heart failure is unknown. Heart failure results in persistent



Clinical variable	Score
Active cancer (patient either receiving treatment within previous 6 months or currently receiving palliative treatment)	1
Paralysis, paresis, or recent cast immobilisation of the lower extremities	1
Recently bedridden for 3 or more days, or major surgery within the previous 12 weeks required general or regional anaesthesia	1
Localised tenderness along the distribution of the deep venous system	1
Entire leg swelling	1
Calf swelling at least 3 cm larger than the asymptomatic side (measure 10 cm below the tibial tuberosity)	1
Pitting oedema confined to the symptomatic leg	1
Collateral superficial veins (non-varicose)	1
Previously documented DVT	1
Alternative diagnosis at least as likely as deep vein thrombosis	-2

Scoring: -2 to 0 = low probability; 1-2 points = moderate probability; 3-8 points = high probability

In the trauma patients in this study, use of the rule achieved sensitivity of 100%; specificity of 90% and a ROC score of 0.859 ($p < 0.0001$)

Figure 4.8 Wells prediction score for lower limb DVT. *Source:* Modi et al. [70]/Springer Nature/CC BY 4.0. Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0>) applies to the data made available in this article, unless otherwise stated.

activation of neurohormonal systems including the renin-angiotensin-aldosterone (RAAS), sympathetic nervous system, endothelin-1 (ET-1) and anti-diuretic hormone (ADH). This is due to the combined reduction in cardiac output and renal perfusion. This activation results in a combination of effects including sodium and water retention, vasoconstriction, increased central venous pressure associated with renal venous hypertension, congestion and increased abdominal pressure [71]. Heart failure is also characterised by (exceptionally) elevated levels of atrial natriuretic peptide (ANP) and brain natriuretic peptide (as compensatory mechanisms attempting to restore the status quo). However, the activated neurohumoral mechanisms can dominate the beneficial mechanisms leading to persistent sodium and water retention and cardiac remodelling (Figure 4.9).

4.8.6 Key Points in the History

Exploring oedema should include:

- Unilateral
- Bilateral
 - Equal or asymmetric
- Variation in severity and with time of day

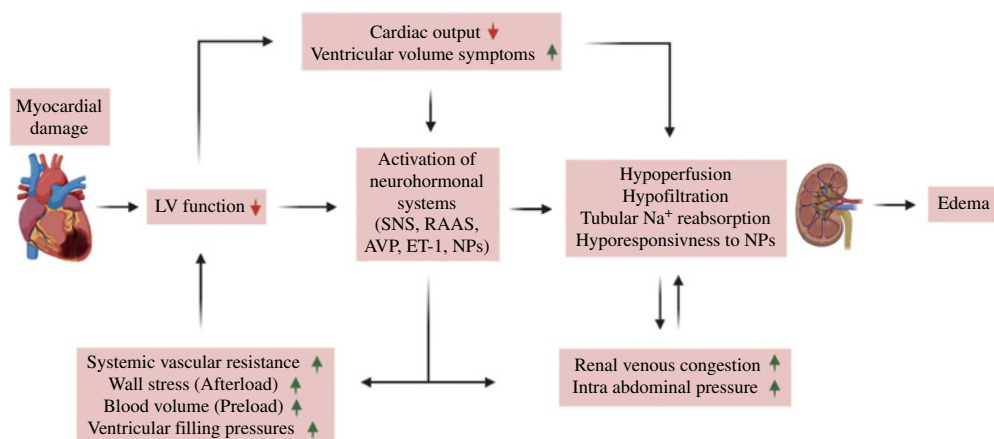


Figure 4.9 Mechanism of oedema formation in heart failure with reduced ejection fraction (HFrEF). *Source:* Abassi et al. [71]/ Frontiers Media/CC BY 4.0. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

- Associated symptoms
 - Asymptomatic
 - Aching
 - Pain
 - Heaviness
 - Venous or lymphatic skin changes
- Mode of onset
 - Sudden
 - Gradual
 - Longstanding

4.9 Syncope

Syncope is a transient loss of consciousness, postural tone followed by spontaneous recovery [72]. It is sometimes referred to as ‘passing out’ or ‘fainting’. Pre-syncope is the sensation of being about to pass out. Syncope, along with other causes of light-headedness may overlap with causes of dizziness. It can occur solely due to cardiovascular causes or in combination with neurological, vestibular or psychological disturbance or a combination of causes from these systems (see Chapter 6).

Though frightening, most episodes have a benign cause. The commonest cause is vasovagal. The most serious causes are cardiac and include arrhythmias and heart valve abnormalities including ventricular tachycardia, atrioventricular (AV) block or aortic stenosis. Left ventricular dysfunction may be associated with degeneration of the conducting system and is a serious aetiological predictor for adverse syncopal events [72]. Where the aetiology of syncope is unclear, mental illness and substance abuse should be considered [73]. In the US, syncope accounts for 1–3.5% of visits to the emergency department [72]. Annual mortality is 0–12% in patients with a non-cardiac cause and 18–33% where there is an underlying cardiac cause [74].

I've had one or two flutters recently but thought nothing of it. I have been stressed at work and I thought that was the reason. Anyway, I got up after sitting at my laptop for a few hours, more than I should have done. When I got up, I suddenly felt really drained, you know tired, and I just didn't feel right....sort of as though I was about to pass out...lightheaded or dizzy I suppose. It didn't last long. One of the staff noticed I wasn't right, and they got me to sit down and rest my head on the desk. They brought me some water. I was ok after, I suppose, about 2-3 minutes. But someone rang and made me this appointment with you...

4.9.1 Pathophysiology

Syncope arises from decreased brain perfusion [74]. Causes can range from benign to life-threatening. To function, the brain requires a constant supply of glucose. Any interruption of this will cause a loss of consciousness. Maintaining cerebral blood flow requires normal cardiac output, systemic vascular resistance, mean arterial pressure and intravascular volume. Three-quarters of the blood is in the venous bed and any interruption of venous return leads to reduced cardiac output. An episode lasting more than a few minutes is not syncope and is more likely to be related to a seizure or other neurological process.

4.9.2 Evidence Base

Symptoms develop quickly, last only a short time and recovery is spontaneous and doesn't require resuscitation or treatment. Patients may experience symptoms including:

- Dizziness
- Light-headedness
- Nausea
- Vision is blurred or 'blacks out'
- Cold or clammy skin

Descriptions may include fainting, blacking out, funny turn. Symptoms can be triggered by prolonged standing, heat pain, fatigue and stress. The mechanism is vasodilatation (sympathetic withdrawal) and bradycardia (parasympathetic). There is a fall in blood pressure followed by loss of consciousness. There is no loss of sphincter control nor any tonic-clonic movement or confusion such as occurs after a seizure (see also Chapter 8) (Table 4.12).

4.9.3 Key Points in the History

The history should focus on duration, preceding events, precipitating events and post-event findings. Position of the patient – standing = vasovagal; supine = neurological. Past medical problems and details of medication are also important.

4.9.4 Differential Diagnosis

- Seizure disorder – aura, tonic-clonic activity, prolonged loss of consciousness, urinary and/ or bowel incontinence, tongue biting, confusion post-recovery
- Hypoglycaemia
- Panic attacks – impending gloom, palpitations, air hunger, tingling of perioral region and tips of fingers

Table 4.12 Causes of syncope.

Type or cause of syncope	Mean prevalence, % (range)
Reflex mediated	14 (8–37)
Situational	3 (1–8)
Cough	
• Micturition	
• Defaecation	
• Swallow	
Orthostatic	11 (4–13)
Medications	3 (0–7)
Psychiatric	1 (0–5)
• Neurological	7 (3–32)
• Migraine	
• Transient ischaemic attacks	
• Seizures	
• Subclavian steal syndrome	
Cardiac	
• Organic heart disease	3 (1–8)
– Aortic stenosis, hypertrophic cardiomyopathy, pulmonary embolism, pulmonary hypertension, myxoma, myocardial infarction, coronary spasm, tamponade, aortic dissection	
Arrhythmias	14 (4–26)
• Bradyarrhythmias	
– Sinus node disease	
– Second- or third-degree heart block	
– Pacemaker malfunction	
– Drug induced	
• Tachyarrhythmias	
– Ventricular tachycardia	
– Torsade de pointes	
– Supraventricular tachycardia	
Other	5 (0–7)
• Including carotid sinus syncope, hypoglycaemia, hyperventilation	
Unknown	39 (13–42)

Source: Kapoor [74]/with permission of Wolters Kluwer Health, Inc.

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5

Gastrointestinal

5.1 Overview

- Symptoms of the gastrointestinal (GI) tract are often described as upper and lower, reflecting how patients present
- Any symptom presenting from the GI tract should prompt inquiry about all the other symptoms in the GI tract to facilitate differential diagnosis
- Dysphagia (difficulty swallowing) should never be considered a normal part of ageing
- Right sided colonic tumours can cause bright red rectal bleeding
- Cultural factors such as diet and fasting should be accounted for as they affect symptoms

5.2 Global Burden of Gastrointestinal Disease

In 2019, there were 7.32 billion new cases and 2.86 billion prevalences of digestive diseases worldwide, resulting in 8 million deaths and 277 million disability adjusted life years (DALYs) lost [1]. There has been little change in incidence and prevalence between 1990 and 2019 [1]. Enteric infections are the main cause of new cases and deaths, while cirrhosis and chronic liver diseases have the highest prevalences [1]. Burden of disease is highest in low-sociodemographic index (SDI) countries. Enteric infections are the leading cause of death in low- and middle-SDI countries, while colorectal cancer (CRC) is the leading cause in high-SDI countries [1].

5.2.1 Ethnicity

A study of 11 ethnic groups in Scotland found appendicitis and diverticular disease to be low in most non-white groups, though risk ratios were higher for Irish men (176.0 [159.9–197.5]) and any mixed background woman (144.6 [107.4–194.8]) [2]. For ulcerative colitis, the risk ratio (RR) was high in Indian men (169.8 [109.7–262.7]) and Pakistani (160.8 [104.2–248.2]) men [2]. In Crohn's disease, the RR was 209.2 (149.6–296.6) in Pakistani men [2].

5.2.2 Lesbian, Gay, Bisexual, Transgender, Queer or Questioning (LGBTQ+)

Sex and gender minorities (SGM) may be at increased risk of some digestive diseases [3]. Research is not well established, but priorities are identified for conditions including alcohol-associated liver disease, non-alcoholic fatty liver disease, cirrhosis, hepatocellular carcinoma, hepatic adenomas, hepatitis C and hepatitis B [3]. Current

modelling of the risk of gastroenterological conditions is adapted from the Minority Stress Model, which links the effects of life stressors, psychosocial and behavioural factors and physiological factors experienced by SGMs to the risk of GI diseases [4].

5.3 Anatomy and Function

The gastrointestinal (GI) tract extends from the oropharynx to the anal sphincter [5]. It prevents toxins and injurious substances from entering the body. The main organs are the oesophagus, stomach, duodenum and jejunum, colon, rectum and anus (Figure 5.1). There are four main functions of the GI tract:

- Ingestion and digestion of food
- Nutrient absorption
- Secretion of water and enzymes
- Excretion of waste products

The stomach provides storage, sterilisation and digestive capacity; the duodenal and jejunum (small intestine) are sites of digestion and absorption; the small intestine discharges into the colon (large intestine), where water and electrolytes are salvaged. The rectum stores waste material (faeces) ready for elimination. Ingestion of food

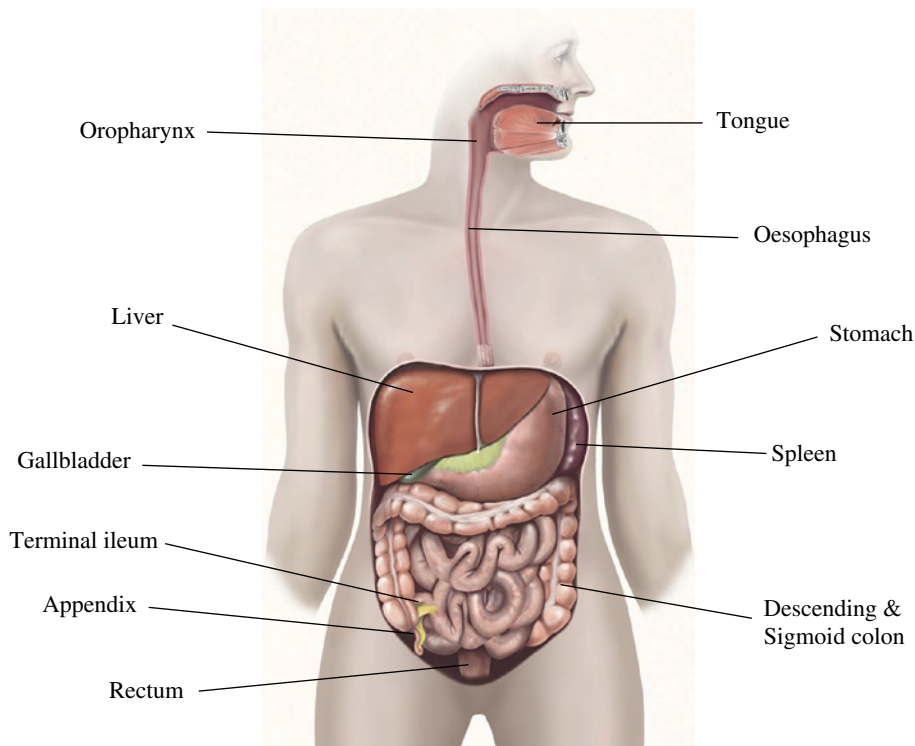


Figure 5.1 Anatomy of the gastrointestinal tract. Dr Joanna Butler, 2024/with permission of Medical Artist Limited.

Table 5.1 Exocrine and endocrine functions of the liver and pancreas.

	Exocrine	Endocrine	Synthetic
Liver	Bile production and metabolism		Conversion of glucose to glycogen Synthesis of low density lipoprotein (LDL) and high density lipoprotein (HDL) Albumin Clotting factors Triggering of local and systemic inflammatory responses Drug and toxin metabolism
Pancreas	Amylase – carbohydrate Lipase – lipids Trypsinogen Chymotrypsinogen Procarboxypeptidase	Insulin	

Source: Adapted from Ogobuiro et al. [6].

and elimination of waste are under voluntary control [6]. Ingestion coincides with social activity and bonding. Elimination can be a source of embarrassment to patients, which may delay the presentation of symptoms.

The secretory and digestive function of the GI tract is augmented by the pancreas and the liver. These ‘glands’ have both exocrine and endocrine functions and are integrated not only with the function of the GI tract but with other systems (Table 5.1)

5.3.1 The Enteric Nervous System

In addition to innervation from the sympathetic and parasympathetic nervous systems, the GI tract is innervated by the enteric nervous system (ENS). The ENS functions both with and without neural input from the central nervous system. It produces the ‘Law of the Intestine’ where stimulation of the gut muscle at a particular point produces excitation above and relaxation below facilitating peristalsis [7]. Functions of the ENS include peristalsis, nutrient handling, blood flow regulation and immune defence [7]. The ENS extends from the oesophagus to the anus and is situated in the walls of the GI tract [8]. The ENS functions independently of the central nervous system (CNS) include those regulating [9]:

- Peristaltic motor
- Secretory
- Immunological
- Non-propulsive mixing
- Slow orthograde propulsion
- Retropulsion of noxious substances
- Modification of nutrient handling
- Changing of local blood flow.

The ENS helps maintain the epithelial barrier of the mucosa in intestinal inflammation and interaction with the microbiome [9]. ENS dysfunction is relevant in functional disorders of the intestine (Chapter 14).

5.4 Key Gastrointestinal Symptoms

Symptoms arise from all parts of the tract. We will cover:

- Oral symptoms
- Difficulty swallowing
- Dyspepsia/acid reflux/indigestion
- Nausea and vomiting
- Vomiting blood
- Abdominal pain
- Bloating/distension
- Change in bowel habit
- Rectal bleeding
- Jaundice

5.5 How Common Are Gastrointestinal Symptoms?

With population ageing, the prevalence of gastrointestinal disease is expected to increase [10]. A population-based study of almost 72 000 people surveyed in the United States found almost two-thirds (61.2%) suffered gastrointestinal symptoms during the previous week (Table 5.2) [11].

Patients with GI symptoms do not always present to a clinician. Less than 20% of people with abdominal pain, bloating or diarrhoea consult for diagnosis and treatment of their symptoms [12].

5.5.1 The Mouth and Oropharynx [5]

The mouth is the opening of the upper GI tract. It begins at the lips and extends to the tonsils, then continues into the oropharynx. The oropharynx extends from the back of the nasal airways to the cricoid cartilage, where it becomes the oesophagus. The mouth consists of the lips, the cheeks and buccal mucosa and the vestibule – between the lips, cheeks, teeth and gums

Table 5.2 Prevalence of GI symptoms in a US population during the previous week.

	Prevalence (%)
Heartburn/reflux	30.9
Abdominal pain	24.8
Bloating	20.6
Diarrhoea	20.2
Constipation	19.7
Nausea/vomiting	9.5
Difficulty swallowing	5.8
Bowel incontinence	4.8

Source: Adapted from Almario et al. [11].

The mouth gives form and definition to the face. Disorders of the mouth may have an effect on the appearance and social function of the patient and impact self-esteem and well-being.

5.5.2 Functions of the Mouth

The mouth has three main functions – ingestion of nutrients, speech and assistance in breathing. The function of the mouth includes chewing, tasting and swallowing. Food is chewed to break it down. The release of saliva lubricates movement of the food bolus into the oropharynx and oesophagus. Salivary amylase initiates the digestion of starch.

5.5.3 What Are the Key Mouth and Oropharyngeal Symptoms?

- Appearance of the tongue
- Bad breath (halitosis)
- Ulceration
- Bleeding

5.5.4 Mouth Ulceration

An ulcer occurs when there is loss of mucosa inside the oral cavity. Symptoms of mouth soreness include:

- Tingling or burning sensations
- Difficulty eating (especially spicy or salty foods)
- Blistering
- Bleeding
- Ulceration
- Dysphagia (difficulty swallowing)

5.5.4.1 Pathophysiology

The mechanism of oral aphthous ulcers is not wholly clear. It involves cell-mediated inflammation involving TNF-alpha (tumour necrosis factor-alpha). Major causes of a painful mouth include:

- Aphthous ulceration
- Dermatological disorders
- Gluten enteropathy
- Inflammatory bowel disease (IBD)
- Iron/folate/B12 deficiency
- Alcohol
- Smoking

5.5.5 Key Points in the History

- Oral hygiene practices
- Piercings
- Previous dental work
- Non-healing of ulcer

5.6 Difficulty Swallowing (Dysphagia)

Difficulty swallowing is a feeling of delay in the passage of solid or liquid from the oropharynx through the oesophagus to the stomach. Difficulty swallowing may be painful (odynophagia).

Dysphagia occurs first usually for food and later for liquids. Dysphagia may occur only for liquids (e.g. neurological) or involve complete physical obstruction for all foods (anatomical). Dysphagia may persist due to the impaction of food. It may be intermittent or occur every time. For a definitive diagnosis, investigation should demonstrate slowing of transit at some point between mouth and stomach [13]. Patients may present with functional dysphagia where there is a sensation of delayed swallowing but no objective delay in transit of either solid or liquid.

5.6.1 Anatomy

The oesophagus begins at the lower border of the cricoid cartilage (C6 level) and is continuous superiorly with the laryngopharynx [14]. It is approximately 25 cm long and passes into the superior mediastinum between the trachea and the vertebral bodies of T1 to T4. An opening in the right crus of the diaphragm (oesophageal hiatus) at T10 allows the oesophagus to pass into the abdomen. Only 1.25 cm of the oesophagus lies within the abdomen. It joins the cardia of the stomach at the level of T11. Anatomical relations of the oesophagus within the mediastinum cause four areas of physiological constriction where objects such as food are more likely to become stuck:

- Arch of the aorta
- Bronchus (left main)
- Cricoid cartilage
- Diaphragmatic

5.6.2 Mechanism of Normal Swallowing

Swallowing involves coordinated action of the muscles of the tongue, mastication, pharynx and larynx [14]. There are three distinct phases:

- Oral
 - Preparatory
 - Propulsion into the oropharynx
- Pharyngeal
 - Nasopharyngeal closure
 - Airway protection
 - Elevation of the hyoid-laryngeal complex
 - Bolus transport through the upper oesophageal sphincter
- Oesophageal
 - Movement inferiorly to the stomach by peristalsis

Swallowing is a complex process. Neurological deficits, obstruction, fibrosis, structural damage or congenital and developmental conditions can all result in dysphagia. Though dysphagia is divided for purposes of description and learning into higher (oropharyngeal) and lower (oesophageal), the disease may affect both upper and lower regions

5.6.3 Pathophysiology of Dysphagia [15]

Dysphagia arises from obstruction of the lumen or dysmotility of the oesophageal walls. Obstruction arises from either a lesion within the oesophagus (intrinsic) or from compression of the oesophagus by a structure within the

throat or mediastinum (extrinsic). Anatomical causes of dysphagia cause symptoms with solids, particularly those of large size. Dysmotility occurs with both solids and liquids since neuromuscular coordination is required to propel both solids and liquids from mouth to stomach.

5.6.4 Classification of Dysphagia

The mechanism of swallowing can be used to classify dysphagia into four types based on anatomical site [16]. At each site, pathologies may arise from either obstructive or motility symptoms (Table 5.3).

5.6.5 The Patient Experience

‘It started quite gradually. There was this occasional feeling I had to think about how I swallowed my food, usually a piece of meat or bread. It was only momentarily. I thought it must be stress or anxiety. Then it began to happen more often and for smaller pieces of food. I found I was choosing softer or smaller foods when I was out for a meal. Then for the first time I remember spluttering when I tried to drink some water as though I couldn’t swallow it. It was embarrassing as we were out, and I think people thought I’d been drinking. The family started talking about it openly and telling me they’d noticed my eating habits had changed and I was eating smaller meals. They noticed I was drinking water with my meal which I never do. I’m always the last to finish’

Individuals may also have developed strategies for coping or masking their symptoms. These include:

- 1) Eating more slowly
- 2) Wearing multiple layers of clothing to conceal weight loss
- 3) Drinking fluids to facilitate swallowing of solids

Table 5.3 Causes of dysphagia based on anatomical site and phase of swallowing.

	Obstruction	Motility
Oropharyngeal	Oesophageal carcinoma Congenital web Zenker’s diverticulum	Upper oesophageal dysfunction Cerebrovascular disease Parkinson’s disease Peripheral neuropathy Myasthenia gravis Myopathy
Oesophageal	Oesophageal carcinoma Reflux oesophagitis Peptic stricture Schatski ring	Diffuse oesophageal spasm Achalasia Vigorous achalasia Scleroderma Diabetes mellitus
Oesophagogastric	Gastric carcinoma Stricture	Achalasia
Paraoesophageal (extrinsic compression)	Thyroid goitre Cervical spine disease Left atrial enlargement Postsurgical scarring Lymphadenopathy (cervical or mediastinal)	

Source: Adapted from Azer et al. [16].

- 4) Avoiding social situations
- 5) Family and friends may notice a change in eating habits

Assessment of dysphagia may be helped by using questionnaires developed for use in general populations. These seek to characterise the symptom for chronicity, frequency, severity and associated symptoms. Examples include the Mayo Dysphagia Questionnaire and the Northwestern Questionnaire [17, 18].

Cranial nerve abnormalities may affect the oropharyngeal phase of swallowing, causing symptoms of drooling, nasal regurgitation, pulmonary aspiration and voice dysfunction.

Oropharyngeal symptoms

- Difficulty initiating a swallow
- Repetitive swallowing
- Coughing
- Nasal speech
- Drooling
- Loss of cough reflex
- Choking
- Dysarthria and diplopia
- Halitosis
- Recurrent pneumonia

With neurological causes:

- Hemiparesis
- Ptosis of eyelids and fatiguability – myasthenia gravis
- Stiffness, tremors and dysautonomia – Parkinson's disease
- Cervical dystonia/cranial nerve compression – hyperostosis or hindbrain herniation (Arnold–Chiari)

5.6.6 Evidence Base – Epidemiology

Difficulty swallowing is always a red flag symptom. It has good predictive value for gastro-oesophageal cancer with 3–5% having this diagnosis. Mild motility changes may occur with ageing and are rarely symptomatic [19]. Dysphagia in an older person should never be assumed to be due to ageing. Incidence rises with age affecting 6–9% in the 30–64-year-old age group and 16–22% of the over 50-year-old group. Careful history-taking may localise the cause to either the oropharyngeal or oesophageal region in 80–85% of patients. Patient localisation is not entirely reliable and does not preclude the need to investigate the whole of the upper GI tract in making a diagnosis [20–22].

Associated symptoms can facilitate localisation of a cause. Oropharyngeal dysphagia may co-present with voice changes, nasal regurgitation or increased coughing around meals. Where regurgitation occurs, the volume regurgitated may provide a clue, with increased volumes suggesting a lower oesophageal disorder [13]. In lower oesophageal disease, scleroderma and multiple sclerosis, myasthenia gravis and Parkinson's disease may all produce oropharyngeal dysphagia (Table 5.4). It is important to screen for these other causes and not assume the cause is a primary oesophageal one. The patient's description may help to classify causes (Figure 5.2) [13].

5.6.6.1 Historical Factors in Oesophageal Dysphagia

- Dysphagia for solids and liquids implies a neuromuscular cause; intermittent dysphagia with chest pain reinforces this [15].
- Progressive symptoms suggest peptic stricture or carcinoma. Peptic stricture is often associated with previous heartburn and regurgitation but no weight loss. Malignancy is also likely if progressive, the duration is less than four months, dysphagia is greater for solids than liquids and there is weight loss.

Table 5.4 Classification of causes of oropharyngeal dysphagia by abnormality.

Anatomical	Neurological	Muscular
Retropharyngeal abscess	Amyotrophic lateral sclerosis	Head/neck surgery
Enlarged thyroid	Cerebrovascular accident	Muscular dystrophy
Head/neck surgery	CNS tumour	Myasthenia gravis
Oesophageal web	Head/neck surgery	Polymyositis
Osteophyte	Multiple sclerosis	Radiation injury
Tumour	Myotonic dystrophy	Thyroid disease
Zenker's diverticulum	Parkinsonism	
	Post-polio syndrome	
	Radiation injury	
	Supranuclear palsy	

Source: Abdel Jalil et al. [13]/with permission of Elsevier.

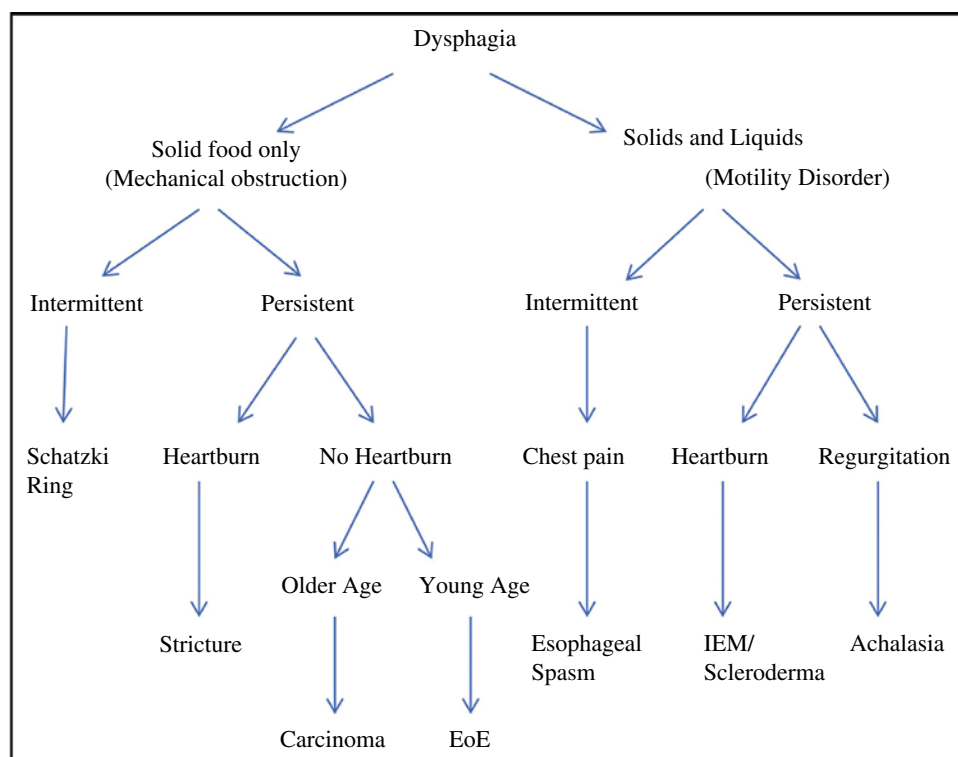


Figure 5.2 Causes of dysphagia based on patient's symptoms. NB: Please use British spelling for this caption. Symptom differential of common causes of oesophageal dysphagia. Overlap exists among the features. Persistent dysphagia represents more severe disease that requires earlier medical attention. EoE = eosinophilic oesophagitis; IEM = ineffective oesophageal motility. Source: Abdel Jalil et al. [13]/with permission of Elsevier.

- Intermittent dysphagia with food impaction especially in young men, eosinophilic oesophagitis should be considered.
- Achalasia may be present where:
 - There is passive nocturnal regurgitation of mucous or food
 - Symptoms have been present for months or years
 - Patient takes additional measures – drinking or changing body position.
- In younger patients, dysphagia is usually caused by muscle disease, webs or rings and in older people by CNS disease (e.g. Stroke, Parkinson's and dementia) [23]. Oropharyngeal dysphagia complicates 67% of strokes and is particularly prevalent in nursing homes. There is an increased risk of aspiration.

5.6.7 Key Points in the History

Risk factors for mechanical obstruction include [15]:

- Dysphagia for solids alone
- Progressive
- Older age
- Male sex
- Alcohol misuse/smoking
- Obesity
- Gastro-oesophageal reflux

Pitfalls in the evaluation of dysphagia include:

- Site of symptoms is not reliable for the site of obstruction.
- Dysphagia is not the feeling of hunger being quickly satisfied or being unable to finish a meal.
- It is not the feeling of a lump in the throat – this is GLOBUS.
- GLOBUS does not interfere with swallowing and is unrelated to eating.

5.7 Dyspepsia

Dyspepsia suggests a discomfort around the upper abdomen. It was described over 2000 years ago [24]. Dyspepsia is a complex of symptoms originating in the upper GI tract. There is disagreement about which symptoms should be included in the definition [24]. A broad definition includes any symptom referable to the upper GI tract. Differences and misunderstandings in definition present difficulties for both patients and doctors. These miscommunications or misunderstandings can increase the risk of diagnostic delay or misdiagnosis [25].

Descriptions used include:

- Feeling uncomfortably full or heavy
- Belching or flatulence (passing wind)
- Bringing food or fluid back up from your stomach (reflux)
- Bloating
- Feeling sick (nausea)
- Vomiting
- Acid

5.7.1 Anatomical Site

A disorder arising around the level of the gastro-oesophageal junction.

5.7.2 Anatomy and Physiology of the Stomach

After chewing and swallowing, the next stage of digestion occurs in the stomach [26]. The stomach is in the upper abdomen. It is a large, muscular organ that holds food temporarily. This enables partial digestion and mechanical breakdown of food. The cardia, body and fundus relax as food enters from the oesophagus allowing the stomach to hold more food. Waves of contractions break down the food, enabling chemical digestion to begin. With each wave of contraction towards the pylorus, the pyloric sphincter relaxes allowing a small amount of chyme into the first part of the duodenum. Three movements are associated with gastric motility:

- Peristaltic wave – longitudinal contractions
- Segmentation – mixing component – rhythmic contraction of the circular muscle layer
- Ancillary movements – stomach relaxation – mediated by parasympathetic nerves during swallowing.

The stomach wall produces hydrochloric acid (HCl), pepsin and intrinsic factor (necessary for the absorption of vitamin B12), which play an essential role in chemical digestion and absorption. Gastric acid secretion and peristaltic propulsion are controlled and integrated by the ENS, parasympathetic nervous system and neurohormonal secretion by the gastric mucosa [27].

5.7.3 Hiatus Hernia

A hiatus hernia is an anatomical abnormality in which the upper part of the stomach bulges through an opening (hiatus) in the diaphragm through which the oesophagus passes from the thorax and into the peritoneal cavity to connect to the stomach (Figure 5.3) [28]. This compromises the function of the lower oesophageal sphincter allowing gastric acid and stomach contents to ‘reflux’ back into the oesophagus. There are four types of hiatus hernia though 95% are sliding with most of the remainder being paraoesophageal. Anatomical abnormality may prevent the stomach from returning to its normal position during swallowing. Hiatus hernia is common in North America and Western Europe but rare in rural Africa [29]. Risk factors include [28, 30]:

- Increasing age – 55–60% of over-50s have hiatus hernias; 9% have symptoms
- Increased intra-abdominal pressure
 - Obesity
 - Pregnancy

Figure 5.3 Gastro-oesophageal reflux due to hiatus hernia. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited.



A hiatus hernia compromises function of the lower oesophageal sphincter allowing gastric acid and stomach contents to ‘reflux’ back into the oesophagus.

- Chronic constipation
- chronic obstructive pulmonary disease (COPD)
- Gender – commoner in females
- Trauma
- Previous surgery
- Genetic

Complex interplay of gastric anatomy, physiology and function produces a range of symptoms that may be described by patients, and heard by listening clinicians, in a variety of ways that, if not carefully explored and defined can lead to misunderstanding and misdiagnosis [25].

There may be both an anatomical cause (e.g. hiatus hernia) and a physiological cause (acid reflux) for the symptoms. Symptoms may be classified:

- Reflux-like dyspepsia (heartburn predominant)
- Ulcer-like dyspepsia (epigastric pain relieved by food or antacids)
- Dysmotility-like dyspepsia (accompanied by nausea, belching, bloating and early satiety)

Patients may experience an overlap of these different symptoms.

5.7.4 The Patient Experience

The interval from first presentation to diagnosis may be lengthened by misunderstanding the patient's description of their symptoms [25] (Figure 5.4). While the significance of 'difficulty swallowing' is apparent to both clinician and patient, the understanding of terms such as heartburn, reflux and indigestion can differ for both parties [25]. Since patients often do not present spontaneously all symptoms experienced at the first presentation, both a mutually agreed ('What do you mean by that?') definition as well as a detailed exploration for other associated symptoms around the upper GI tract are essential.

'I get this burning feeling behind my breastbone; I don't think it's my heart. It seems to be worse when I've eaten something spicy particularly if I've had a couple of pints of beer with it. I start to feel a bit queasy over the next couple of hours. Then I'll wake up with bad heartburn and acid. Sometimes I dream I'm about to be sick and wake up with a mouth full of acid. I have to get up and drink water and take some antacid. It makes me cough as well. Every time I say to myself never again....'

5.7.5 Evidence Base

Dyspepsia affects approximately 25% of Western populations [31]. Accurate estimates of community prevalence depend on the definition used with up to 40% when a broad definition is used and 25% when the Rome criteria are used [24]. Gastric carcinoma is the fourth most common malignancy and the second-deadliest [31]. *Helicobacter pylori* is challenging to treat and around 20% of infected people continue to experience dyspepsia over their lifetime.

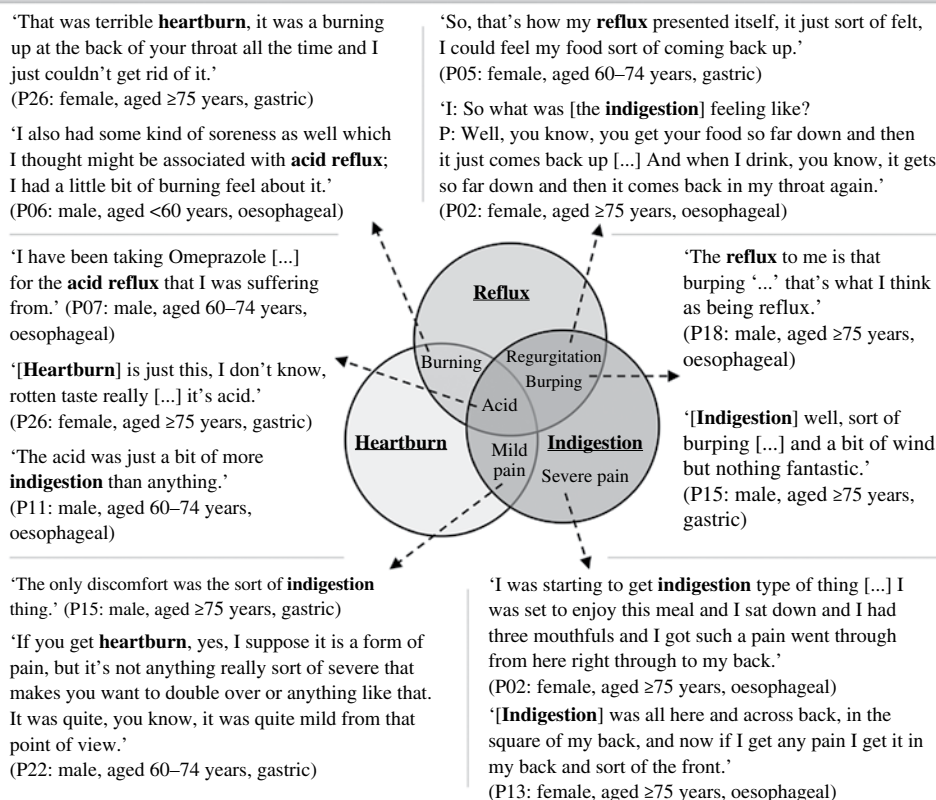
Prevalence is higher in younger age groups, females, lower socioeconomic status, use of NASIDS and positivity for *H. pylori* [32]. The incidence of dyspepsia in the United Kingdom is around 3% [33].

Possible aetiologies for dyspepsia include: [24]

- Peptic ulcer disease (PUD)
- Gastroesophageal reflux disease
- Gastroesophageal cancer
- Functional dyspepsia (Chapter 14)

A. Participant perspectives

Based on interview narratives, this figure represents participant understanding of the symptoms associated with heartburn, reflux and indigestion, and illustrates the perceived overlap between the three conditions.



B. Clinical perspectives

Definitions based on the American College of Gastroenterology and the Canadian Association of Gastroenterology guidelines on dyspepsia³⁵, and the Montreal definition and classification of gastroesophageal reflux diseases³⁶ as recommended by the American Gastroenterological Association³⁷

- **Heartburn:** "Burning sensation in the retrosternal area (behind the breastbone)."³⁶
- **Reflux:** "The presence of troublesome heartburn and/or regurgitation", with regurgitation defined as "the perception of flow of refluxed gastric content into the mouth or hypopharynx". Patients may also experience "epigastric pain or sleep disturbance".³⁶
- **Dyspepsia (indigestion):** "Predominant epigastric pain lasting at least 1 month. This can be associated with any other upper gastro intestinal symptom such as epigastric fullness, nausea, vomiting, or heartburn, provided epigastric pain is the patient's primary concern."³⁵

Figure 5.4 Patient perspectives on upper gastrointestinal symptoms. *Source:* Humphrys et al. [25]/British Journal of General Practice/CC BY – 4.0.

A systematic review of seven studies where upper GI endoscopy was performed in unselected patients with dyspepsia found erosive oesophagitis to be the commonest significant finding followed by PUD. Malignancy was rare and remaining patients had structurally normal GI tracts (Table 5.5) [35].

Dyspepsia follows a relapsing and remitting course [33]. Two-thirds have long-term symptoms. Some patients' symptoms resolve spontaneously while others fluctuate. Around 40% of those with symptoms will consult their GP.

Table 5.5 Prevalence of clinically significant endoscopic findings in individuals with dyspepsia.

Endoscopic findings	Number of studies	Number of subjects	Pooled prevalence	95% CI	I^2 , %	P value for I^2
Erosive oesophagitis	12	3435	12.0	3.6–24.2	98.8	<0.001
Barrett's oesophagus	10	3004	0.6	0.0–1.9	87.4	<0.001
Peptic ulcer	14	3965	7.2	4.0–11.1	94.2	<0.001
Gastric ulcer	11	3125	2.7	1.4–4.3	83.8	<0.001
Duodenal ulcer	11	3125	3.3	1.1–6.4	94.2	<0.001
Gastric cancer	11	3350	0.006	0.0–0.12	0.0	—
Oesophageal cancer	11	3350	0.12	0.0–0.02	0.0	—

Source: Nasseri-Moghaddam et al. [34]/with permission of Elsevier.

Table 5.6 Alarm features of the history for upper GI malignancy in patients presenting with dyspepsia.

Age over 45 years
Male
Family history of upper GI malignancy
Alcohol
Smoking
Dysphagia
Odynophagia
Bleeding from the GI tract – haematemesis or melaena
Persistent vomiting
Iron deficiency anaemia
Unintentional weight loss

Consultation rates are increased with age and lower social class. Thresholds for consultation include symptom severity, frequency, duration and concerns about possible diagnosis [24]. The presence of one or more alarm features has a pooled sensitivity and specificity of 67% and 66% for diagnosis of upper gastrointestinal malignancy [36]. Where individual alarm features of weight loss, anaemia and dysphagia are examined separately the pooled sensitivities ranged from 13% to 49% and specificity from 85% to 95% [36]. The low sensitivities mean many patients need to be referred to detect a low number of cancers.

The main causes of dyspepsia include (Table 5.6):

- Functional (50–60%)
- PUD (15–20%)
- Reflux oesophagitis (5–15%)
- Gastric or oesophageal cancer (<2%)
- Absence of alarm symptoms is a useful diagnostic predictor (negative predictive value [NPV] = 99%)

5.7.6 Key Points

This is a common group of symptoms affecting up to 80% of the population. Most cases are functional in origin.

It is important to establish exactly what the patient means by ‘indigestion’, ‘heartburn’ or whatever term they use to describe their symptoms. Your approach should be:

- Describe your symptoms
- Symptoms can be vague
- Is it acute/chronic/acute-on-chronic?

Patients may describe the symptoms as worse after meals, or on stooping or lying down. They may experience a cough, which is also worse on lying down. Acid reflux should be considered as a cause of any unexplained chronic cough.

The following may cause relaxation of the oesophageal sphincter:

- Alcohol
- Chocolate
- Caffeine
- A fatty meal
- Theophylline
- Calcium channel blockers
- Anticholinergic drugs

5.8 Nausea and Vomiting

Nausea is the sensation of wanting to vomit, while vomiting is the expulsion of gastrointestinal contents via the mouth. Both are triggered by a wide variety of causes. It is likely to have evolved as a mechanism for ridding the body of noxious substances.

5.8.1 Anatomical Site

These sensations are felt in the upper GI tract particularly the throat, oesophagus and stomach [15]. The symptom is a reflex arc. The afferent arm has chemoreceptors in the stomach and small intestine, stretch receptors in the stomach and chemoreceptors outside the blood–brain barrier in the medulla oblongata.

5.8.2 Pathophysiology

Irritation and overdistension of these organs results in peristalsis with reverse flow of contents through the small bowel and stomach [15]. Strong rhythmic contractions occur in the duodenum, stomach and abdominal muscles. Vomiting empties the proximal GI tract and relieves stimulation of chemoreceptors and stretch receptors responsible for nausea. Patients will often feel better after vomiting (Figure 5.5) [37].

5.8.3 Patient Experience

Patients may feel dizzy and lightheaded. Nausea does not always lead to vomiting. Nausea and vomiting promote food aversion and avoidance of noxious stimulants. These promote triggers based on sight, sound and smell previously experienced.

‘I get these waves of nausea sometimes where I have to rush outside to get some air. It can be brought on by strong smells, nothing particularly though tarmac and car fumes can do it sometimes. There is a lot of building going on near where I work. Walking past there each morning with all the noise means I arrive feeling quite lightheaded and unwell’

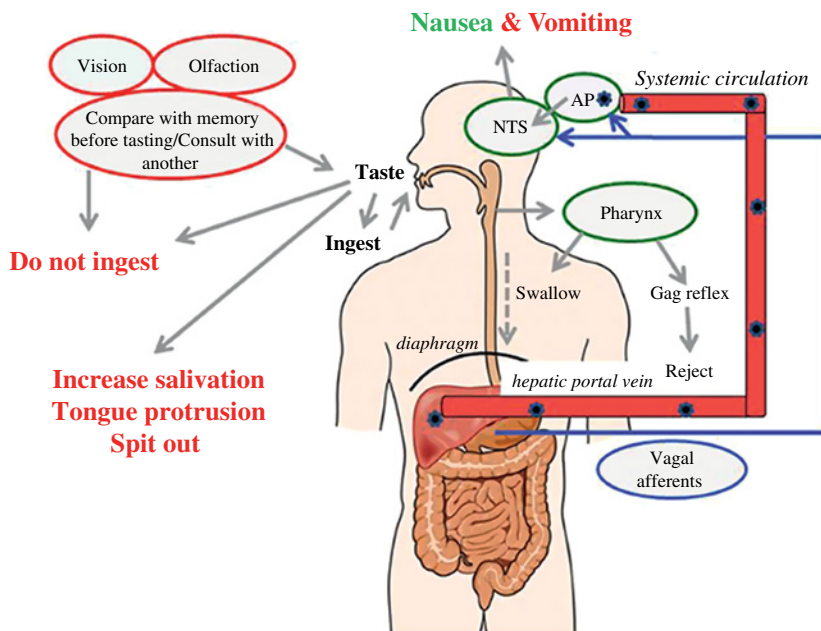


Figure 5.5 Initiation of nausea and vomiting. NTS = nucleus tractus solitarius and AP = area postrema. Source: Sanger and Andrews [37]/Frontiers Media/CC BY – 4.0.

5.8.4 Evidence Base

Acute causes include infection (viral, ‘food poisoning’), gastritis or small bowel obstruction [15]. Nausea and vomiting may signify systemic disease (e.g. myocardial infarction) and should be assessed as part of the overall presentation of symptoms. Pathology beyond the pylorus may produce bile staining of the vomit.

Patterns of vomiting may suggest different causes. Self-limiting, repetitive vomiting usually has a toxic or viral cause. Patients with mechanical obstruction of the pylorus or proximal duodenum secondary to tumour, scarring or oedema due to peptic ulcer or pancreatitis may eat normally only to later vomit a large amount without warning. The vomitus may contain evidence of earlier meals. Bile or faeces in the vomitus provide clues to the level of obstruction.

A psychological component exists for nausea and vomiting. In anorexia or bulimia nervosa, patients may induce vomiting by stimulation of the pharynx and learn to vomit spontaneously. The patient may vomit after eating or drinking only small amounts, though sufficient to trigger chemo- or stretch-receptors. This is often a learnt phenomenon. It is prominent in patients with gastric dysmotility, and young females. Patients may report vomiting everything ingested but still maintain their weight and hydration status. Cyclical vomiting syndrome is characterised by repeated vomiting following a migraine-like onset.

Causes include:

- Alcohol
- Drugs
 - Digoxin
 - Opiates
 - Chemotherapy
 - non-steroidal anti-inflammatory drugs (NSAIDs)
- Eating disorders
- First trimester of pregnancy
- Gastric paresis/gastroenteritis
- Hepatobiliary disease

- Migraine
- Pancreatitis
- Pain
- PUD
- Psychogenic
- Raised intracranial pressure
- Vestibular disorders

5.8.5 Alarm Features

- Abdominal pain
- Associated with dizziness, etc.
- Chest pain
- Head injury/headache
- Ingestion of toxins
- Pregnancy
- Upper gastrointestinal bleeding
- Ingestion of toxins

5.9 Haematemesis

Where vomitus contains blood, it is referred to as haematemesis. Any GI bleeding is a symptom of a disease or condition, rather than a disease or condition itself. Acute GI bleeding is sudden and can sometimes be severe.

5.9.1 Anatomical Site

This originates between the mouth and the small bowel (Figure 5.6).

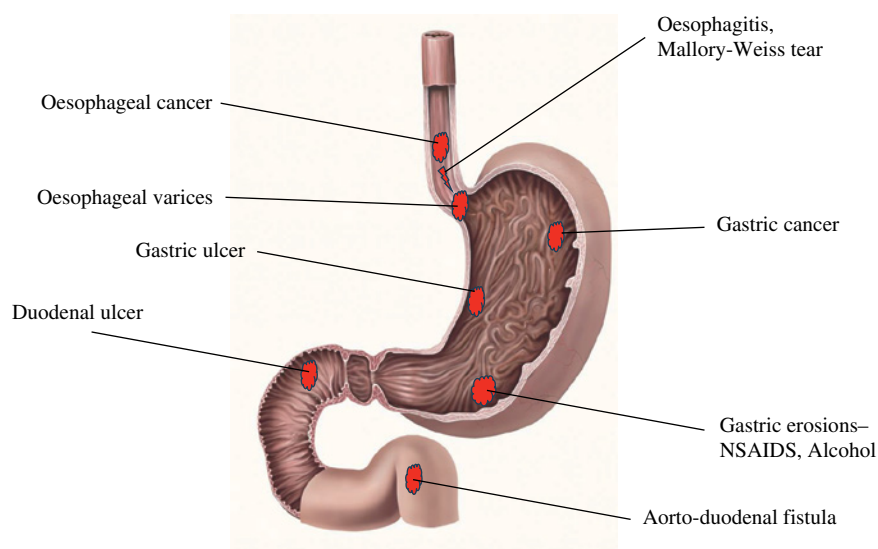


Figure 5.6 Conditions associated with upper gastrointestinal bleeding. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited.

5.9.2 Pathophysiology

Gastrointestinal (GI) bleeding results from disruption of the arteries supplying the GI tract. Lesions bleed into the lumen leading to blood being expelled in the vomitus. Prolonged retching or vomiting (e.g. after binge drinking) may cause a tear of the lower oesophageal mucosa and result in blood staining the vomitus (Mallory-Weiss tear).

5.9.3 Patient Experience

‘I have been getting quite a lot of tummy pains especially after eating. I thought it was just indigestion but then I was feeling sick and started to vomit. After a few times the colour changed from just being food to getting dark bits in it. Not exactly bright blood but much darker and I was worried. It’s not normal to vomit up blood...is it?’

5.9.4 Evidence Base

The main diagnoses to be considered in haematemesis are:

- PUD
- Oesophageal or gastric varices
- Angiodysplasia
- Upper GI cancer
- Severe oesophagitis or gastritis

5.10 Abdominal Pain

Pain arising from the structures of the alimentary tract (visceral pain) or from irritation/inflammation of the peritoneum. Definitions vary but pain may be further defined: [38]

- Acute – it develops over several minutes and may persist for up to 30 days
- Sub-acute – lasting one to three months
- Chronic – present for several months, usually longer than three months
- Non-specific – poorly localised on clinical examination and does not easily relate to the anatomy of underlying structures
- Referred – felt distant to the site of origin of the pain

A useful definition of chronic pain is that ‘which extends beyond the expected period of healing’ [39]. As well as the GI tract, the genitourinary tract should also be considered in the differential diagnosis of abdominal pain. Respiratory and cardiovascular causes should be considered in upper abdominal pain.

5.10.1 Anatomical Site

Pain may originate from:

- An alimentary organ
- The visceral peritoneum
- Parietal peritoneum
- The abdominal wall

Pain originating from the foregut is usually localised above the umbilicus, the midgut to the umbilical area and the hindgut to the suprapubic area. Pain may be felt in the chest or in the groins. It may radiate to the back and/or the thighs (e.g. abdominal aortic aneurysm). Generalised peritonitis may result in shoulder tip pain from

diaphragmatic irritation (Kehr's sign; C3–4). The abdomen is assessed as a discrete region to aid description and diagnosis of the cause in relation to underlying structures. The abdominal and pelvic cavities are continuous with one another. Structures outside the abdominal cavity may be painful and radiate, appearing to originate from within the abdomen (e.g. testes, ovary or inguinal hernia).

5.10.2 Pathophysiology

Causes of abdominal pain may be classified as:

- Distension of a viscus
- Mesenteric traction
- Excess smooth muscle contraction
- Inflammation of the peritoneum or abdominal wall

The origin of the patient's pain may be deduced from the description (Figure 5.7):

- Somatic – 'sharp, localised pain' – arises from the parietal peritoneum and is conducted by A-delta neurones
- Visceral – 'dull, aching pain'. Innervation is from bilateral autonomic slow C neurones with pain referred to the midline. It arises often from the distension of an organ or muscular contraction.

5.10.3 The Patient Experience

There are significant effects on general health perception, together with higher scores for anxiety and depression [40]. Reduction in quality of life is similar to patients with moderate angina [41].

'I get this pain in the left side of my tummy, it's quite dull and I think it is aggravated by alcohol. It makes me feel sick and I can't eat anything. I haven't been sick though. I can't face eating and I seem to be sensitive to foods which have never bothered me before. Sometimes, I get these intense episodes where it feels my guts have been taken and twisted round and round like you would ring out a dish cloth or something. It is so intense, and I just have to stop and wait for it pass off....it's a horrible feeling'

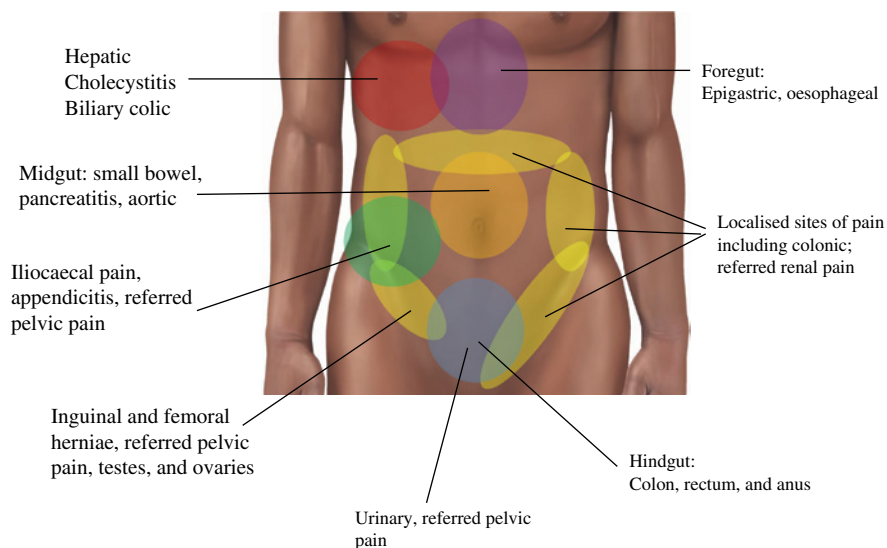


Figure 5.7 Sites of abdominal pain. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited.

5.10.4 Evidence Base

Virtually everyone experiences abdominal pain during life. There is a wide range of diseases from short, self-limiting conditions (e.g. gastroenteritis) to life-threatening conditions (e.g. ruptured abdominal aortic aneurysm) [42]. The UK General Practice Database reported an incidence of newly diagnosed unspecified abdominal pain of 22.3 per 100 person-years [43]. The incidence was higher in females. A systematic review of 14 studies in primary care found a mean consultation prevalence of 2.8% of patients per year [42]. Ninety percent of abdominal pain is chronic [42]. Patients with chronic abdominal pain may experience it from an acute episode or it may arise *de novo*. It can be intermittent or continuous. At one-year follow-up, patients with chronic pain have an increased risk of death relative to controls (RR = 2.8 [95% confidence interval [CI] 2.3–3.3]) with risk factors including old age, smoking, very low body mass index and prior history of cardiovascular morbidity [43].

Abdominal pain is a significant cause of morbidity accounting for 10% of all visits to emergency departments. Of this number, 25% require admission. There may be diagnostic uncertainty surrounding the symptom and ‘non-specific abdominal pain’ accounts for 33% of all diagnoses. Abdominal pain is associated with diagnostic error in primary care with an incidence of 13% [44]. Prevalence of any given cause depends on age. Urological and gynaecological causes also need to be borne in mind. The possibility of pregnancy should always be considered in females.

In the early stages, patients do not often feel pain over the whole abdomen. Instead, they localise it to an area of maximum intensity. Generalised pain across the abdomen particularly with physical signs may suggest peritonitis. Any approach to the patient should attempt to characterise the pain. The following can be helpful:

Site

Onset

Character

Radiation

Alleviating factors

Time course

Exacerbating factors

Severity

You should enquire about associated symptoms including those arising from other systems and their effect on daily life. Abdominal pain may show the following characteristics:

- Colicky (comes and goes)
 - Usually due to a hollow viscus (small or large bowel)
- Constant
 - Usually a solid organ (e.g. pancreas)
 - Biliary and renal colic cause constant increasing pain
- Sudden onset
- Preceding symptoms e.g. dyspepsia, constipation and vascular disease
- Development of shock
- Pain migration
- Change in nature of pain

Signs and symptoms of abdominal pain may change rapidly. You should listen to the patient’s description and examine the patient frequently. Caution should be exercised with the:

- Elderly
- Transgender (Box 5.1)
- Very young
- Diabetics
- Immuno-compromised
- Emotionally or mentally distressed

Box 5.1 Assessment of abdominal pain in Transgender patients

Introduce yourself and your role, and offer your pronouns. For example, *'Hi, my name is Dr. Smith, my pronouns are she/her, and I am one of the doctors here'*.

This lets the patient know you understand what it means to be transgender and creates a safe space for them to open up about their own identity. You can follow this up by asking for their name, pronouns and date of birth. This demonstrates your respect for their identity.

Take a history of the presenting complaint. Ask yourself which systems could be involved and keep an open mind.

If you suspect the reproductive organs could be involved, you need to ask about the patient's surgical history. If you know their transgender status from the notes, you could say, *'I have seen in your medical notes that you are transgender. To find out what's causing the problems you are experiencing, I will need to ask a few personal questions, is this okay?'*

Once you have consent, you might ask, *'Do you currently have a uterus and ovaries?'* If you do not have access to their notes and are unsure if they are transgender, you should take a detailed medication and surgical history, asking specifically whether they have ever been on hormone-replacement therapy.

Transgender Men

Those who have transitioned from female to male may still have their uterus and ovaries, so it is important to establish this. Even on long-term testosterone hormone-replacement therapy (HRT), trans men may still have persistent menses. Testosterone therapy is not an effective form of contraception. A full menstrual and sexual history should be taken. It is important to recognise that trans men may engage in receptive vaginal sex. It is therefore important to rule out differential diagnoses such as ectopic pregnancies, endometriosis and pelvic inflammatory disease. Long-term testosterone HRT can cause symptoms like post-menopausal vaginal atrophy, and abdominal cramping due to uterine atrophy which puts tension on surrounding ligaments and muscles. Trans men who are post-hysterectomy may have complications such as scar tissue and adhesions, so asking whether the surgery was an open, laparoscopic or vaginal approach is useful.

Transgender Women

Those who have transitioned from male to female will not have been born with a uterus and ovaries. If you know their transgender status from their notes, then you can rule out pregnancy and menstruation-related causes. You should still gain a detailed surgical history to discern whether they have had lower surgery, as surgical complications could cause symptoms. You might say, *'I noticed in your medical notes that you are transgender, to help me figure out what is going on, do you mind me asking if you have had any gender-affirming surgeries?'* Suppose you do not have access to the medical notes and are unsure whether a patient is transgender but want to rule out gynaecological causes. In that case, you should ask whether the patient has a uterus and ovaries. This is not impolite to ask, as many cisgender (non-trans) women have had hysterectomies and oophorectomies for medical reasons.

Additional information:

Adapted from UCSF 2016

5.11 Bloating and Distension

Bloating is a sense of fullness of the abdomen. In some cultures, the abdomen may be described as inflamed [45]. It occurs when gas, liquids or solids accumulate in the GI tract. Volume of gas in the tract increases following a meal. Patients may experience belching, abdominal cramps and flatulence. When these symptoms are severe enough to affect daily activity, they are categorised as disorders of gut–brain interaction (DGBIs) (see Chapter 14) [46].

Distension is a visible increase in abdominal girth. The patient may describe feeling ‘blown up’, ‘pregnant’ or the clothing being too tight. Bloating and distension may occur together or independently of one another.

Belching is an audible escape of air from the oesophagus or the stomach into the pharynx. It is excessive when it disrupts the patient’s usual activities and occurs on more than three days per week [47]. It is classed as supragastric, coming from the oesophagus and gastric belching arising from the stomach. Supragastric belching occurs more commonly in anxiety [48]. A global study of 73 000 adults found a 1% prevalence of belching disorders [49]. Aerophagia is excessive swallowing of air. The air moves into the small intestine and colon with bloating and flatulence as the main manifestations.

5.11.1 Anatomical Site

Bloating is felt in the upper abdomen. Belching occurs when gas or air accumulated in the stomach is expelled back via the oesophagus and oropharynx. Gas may also pass from the stomach into the small intestine to eventually pass as rectal gas (flatus). Flatus is a combination of swallowed air and gases produced by colonic bacteria on undigested carbohydrates. Gas around the hepatic flexure of the colon may mimic biliary pain while accumulation around the splenic flexure may radiate into the lower chest and mimic cardiac pain.

5.11.2 Pathophysiology

Everyone swallows air whilst eating. The volume of gas increases after a meal. Gastric distension and small bowel stimulation increase gas transit at this time. Intraluminal lipids cause retention of gas. Bloating and distension have five aetiologies [50]:

- Diet
- Small intestine bacterial overgrowth (SIBO)
- Constipation
- Visceral hypersensitivity
- Abdomino-phrenic dyssynergia

5.11.2.1 Diet

Artificial sweeteners often contain poorly absorbed sugar alcohols including sorbitol, mannitol and glycerol which may facilitate gas production [51]. Enquire about use of diet drinks, chewing gum and drink sweeteners. Lactose is the main carbohydrate found in milk and related products. Deficiency of lactase can lead to suboptimal digestion of lactose with increased gas and diarrhoea. Global prevalence of lactose intolerance is 68% and 36% in the United States [52].

5.11.2.2 Small Intestine Bacterial Overgrowth (SIBO)

This is the excess of normal bacteria with resultant excess gas production. It is not easily elucidated from the history though risk factors should be sought. Both definition and optimal method of diagnosis are not clearly defined [50]. Risk factors for SIBO are given in Table 5.7 [50].

5.11.2.3 Chronic Constipation

Fifteen percent of patients suffer chronic constipation, with many experiencing bloating [53]. In patients with irritable bowel syndrome (IBS) with constipation (IBS-C), over 90% experience bloating [54]. Patients with prolonged colonic transit time have greater distension than those with normal time [55]. Pelvic floor dysfunction with disco-ordination of relaxation and contraction of puborectalis and anal sphincter muscles may be present in nearly 50% of patients with chronic constipation [56].

Table 5.7 Risk factors for small intestine bacterial overgrowth (SIBO).

<i>Anatomical abnormalities</i>
Gastrointestinal surgery (Roux-en-Y gastric bypass, ileocaecal valve resection)
Small bowel stricture or fistula
Short bowel syndrome
Small bowel diverticulosis
Small bowel intussusception
<i>Gastrointestinal and motility disorders</i>
Gastroparesis
Delayed small bowel transit
Chronic intestinal pseudo-obstruction
Celiac disease
Pancreatic insufficiency
Atrophic gastritis
<i>Systemic disorders</i>
Connective tissue disorders (scleroderma, Ehlers-Danlos syndrome)
Amyloidosis
Immune deficiency
Diabetes mellitus
Hypothyroidism
Cirrhosis
Paraneoplastic syndrome
<i>Medications</i>
Proton pump inhibitors
Opioids
Anticholinergics

Source: Cangemi and Lacy [50]/with permission of Elsevier.

5.11.2.4 Visceral Hypersensitivity

Bloating and distension are common in patients with DGBIs (see Chapter 14). Bloating alone may be due to visceral hypersensitivity to normal or increased volumes of gas [50].

5.11.2.5 Abdomino-Phrenic Dyssynergia

The normal physiological response to increased intestinal gas is relaxation of the diaphragm and contraction of the abdominal muscles. This manoeuvre increases the ‘top to bottom’ length of the abdominal cavity and prevents anterior wall protrusion. Dyssynergia of diaphragmatic contraction and abdominal muscle relaxation has been demonstrated on CT scans of patients with IBS and functional bloating (Figure 5.8) [57].

5.11.3 The Patient Experience

These symptoms cause embarrassment, affect quality of life and contribute to work absenteeism [45]. Patients with reflux or dyspeptic symptoms may swallow increased air to aid symptom relief.

In lactose intolerance, patients may experience cramps, bloating and flatulence on eating milk, some cheeses or ice cream because they lack the enzyme lactase required to digest lactose. Patients with IBS may be more sensitive to normal or slight increases in volume of gas in the gut with onset of cramps and bloating.

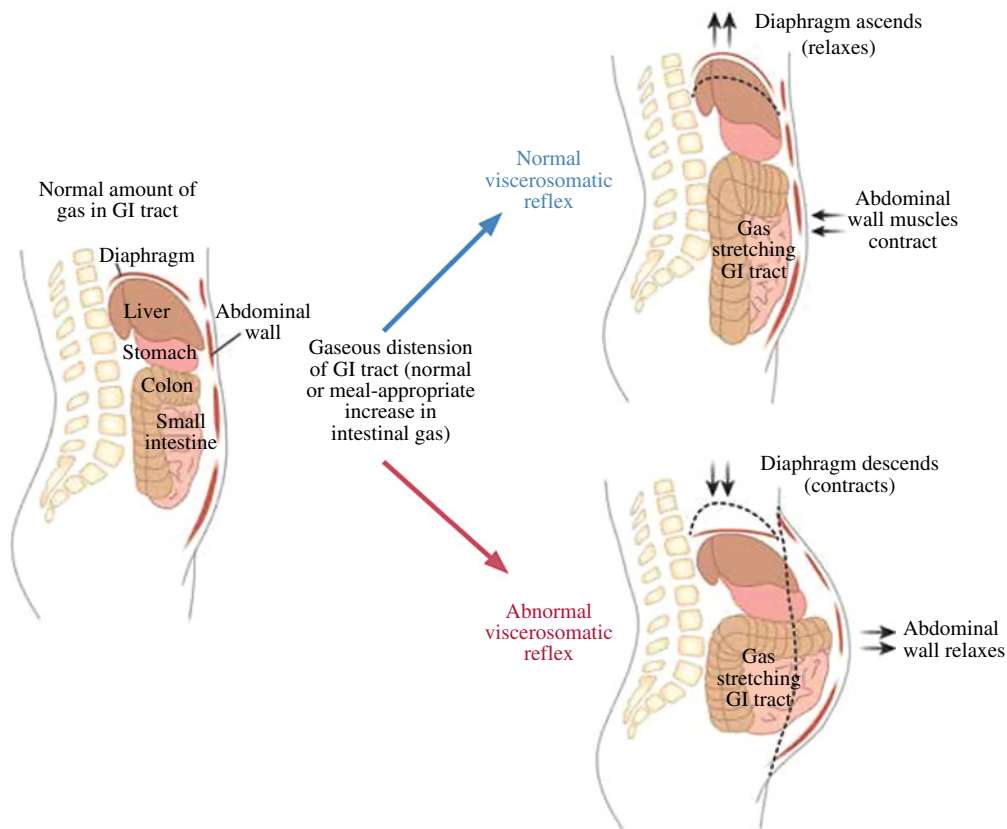


Figure 5.8 Abdomino-phrenic dyssynergia. *Source:* Cangemi and Lacy [50]/with permission of Elsevier.

Patients may present with apparent distension when standing up only for this to disappear on lying flat. This may occur post-pregnancy or deconditioning in all genders. It is due to weakness and loss of tone of the abdominal muscles.

5.11.4 Evidence Base

Functional bloating and distension have a global prevalence of 3.5% (4.6% in women and 2.4% in men) [49]. Both symptoms are much more prevalent when associated with DGBIs such as IBS, constipation and dyspepsia [45].

Carbohydrates from foods including cabbage, cauliflower, broccoli and beans cannot be digested by duodenal and jejunal enzymes. They reach the colon where they are then metabolised to hydrogen and carbon dioxide resulting in excessive flatulence.

Bloating and distension may be caused by bacterial overgrowth. This is an excessive number of normal bacteria in the small intestine. Increased production of gas by the bacteria produces symptoms.

Common organic aetiologies for abdominal bloating and distension are shown in Table 5.8 [50]:

5.11.5 History-Taking Tips

- Do you think the belching comes from your stomach or is it your gullet or throat?
- Are you passing an excessive amount of wind?
- Apply the Rome IV criteria (see Chapter 14) to assess for a functional disorder

Table 5.8 Causes of bloating.

Lactose, fructose and other carbohydrate intolerances
Coeliac disease
Small intestinal bacterial overgrowth
Pelvic floor dysfunction
Gastroparesis
Delayed small intestine transit
Mechanical obstruction
Chronic intestinal pseudo-obstruction
Pancreatic insufficiency
Hypothyroidism
Ascites
Central adiposity
Prior gastroesophageal surgery (bariatric surgery, fundoplication)
Gastrointestinal or gynaecological malignancy
Aerophagia

Source: Cangemi and Lacy [50]/with permission of Elsevier.

- Any nausea or vomiting?
- Any difficulty with constipation or bowel habits?
- Any dietary factors?

5.11.6 Red Flags

- Increasing frequency or severity of symptoms
- Presence of other associated or red flag symptoms

5.12 Change in Bowel Habit

A change in bowel habits refers to a change in stool frequency, consistency, colour or control of the bowel (incontinence). Diarrhoea is the frequent passage of loose stools. Constipation is the infrequent passage of hard stools. Abnormal changes in the colour of stool can include black, tarry stools or clay-coloured stools.

Historically, normal bowel frequency ranges from three times a day to three times a week [58]. A daily bowel habit occurs in a minority of men and women (40% versus 33%) [59]. Most people have irregular bowels with one-third of women defaecating less often than daily and 1% once a week or less [59]. Younger women are more likely to be constipated.

Patients are not always accurate in detecting a change in bowel frequency, though they are accurate at noting stool consistency [59]. A change in bowel habit may occur as the only symptom or it may be accompanied by blood either additional to the stool or by dark stools (melaena). Melaena suggests altered blood, which has originated from the upper alimentary tract.

5.12.1 Anatomical Site

Except for melaena, which originates from within or above the small bowel, these symptoms originate within the colon, rectum or anal canal.

5.13 Anatomy and Physiology of the Colon [60]

The colon processes chyme after most nutrients have been absorbed in the small bowel. By this stage, 90% of the water has been absorbed into the small intestine. The colon consists of four parts – the caecum and ascending colon, transverse colon, descending colon and sigmoid colon. Functions of the colon include:

- Absorbing water and electrolytes
- Producing and absorbing vitamins – particularly B and K
- Forming and propelling faeces towards the rectum

The ascending colon absorbs remaining water and nutrients, while faeces is stored in the descending colon. Contraction of the sigmoid colon increases colonic pressure and moves faeces into the rectum for storage until elimination. Disturbance of normal colonic function affects quality of life and leads to several possible conditions. One in 10 Americans over 40 years have diverticular disease and 3 million in the United States have IBD [61].

5.13.1 Pathophysiology

The pathophysiology associated with defecation can be subdivided into the following three conditions: diarrhoea, constipation and faecal incontinence. Diarrhoea is an increase in stool frequency, liquidity or volume. [11].

Constipation results from reduced transit through the colon. This leads to over-absorption of fluid from the stool resulting in dry, hard faeces. Conditions that constrict or obstruct the intestinal lumen may predispose to constipation.

Increased faecal transit through the colon with decreased absorption of fluid from the stool results in diarrhoea. Irritation and hypermotility of the mucosa and colonic wall contribute to increased rates of transit and reduced fluid absorption.

Bleeding may occur from any of the structures within the colon, rectum or anal canal including lesions of these structures.

5.13.2 The Patient Experience

Symptom burden in changing bowel habits occurs also in patients with IBD. Associations include age and gender, health literacy, disease activity, hospitalisation, delayed diagnosis and quality of IBD care [62]

‘I’ve always been very regular and go every day. Recently, the last 2-3 months, things have changed. I can go 2-3 times a day then nothing for a couple of days. It is much looser than I’m used to when it happens several times a day. I don’t get any more urge to go than I ever do; I know I just need to go. It can be awkward when I’m out as, I’m sure you know, public toilets aren’t always the best and I feel embarrassed if I’m with people and I’m in the toilet for a while. I mean everyone will know why. It’s not like going for a pee is it?’

5.13.3 Evidence Base

Change in bowel habit as a sole alarm symptom has a low diagnostic yield in patients under the age of 55 years [63]. A study of 628 patients reported 22% diagnosed with CRC but none under 55 where change in bowel habit was the only symptom. For patients 55–64 years, this rose to 6%, 8% for 65–74 years and 14% above 75 years. In patients under 55 years, 2% with anaemia/bleeding had CRC, increasing to 34% over 55 years ($p < 0.0001$). Change in bowel habit plus anaemia/bleeding gave a CRC prevalence of 16% under 55 years increasing to 30% over 55 years ($p = 0.07$) [63].

Change in bowel habit and rectal bleeding combined with abnormal haematology (full blood count [FBC]) are strongly predictive of bowel disease (CRC/IBD) in under 50-year-old [64]. Change to looser stools was independently associated with an increased risk of CRC/IBD [64].

Change in bowel habit is traditionally described as a symptom of left sided colonic cancer. A change in bowel habit (with or without rectal bleeding) also occurs in 13% of right sided cancers (95% CI 2–30%, I₂ = 96%); 73% for left sided cancers (95% CI 41–96%, I₂ = 99%) [65]. In all patients with cancer presenting with a change in bowel habit (with or without rectal bleeding), the cancer was right sided in 8% (95% CI 4–12%, I₂ = 69%) [65]

In patients with chronic constipation, the following features may be reported:

- All occur more than 25% of the time for at least 12 weeks over last year
 - Straining
 - Lumpy/hard stools
 - Sensation of incomplete evacuation
 - Sensation of anal blockage
 - Manual evacuation necessary
 - Bowels open less than three times per week

Table 5.9 shows risk factors and alarm symptoms for constipation and diarrhoea.

In the patient with rectal bleeding, the following additional information should be sought:

- Recent or long-term intermittent problem
- Only when straining?
- Only when constipated?
- Painful or not?
- In the toilet/on wiping?
- Associated change of bowel habit or weight loss?
- Associated diarrhoea?

Table 5.9 Risk factors and alarm symptoms for constipation and diarrhoea.

Constipation	Diarrhoea
<i>Risk factors</i>	<i>Risk factors</i>
• Female • Elderly • Reduced physical activity • Low socioeconomic status • Low calorie intake • Medication • Depression/anxiety	• Fever • Travel • Food eaten • Bloating • Wind • Nausea/vomiting • Medication
<i>Alarm symptoms</i>	<i>Alarm symptoms</i>
• Weight loss • Recent onset • Rectal bleeding • Abdominal pain • Change in stool calibre • Nausea/vomiting • Fever	• Weight loss • Fever • Bloody stools • Waking from sleep • Family history • Age > 50 years • Intercurrent infection

Table 5.10 Clinical features of increased risk for Colorectal Cancer (CRC).

Rectal bleeding with weight loss
Blood mixed with the stool
Rectal bleeding and a change in bowel habit
Bleeding and diarrhoea
Rectal bleeding at older ages
Male gender
Rectal bleeding and abdominal pain

Source: Adapted from Del Giudice et al. [66].

Although guidelines highlight the value of symptoms in identifying patients at risk of cancer, evidence for this is unclear. A systematic review of clinical features of suspected CRC in primary care patients examined the results of 32 studies including 5 meta-analyses. No single symptom is wholly diagnostic, but all those emergent in the studies identify patients at increased risk (Table 5.10) [66]. Rectal bleeding (area under the curve [AUC] 0.66; LR +1.9; LR −0.7) and weight loss are important symptoms (AUC 0.67; LR +2.5; LR −0.9) [67]. When rectal bleeding is present alongside a second symptom, the risk of CRC is greatest when weight loss or change of bowel habit is also present (Table 5.10), (Figure 5.9) [68].

5.14 Jaundice

An excess of bilirubin in the body tissues leading to a yellowish discoloration.

5.14.1 Anatomical Site

Jaundice may be noted in any of the following sites:

- Sclerae
- Under the tongue
- Tympanic membranes
- Skin

Skin of colour (SOC) is a range of skin tones. With progressively darker skin tones, it may be more challenging to see. However, jaundice is also visible in the sclera and mucosal surfaces so these should be examined. Patients, or others around them, may also have noticed a change in their normal skin tone suggesting pigmentary change. The patient's opinion should always be respected, and they should be thoroughly assessed.

5.14.2 Pathophysiology

There are many causes of jaundice, each of which has a complex pathophysiology (Figure 5.10). As a starting point, you can classify the symptom as follows:

- Causes
 - Pre-hepatic (rare – usually due to haemolysis)
 - Hepatic
 - Cholestatic (post-hepatic)

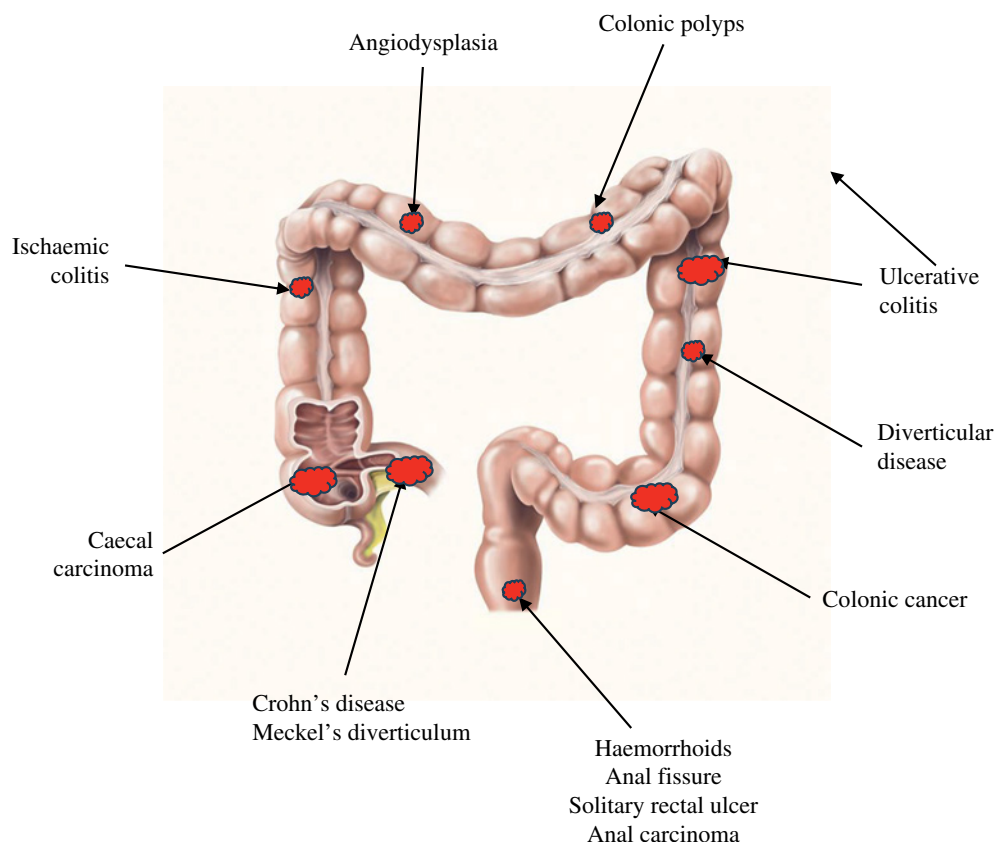


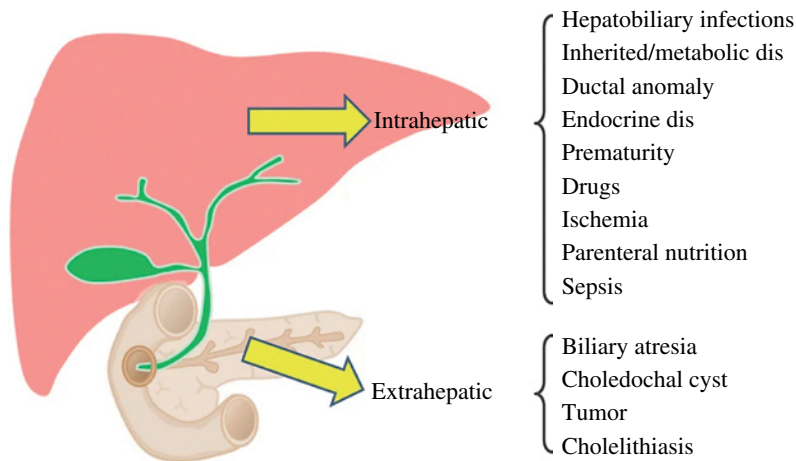
Figure 5.9 Conditions associated with lower gastrointestinal bleeding. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited.

- Hepatic
 - Drugs
 - Hepatitis
- Cholestatic
 - Gallstones
 - Pancreatic cancer (head of pancreas blocking common bile duct [CBD])
 - Lymph nodes at porta hepatis

5.14.3 Patient Experience

‘I was looking in the mirror a few days ago. The light bulb had gone, and it wasn’t very light, but I had this feeling the whites of my eyes looked darker. I thought it must be the light. I went and asked my partner to have a look and we went outside in the sunshine. They thought my eyes have both definitely gone yellow. Now my skin in looking a bit yellow this morning. My urine has gone dark, and I passed this pale stool this morning when I got up.’

From: [Jaundice revisited: recent advances in the diagnosis and treatment of inherited cholestatic liver diseases](#)



Etiologies of intrahepatic and extrahepatic cholestasis of inherited or secondary causes. dis: disorders

Figure 5.10 Intrahepatic and extrahepatic causes of jaundice [69]. *Source:* Chen et al. [69]/Springer Nature/CC BY – 4.0.

5.14.4 Evidence Base

You should seek the following information in the history:

- Alcohol use
- Foreign travel
- Blood transfusions
- Intravenous drug use
- Antibiotics
- All prescription and non-prescription drugs
- Paracetamol overdose
- Family history
- Tattoos
- Sexual partners

Ask about urine and stools

- Pre-hepatic
 - Normal urine and normal stools
- Hepatic
 - Dark urine and normal stools
- Cholestatic
 - Dark urine and pale stools

The following features may be associated with a presentation of jaundice:

- Itching
- Fever
- Right upper quadrant pain
- Confusion

- Bleeding nose and/or gums
- Back pain
- Pregnancy
- Weight loss

Alarm symptoms for jaundice include:

- Fever
- Right upper quadrant pain
- Confusion or altered mental state
- Gum bleeding or epistaxis
- Back pain
- Pregnancy
- Altered bowels/urine
- Unintentional weight loss

Jaundice usually denotes serious disease. Further associations to be borne in mind include:

- Severe haemolysis (transfusion reaction/malaria)
- Painless
 - Bile duct or pancreatic cancer
- Fever +/- abdominal pain
- Gallstones, infection and acute hepatitis

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6

Endocrine and Multisystem Symptoms

KEY POINTS

- The endocrine system affects the function of all systems of the body
- Endocrine and metabolic symptoms can be vague in their presentation leading to delays in diagnosis
- Symptoms described in this chapter can present due to endocrine disorders
- They can also present due to dysfunction in other systems such as haematological or neurological disorders
- If a symptom does not fit neatly into a particular system – review the function of all systems
- Ethnic minorities and LGBTQ+ individuals are disproportionately affected by endocrine conditions

6.1 Structure and Function of the Endocrine System

This system comprises the ductless glands which secrete hormones directly into the bloodstream. These are the hypothalamus, pineal body, pituitary, thyroid, adrenal and reproductive glands (testes and ovaries) (Figure 6.1). Reproductive symptoms are covered separately in Chapter 10. The pancreas is included in the endocrine system as it secretes hormones directly into the blood and also exocrine secretion of digestive substances into the duodenum via the pancreatic duct.

The endocrine system is involved in homeostasis, metabolic demand, development and reproduction [2]. Anatomically, each endocrine gland is divisible into distinct regions which may produce hormones acting directly on other tissues, and interact with other endocrine glands and with the nervous system (Table 6.1). There are differences in function between childhood and adulthood (e.g. growth hormone, follicle-stimulating hormone [FSH]).

6.1.1 Exocrine Glands

Exocrine glands secrete their products via a duct into an epithelial surface as opposed to endocrine glands which secrete hormones directly into the bloodstream. Examples of exocrine glands are the skin, salivary glands, stomach, pancreas, duodenum and breast [3]. They will not be considered further in this chapter.

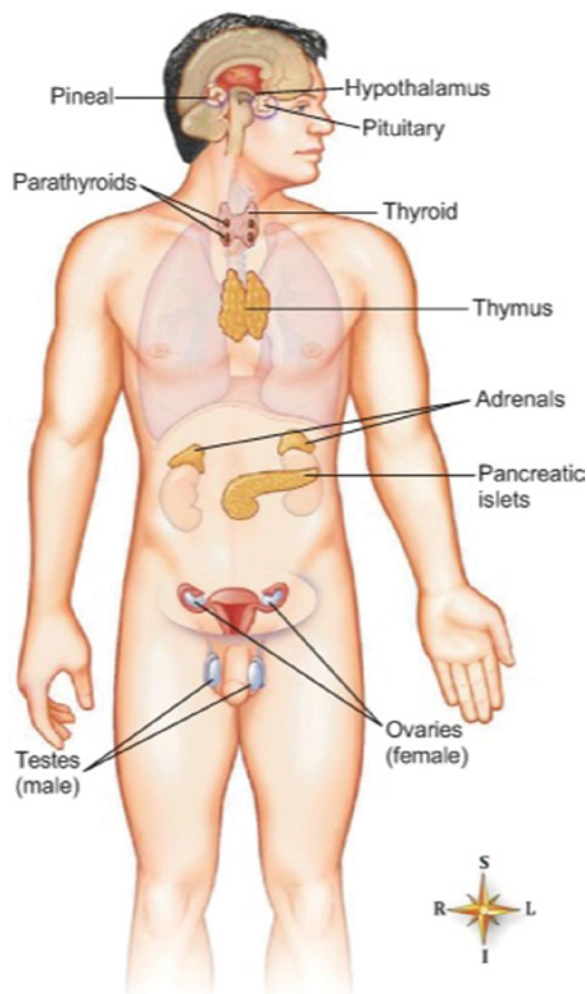


Figure 6.1 The major endocrine glands of the body.
Source: Steven et al. [1]/with permission of Elsevier.

6.2 Endocrine Symptoms

These are:

- Fatigue/malaise
- Fevers/rigours/sweats
- Weight and appetite change
- Skin changes
- Dizziness
- Polyuria and thirst
- Flushing
- Long Covid

These are not specific to endocrine disease, but they may present as systems of an endocrine disorder. Alternatively, fatigue and ‘tired all the time’ may also be symptoms of heart failure, anaemia, inflammatory arthritis and depression among other causes. Fevers can be a feature of acute infection, sweats a sign of menopause and weight loss a sign of malignancy. Dizziness can occur in neurological, cardiovascular, and vestibular disorders. When exploring symptoms properly, we must ensure familiarity with and consider all diagnostic possibilities, at least initially. Understanding of long Covid is evolving but some symptoms may appear similar to endocrine disorders.

Patients may present symptoms which initially appear to arise from another system but have an underlying endocrine cause. These are covered in the respective chapters for each system. An example is the elderly person who presents with fast, irregular palpitations due to atrial fibrillation which on investigation is caused by underlying hyperthyroidism (see Chapter 4).

6.3 Burden of Disease

Endocrine, metabolic, blood and immune disorders (EMBID) increased globally between 1990 and 2019 [4]. Death rates (ASDRs) are higher in men than women while women have higher disability adjusted life years [4]. North America and Southern Sub-Saharan Africa have the highest ASDRs and DALYs while Southern Sub-Saharan Africa and the Caribbean had the highest years of life lost (YLL), and years lived with disability (YLD) [4].

In 2021, 529 million (95% UI 500–564) were living worldwide with diabetes [5]. The age-adjusted prevalence is 6.1% [5]. Prevalences are highest in North Africa and the Middle East (9.3%) and Oceania (12.3%). Qatar has the highest age-specific prevalence with 76.1% of people aged 75–79 years [5]. Type 2 diabetes accounts for 96.0% of all cases. The global prevalence of diabetes is projected to be 1.31 billion (95% UI 1.22–1.39) by 2050 [5]. The rise is primarily due to increased obesity.

Table 6.1 Summary of the main endocrine glands.

Gland	Hormone	Function
Hypothalamus	Oxytocin	Increasing contractions in childbirth Lactation
	HPA axis	Blood portal system connecting hypothalamus and anterior pituitary
	Gonadotrophin releasing	Reproductive functions (see chapter 10)
	Corticotrophin releasing hormone	Stimulates release of adrenocorticotrophic hormone (ACTH)
	Somatostatin	Decreases liver/gallbladder blood flow Inhibits gallbladder contraction Inhibits bile duct secretion Inhibits salivary amylase, gastric acid, GI hormone secretion Brain – antinociception properties Delays gastric emptying, slows motility, inhibits absorption, decreases splanchnic blood flow
Anterior pituitary	Dopamine	Inhibits secretion of prolactin
	FSH and LH	See chapter 10
	Prolactin	Ante-partum – prepares breasts for milk production Stimulates milk production – postpartum Effects of TRH
	Thyroid-stimulating hormone	Stimulates hormone synthesis in the thyroid
	Growth hormone	GH levels peak during puberty then decline by 50% every 7 years (47 in 1) – stimulation of linear growth in children, increased lipolysis, protein synthesis, phosphate retention, sodium and water; antagonism of insulin
	ACTH	Stimulates cortisol release in zona fasciculata of adrenal cortex; androgen production in zona reticularis
Pineal	Melatonin	Sleep promotion and circadian rhythms
Thyroid	Thyroxine and triiodothyronine	Children – development of several body systems
		Adults – drives metabolic action and function of nearly all organs. T3 is the only active metabolite of T4
		Bone – congenital hypothyroidism – delayed epiphyseal development and poor growth
		Heart – T3 resistance – tachycardia
		Metabolism regulation – modest weight changes
Parathyroid	Parathyroid hormone	Short-term control of serum calcium PTH – converts calcidiol to calcitriol with tubular cells Increases bone resorption; reabsorption of calcium in the distal nephron – calcium homeostasis
Pancreas	Insulin	Controls glucose levels through gluconeogenesis, oral intake and glycogenolysis
Adrenal	Cortisol	Increases glucose levels; increases insulin resistance; increases appetite, raised BP, decreases bone formation. Decreases inflammatory and immune response Regulation of cardiac, renal and vascular physiology
	Aldosterone	
	Adrenal androgens	
	Adrenaline/noradrenaline	
	Ghrelin	Appetite regulation
	Leptin	

Source: Adapted from Campbell and Jialal [2].

6.4 Ethnicity

Asians in the United Kingdom have a higher prevalence of type 2 diabetes (7.69%) than Black individuals (5.58%), Whites (5.04%) and Mixed/Other groups (3.42%) [6]. Socioeconomic deprivation in the United Kingdom, has a disproportionate effect on diabetes disparities among South Asian and Black ethnic groups [7]. In the United States, Black individuals and Hispanic have the highest rates (11.8% and 12.6% versus 7.1% in Whites) [8]. In African populations, primary adrenal insufficiency has lower prevalence than might be expected from figures in comparable populations around the world. This is likely to be due access to services, including misdiagnosis of a condition which is often mistaken for others [9]. In the United States, exposure to endocrine-disrupting chemical (EDC) such as pesticides, and flame retardants, is higher among non-Hispanic Blacks and Mexican Americans. This translates into higher health costs for these groups [10]. Racially and ethnically diverse youth suffer a higher burden of disease from obesity and diabetes and have less access to diabetes and bariatric surgery services [11].

6.5 LGBTQ+

LGBTQ+ groups show increased rates of type 2 diabetes when adjusted for age and sex [12]. Obesity and prediabetes are lower in gay men while bisexual men have higher rates of diabetes [13]. Lesbian and bisexual women have higher rates of obesity though bisexual women have lower odds of diabetes than straight women. There are differing rates for diabetes among lesbian and bisexual women across ethnic groups with Hispanic and non-Hispanic Black women having higher rates [14]. Pre-existing disparities in the United States for diabetes care and hypertension persisted according to gender, race and ethnicity during the COVID-19 pandemic but widened for sexual orientation [15]. LGBTQIA youth and adults face discrimination and barriers to endocrine care due to bias in the healthcare system [11].

6.6 Fatigue

Fatigue is a “state . . . characterised by a lessened capacity or motivation for work. . . usually accompanied by a feeling of weariness, sleepiness, irritability or loss of ambition” [16]. The term is synonymous with tiredness and malaise [16]. Lethargy is a term sometimes used to describe fatigue and a lack of mental or physical motivation. Sleepiness is a tendency to doze off but responds to rest [17]. Community surveys show fatigue prevalences of 20–30% of adults at any given time [18]. Fatigue may be physiological or secondary to an underlying medical condition [19]. The duration of fatigue is categorised as recent (within the past month), prolonged (1–6 months) and chronic (longer than 6 months) [18].

The prevalence of chronic fatigue syndrome is higher among adults aged 30–39 years than in those over 60 years and is commoner in women [18]. Consultation rates in the United Kingdom and Australia are similar at 1.5% and 1.4% respectively but higher (5–7%) in other international settings [20–22].

6.6.1 Anatomy and Pathophysiology

This will depend on the cause. It is more often a psychological phenomenon than a physical one though it may result from biochemical and physiological changes [23]. Symptoms are characterised by weakness, weariness and reduced capacity though there is no objective weakness in most people with fatigue.

6.6.2 The Patient Experience

Men and women differ in the way they describe fatigue with women more likely to describe themselves as depressed or anxious [24]. Depression and fatigue may co-exist. Depression is more likely to present as being unable to do ‘anything’ whereas fatigue is being unable to complete specific activities due to a lack of energy [24]. Fatigue affects family, social and work relationships [19].

“I feel completely soaked in tiredness. I can’t seem to rally myself to do anything. I’ve tried so many different things – going to bed early; cutting out tea and coffee; reducing my alcohol, even more exercise. It doesn’t seem to make any difference. My partner is on at me all the time, telling me I’m not much fun to be around but I can’t help it. Whenever I’m in a social situation, I just keep thinking ‘how soon can I leave?’. My job is suffering as well as I can’t seem to motivate myself about what needs to be done and leading my team”

6.6.3 Evidence Base

Fatigue is a very common symptom. It is one of the commonest causes of an unexplained symptom. Clinicians will often investigate to address the diagnostic uncertainty and provide reassurance to the patient [25]. In 2011–12, tests were ordered for 64.2% of Australian patients presenting with fatigue [26]. There is a low pre-test probability for serious illness in fatigue. Ordering tests without specific indications may influence management in only 5% of cases [27]. Ordering tests without a rationale in the history and examination does not necessarily reassure either doctor or patient but instead may provoke anxiety [28].

There is a strong association between prolonged fatigue and psychosocial conditions [7]. It is important to establish what the patient means by this including a lack of physical energy, shortness of breath, muscle aching or sleep disturbance. Careful history-taking should reveal more than 85% of causes by the end of the consultation. A study in Holland reported 8.2% of adults were diagnosed with physical pathology after 12 months follow-up (including anaemia, thyroid disease, diabetes) though other studies have reported higher rates (25–50%) of physical disease [27, 29, 30]. These differences may reflect study method and case definition.

Many patients with chronic conditions will report moderate to intense fatigue [23]. It is the commonest symptom in patients with chronic disease [31]. Risk factors for fatigue include being female, unpartnered, younger and of lower educational attainment [32]. It is also a factor in frailty syndrome in older people [31].

Fatigue can be a normal healthy, but self-limiting response in healthy people. In a systematic review of the differential diagnosis, prevalence of physical disease in those with tiredness was identical to those without tiredness [22]. Depression was more common in those with tiredness [22]. Identified causes were anaemia 2.8% (CI 1.6–4.8%; malignancy 0.6% (CI 0.3–1.3%), serious physical disease 4.3% (CI 2.7–6.7%) and depression 18.5% (CI 16.2–21.0%) [22]. In nondisabled elderly, there is a greater risk in being ‘tired’ and becoming disabled in the next five years [33]. The causes are summarised in Table 6.2.

Chronic fatigue and chronic fatigue syndrome (CFS) represent a small proportion of people (2–10%) (Figure 6.2). Myalgic encephalitis/chronic fatigue syndrome (ME/CFS) has neurological features and is often preceded by infection [36]. Quality of life is lower than multiple sclerosis, chronic kidney failure and congestive heart failure [36]. Exact cause is unclear but appears to overlap with symptoms of long Covid. Where excessive tiredness is present for more than two weeks causes will be depression in a quarter, physical disease in a quarter and no cause in a quarter. For tiredness persisting for more than six months, causes include depression in half, somatisation in a quarter, CFS, prolonged fatigue and physical disease.

In endocrine disease patients with hypothyroidism, Addison’s disease and diabetes may all present as ‘tired all the time’. Other causes include depression, anaemia, connective tissue disease, chronic infection, drugs, chronic liver disease, renal failure and malignancy.

Table 6.2 Causes of fatigue.

<i>Psychosocial</i>	<i>Cardiorespiratory</i>	<i>Endocrine/metabolic</i>
Work pattern	Congestive cardiac failure	Hypothyroidism
Stress/burnout	Chronic obstructive lung disease	Diabetes mellitus
Lack of exercise	Asthma	Addison's disease
Sleep disturbance	Restrictive lung disease	Electrolyte disturbance
Anxiety	Sleep apnoea	Dehydration
Depression		Chronic kidney disease
Substance misuse	<i>Autoimmune</i>	Chronic liver disease
Poor diet	Rheumatoid arthritis	
	Fibromyalgia	<i>Haematological</i>
<i>Neurological</i>	Polymyalgia rheumatica	Anaemia
Myasthenia gravis	Muscular disorders	Myeloproliferative
Parkinson's disease	Inflammatory and connective tissue disorders	
Multiple sclerosis	Systemic lupus erythematosus	<i>Malignancy</i>
<i>Infectious</i>	<i>Functional disorders</i>	<i>Medication</i>
Bacterial	Irritable bowel syndrome	
Viral/post-viral	Functional neurological disorder	
Infectious mononucleosis		
COVID-19	<i>Chronic fatigue syndrome</i>	

Source: Adapted from Murtagh et al. [34].

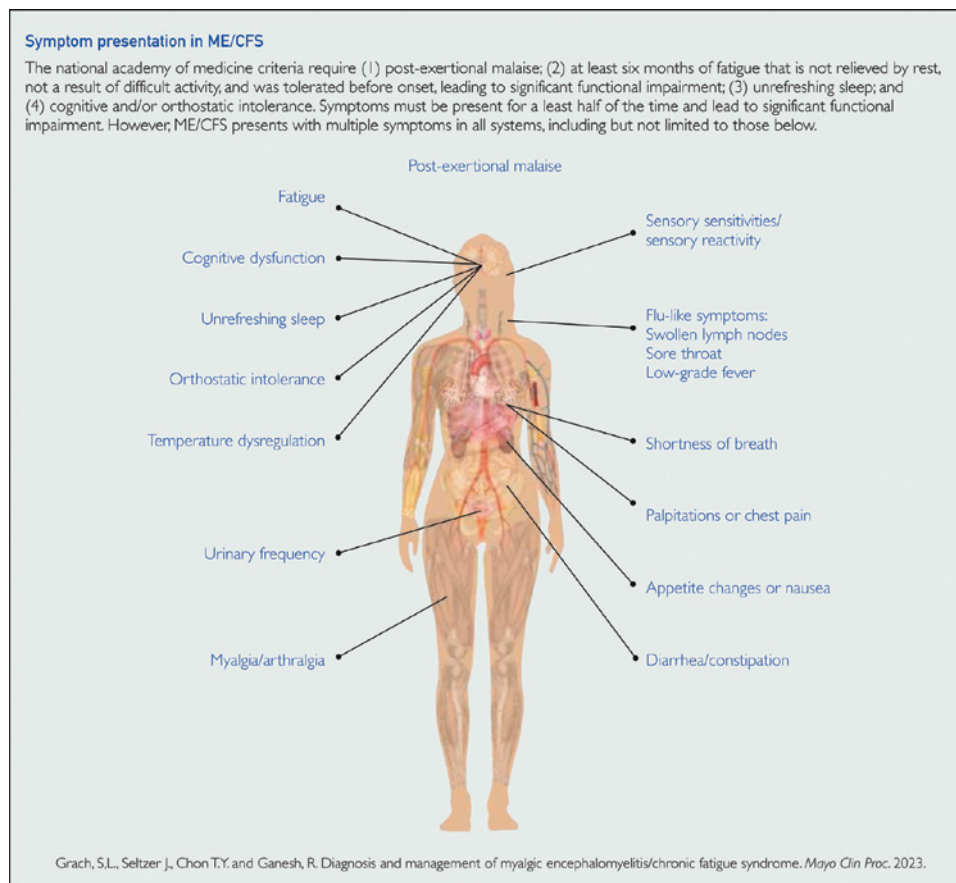
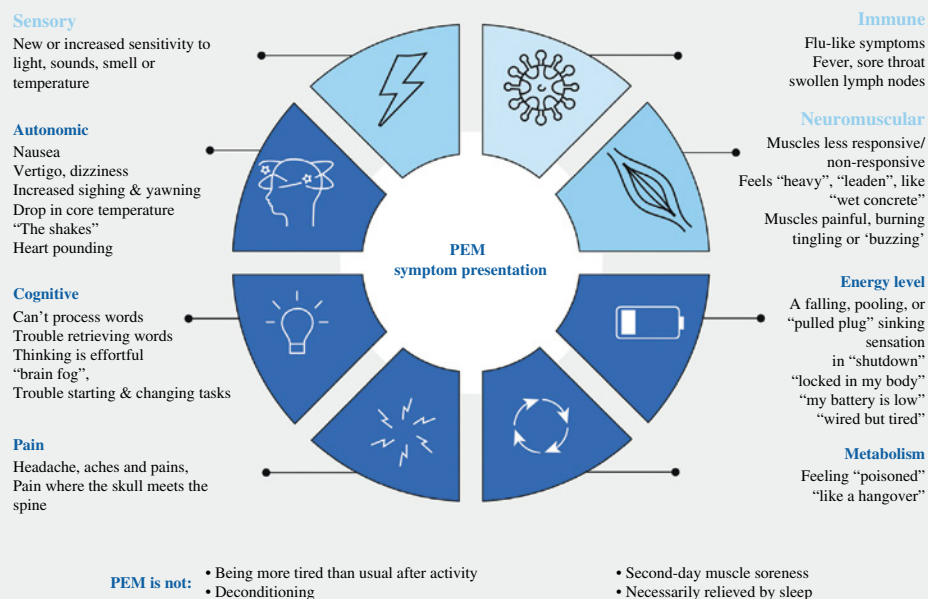


Figure 6.2 Symptom presentation in myalgic encephalitis/chronic fatigue syndrome. Source: Grach et al. [35]/with permission of Elsevier.

Post-exertional malaise (PEM)

PEM is an increase in the severity of symptoms and/or the appearance of new symptoms after physical or cognitive exertion, often manifesting after a characteristic 24-hour delay. However, 12–48 hours is common. Some symptoms that may be part of PEM presentation are outlined below, with common-language descriptions.



Grach, S.L., Seltzer J., Chon T.Y. and Ganesh, R. Diagnosis and management of myalgic encephalomyelitis/chronic fatigue syndrome. *Mayo Clin Proc.* 2023.

Figure 6.3 Features of Post-Exertional Malaise (PEM). *Source:* Grach et al. [35]/with permission of Elsevier.

Post-exertional malaise or post-exertion exacerbation of symptoms is considered pathognomonic of ME/CFS (Figure 6.3) [35]. It is a flare of existing symptoms or the onset of new symptoms between 12 and 48 hours after physical exertion, cognitive overexertion or sensory overload [35]. It may feature impaired oxygen extraction on cardiopulmonary exertion.

6.6.4 Key Points in the History

What does the patient mean by fatigue? How does it affect them? What are their own ideas about the cause? Onset, timeline, severity of symptoms [37]. Associated symptoms (physical systems enquiry – muscle pain after exertion, muscle pain without exertion; psychological – mood, anxiety; social – sleep, lifestyle, alcohol, smoking, drugs; snoring). Ask about occupational history including work patterns; medication. Screen for red flags (see Table 6.3).

At examination, it is important to look for signs of anaemia, hypothyroidism, hyperthyroidism, lymphadenopathy and hepatosplenomegaly.

In forming a differential diagnosis, you should look at the symptom's presentation across all the body's systems. A comprehensive list of differential possibilities includes:

Common – depression, stress, anaemia, acute post-viral fatigue, hypothyroidism

Occasional – myalgic encephalitis, major organ failure, hyperthyroidism, drug use/misuse

Rare – malignant disease, chronic infection, chronic neurological disorders, endocrine, connective tissue, carbon monoxide poisoning.

Table 6.3 Red flags for fatigue.

<i>Symptoms</i>
● Unintentional weight loss ● Loss of appetite ● Fever ● Recent onset in previously well older patient ● Unexplained lymphadenopathy ● Abnormal bleeding
<i>Signs</i>
● Pallor (anaemia, malignancy) ● Lymphadenopathy (malignancy) ● Goitre (thyroid disorder) ● Murmurs (endocarditis) ● Oedema (heart failure, liver disease)

Source: Adapted from Hui Ho et al. [19].

6.6.5 Red Flags

Table 6.3

6.7 Fever/Chills/Night Sweats

6.7.1 Definitions

- 1) Fever – an increase in body temperature
- 2) Chills (rigour) – uncontrollable shivering and shaking due to increasing body temperature
- 3) Night sweats – an exaggeration of diurnal temperature change

Fever is a complex physiological response of which temperature elevation is one component [38]. Fever may play a role in sustaining human immunity [38]. In neutropenic patients, fever may be the only sign of infection.

6.7.2 Anatomy and Pathophysiology

The response to fever originates in the hypothalamus and is mediated by the neuroendocrine system. Chills are thought to be due to the elevation of body temperature by endogenous pyrogens through stimulation of cytokine release [39].

6.7.3 Patient Experience

“I’m waking up 2-3 times a night absolutely soaking wet. My clothes and the bed sheets are soaked. I have to get up and change everything. My partner has started sleeping separately not because there’s a problem between us but because it is disturbing their sleep and I have to have the window open. I feel so warm as well I’ve stopped using blankets or a duvet. My partner checked my temperature a few times. It always seems to be raised when this happens – around 38 or 38.5”

Table 6.4 Patient-reported symptoms experienced in association with fever [38].

Symptom	Frequency (%)
Cold	79
Weakness	79
Warm (not sweating)	75
Sweating	64
Non-specific bodily sensation	39
Gastrointestinal symptoms	32
Headache	32
Emotional changes	18
Achiness	11
Respiratory symptoms	11
Dreams/hallucinations	11

Source: Adapted from Ames et al. [19].

6.7.4 Evidence Base

Fever has long been recognised as a serious sign of illness and is understood as a sign of inflammation. A qualitative study of patient experience reported the following symptoms were present in association with a fever (Table 6.4) [38]:

The ‘cold’ symptom may indicate a resetting of the hypothalamic set point followed by an increase in the body temperature until the new set point is reached [38]. Chills including shaking are a mechanism of bodily heat production. The associated symptoms of fever have been used to formulate the FAST score (not to be confused with the FAST questionnaires in screening for alcohol misuse or stroke) in the assessment of fever. Kuder–Richardson (KR-20) reliability of the rule is reported as 0.70 making it reliable and easy to administer in an acute research setting [40].

Ask the patient for temperature measurements as evidence of the symptoms. Common causes of these symptoms include hormonal (pregnancy, menopause), gastro-oesophageal reflux, sleep disturbance and dumping syndrome.

6.7.5 Fever of Unknown Origin (FUO)

FUO is currently defined as:

- Temperature of greater than or including 38.3 °C (101 °F) on at least 2 occasions
- Duration of illness > (or including) 3 weeks or multiple febrile episodes in 3 or more weeks
- Patient is not immunocompromised which is defined as:
 - Neutropenia for one or more weeks in 3 months prior to start of the fever
 - Known HIV infection
 - Known hypogammaglobulinaemia
 - Use of 10mg prednisolone or equivalent for 2 or more weeks in the 3 months prior to the start of the fever

There are over 200 described causes which may be categorised as infections, malignancies, non-infectious inflammatory diseases (e.g. rheumatological disorders) and miscellaneous causes [41].

Atypical presentations of common conditions account for most cases [41]. Infectious disease is the commonest cause in developing countries. Up to 75% of patients experience spontaneous remission and where no cause is identified, prognosis is good and mortality low [41]. Viral illnesses account for most self-limiting cases of fever and resolve within two weeks [42] (Table 6.5).

Table 6.5 Fevers of unknown origin (PUO).*Infectious*

Subacute bacterial endocarditis
 Chronic sinusitis
 Chronic prostatitis
 Discitis
 Vascular graft infections
 Whipple's disease
 Tickborne
 Tuberculosis
 HIV
 Abdominopelvic abscess
 Epstein-Barr (EBV)
 Cytomegalovirus (CMV)
 Enteric (Typhoid) fever
 Toxoplasmosis
 Histoplasmosis
 Leptospirosis

Malignancies

Lymphoma
 Renal cell carcinoma
 Myeloproliferative disorders
 Breast/liver/pancreatic/colon/cancer
 Brain/liver metastases
 Malignant histiocytosis

Non-infectious inflammatory

Giant cell (temporal) arteritis
 Juvenile rheumatoid arthritis (Still's)
 SLE
 Rheumatoid arthritis
 Gout
 Pseudogout
 Bechet disease
 Sarcoidosis
 Felty syndrome
 Takayasu disease

Miscellaneous causes

Cirrhosis
 Thyroiditis
 Crohn's disease
 Pulmonary disease

Source: Adapted from Brown and Finnigan [43].

6.7.6 Key Points for FUO in the History

These include history of fever and pattern, contacts, travel, occupational, animal exposure, family history (e.g. familial Mediterranean fever), systems review for associated symptoms and past medical history for aetiological conditions and medications.

6.7.7 True Night Sweats

They occur during sleep. Significant sweats are heavy enough to require a change of bedding and/or night clothing. They are not present in the absence of fever, where the patient uses an excessive amount of bedding or where there is an increased ambient temperature. Community prevalence may be as high as 41% though only 12% of patients present to services [44]. The highest prevalence occurs between 41 and 55 years of age. There is an annual prevalence in over 65-year-olds of 5% [44].

The purpose of sweating is to reduce body temperature. It may occur physiologically as a response to excessive temperature or clothing. Sweating response may be reconditioned by intercurrent health (e.g. menopause). It may also be secondary to alcohol, medication or conditions activating the sympathetic nervous system.

They may be associated with weight loss (usually greater than 10% in the previous 6 months).

6.7.8 Key Points in the History

Onset, duration, frequency, pattern, precipitants, daytime somnolence, risks from travel, drug use and unprotected sex. Relevant past medical history includes menopause, panic anxiety, post-traumatic stress (PTSD), obesity, alcohol, tobacco and recreational drug use, diabetes, restless legs, hyperthyroidism and gastroesophageal reflux disease (GORD) [45].

You should ask about the following associated symptoms – weight loss, lymphadenopathy, cough, haematuria, haemoptysis, arthritis, diarrhoea and high-risk behaviour (Table 6.6).

6.7.9 Summary of Main Causes

Serious causes include haematological malignancy (lymphoma/leukaemia), infection (TB/HIV), autoimmune disease (e.g. rheumatological), malignancy (e.g. prostate/renal/thyroid/germ cell) and medication.

6.7.10 Key Point

Although most patients experiencing night sweats do not have a serious underlying cause, night sweats are always a symptom to be taken seriously.

6.8 Sepsis

Sepsis is a life-threatening condition caused by dysregulation of the immune response to infection and leading to organ dysfunction [46]. It is increasing in incidence possibly due to an ageing population and increasing recognition [47]. Mortality may be up to 35% in severe sepsis [48].

6.8.1 Pathophysiology

Sepsis is a multisystem condition in which the response to infection is inadequate. Unless treatment is given quickly mortality rapidly increases.

Table 6.6 Causes of night sweats.*Menopause**Malignancy*

Hodgkin's disease

Non-Hodgkin Lymphoma

Chronic myeloid leukaemia

Renal cell carcinoma

Prostate cancer

Medullary thyroid carcinoma

Germ-cell tumours

Metastatic cancer

Infections

COVID-19

HIV

Infective endocarditis

Osteomyelitis

Tuberculosis

Malaria

Epstein-Barr virus

Cytomegalovirus

Non-malignant

Hyperthyroidism

Gastro-oesophageal reflux

Connective tissue disorders

Chronic fatigue syndrome

6.8.2 Symptoms of Sepsis

Change in mental status, rapid breathing, chills, confusion or delirium, fever or hypothermia, light-headedness due to low blood pressure, tachycardia, skin rash or mottled skin, warm skin, slurred speech, muscle pain, dizziness, nausea and vomiting.

6.8.3 Patient Experience

“My father was fine this morning but this afternoon he didn't seem himself. He was confused and didn't seem to know who I was when I came back round to see him. He couldn't work out how to use the remote to turn on the football. The room was boiling but he kept saying he felt cold even though his skin feels warm. I tried to help him up to bed to have a rest, but he had to sit down again as he was feeling dizzy. His breathing was so fast you'd think he had been running. He said he'd been going to the toilet more often since this morning. When he sat down, I noticed he'd wet himself.”

6.8.4 Evidence Base

Although criteria are subject to change and updating in the light of new evidence, the diagnostic criteria for sepsis are clustered around:

- Fever ($>38.3^{\circ}\text{C}$)
- Hypothermia (core temperature $<36^{\circ}\text{C}$)

- Heart rate $>90/\text{min}^{-1}$ or more than two SD above the normal value for age
- Tachypnoea
- Altered mental status
- Significant oedema or positive fluid balance ($>20\text{ mL/kg}$ over 24 h)
- Hyperglycaemia (plasma glucose $>140\text{ mg/dL}$ or 7.7 mmol/L) in the absence of diabetes.

Sepsis is a condition where use of a clinical prediction rule can facilitate rapid assessment of patients with serious conditions. The qSOFA score is a simple score consisting of three items: respiratory rate (RR) ≥ 22 breaths per minute, altered mentation (Glasgow Coma Scale [GCS] <15) and systolic blood pressure (SBP) $<100\text{ mmHg}$. A qSOFA score of 2 or more should be investigated and managed as sepsis. It predicts increase in stay in intensive care and mortality [49]. Regarding sepsis prediction, SIRS demonstrated high sensitivity (0.85) but low specificity (0.41), qSOFA showed low sensitivity (0.42) but high specificity (0.98), and NEWS exhibited high sensitivity (0.71) and specificity (0.85) [50]. The prognostic accuracy of qSOFA is supported in other research [51].

6.9 Key Points in the History

Recent fever or rigours, passed urine in past 18 hours, symptoms of infection, symptoms of dehydration, cognitive change (not responding to social cues, confusion, irritability), functional change and risk factors for sepsis (co-morbidities, medication) [52].

Early recognition of sepsis is essential for the patient's survival. The UK Sepsis Trust developed the 'Sepsis Six' – six tasks comprising oxygen, blood cultures, antibiotics, fluids, lactate measurement and urine output monitoring – to be commenced within one hour by non-specialist practitioners on the frontline. The Sepsis Six Care Bundle has been demonstrated to reduce the relative risk of death by 46.6% when given to patients with severe sepsis within one hour [53].

6.10 Unintentional Weight Loss

A loss of more than 5% of body weight in 6 months without measures to bring about reduction in weight [54]. It may also be the patient's own subjective opinion of unintentional weight loss over a shorter time.

Cachexia is associated with proportionately greater loss of skeletal muscle mass than of body fat and is a marker of general ill health and malnutrition. A decline of 10% skeletal muscle mass is associated with decline in exercise tolerance and activities of daily living [55]. It is also associated with an inflammatory response which may contribute to early death [56].

6.10.1 Anatomical Site

This is dependent on the cause.

6.10.2 Pathophysiology

If calorie intake is insufficient, fat and protein stores are mobilised and weight is lost. For every 3500-calorie deficit, 1 kg of fat is consumed. Fluid loss also results in weight loss of 1 kg for every litre shed. The three mechanisms of weight loss are decreased intake, increased fluid-nutrient loss and excess metabolic demand [57].

Inflammatory cytokines, tumour necrosis factor and interleukins 1 and 6 are thought to be involved [58]. Cytokines inhibit feeding centrally and peripherally decrease gastric motility, gastric emptying and intestinal motility and by modifying gastric secretion [58]. Tumour necrosis factor levels are elevated in disease states associated with cachexia and weight loss including malignancy, AIDS, heart failure, rheumatoid arthritis and COPD [58].

6.10.2.1 Appetite Loss

People experience a loss of appetite for many reasons. Some of these are short-term, including colds, food poisoning, other infections or the side effects of medication. Others have to do with long-term medical conditions, such as diabetes, cancer or life-limiting illnesses.

6.10.3 Patient Experience

“I have noticed I’ve been losing weight for a while. ...to be honest I was quite happy about it. It was effortless after years of trying. I’ve never felt happy with my weight. More recently, my clothes have begun to feel loose. If it carries on, I’m going to have to buy a lot of new clothes. People have been commenting. At first, I felt flattered. Now, I can’t seem to stop it. I’m trying to eat and planning meals but when I get there, I just can’t face eating it like I used to....”

6.10.4 Evidence Base

Unintentional weight loss predicts morbidity and mortality particularly in the elderly [54, 59]. Independent diagnostic predictors are recent changes in cough, nausea or vomiting, 20-pack-year smoking history, recent change in appetite, decreased activity due to fatigue and any abnormality on physical examination [54].

A prospective study of 2677 patients reported main aetiologies as digestive organic (non-malignant in 17%; malignant 16%), and psychosocial disorders 16%. Oral disorders were second to non-haematological malignancy [60]. Consequences include functional decline, infections, pressure sores, cognitive and mood disorders, increased use of acute and long-term care facilities [61]. Weight loss in the elderly is associated with increased mortality ranging from 9 to 38% within the 2.5 years following the weight loss [62]. Factors associated with weight loss include (Table 6.7) [63].

Weight loss may affect severity of disease. Weight loss of 4–5% or more of body weight within one year or 10% or more over 5–10 years is associated with increased morbidity and mortality [64]. The elderly experience several age-related physiological changes including decreased smell and taste, slowed gastric emptying, and changes to the neuroendocrine axis which result in earlier satiety, decline in appetite and the appreciation of food [65].

A study of unintentional weight loss in Georgia, USA showed the following causes – unknown aetiology (24%), depression (18%), cancer (16%), non-cancer alimentary causes (11%), hyperthyroidism (9%), medication (9%), neurological (CVA/dementia) (7%), tuberculosis (2%), poor intake (2%) and cholesterol phobia (2%) [57].

Endocrine conditions causing these symptoms most commonly are uncontrolled diabetes and thyrotoxicosis.

6.10.5 Key Points in the History

When taking your history listen for:

Amount of weight loss (any recordings? over how long?), associated symptoms (fatigue, loss of appetite, bowel disturbance, cough), is existing disease under control? Diet, smoking and alcohol. A systems review should cover presence of dysphagia, dyspepsia, chewing or dental problems, abdominal pain, previous abdominal surgery, change in bowels to looser stools, polyuria, change in stool character and abnormal gynaecological bleeding. Background information includes dietary history (calorie intake, restrictions, aversions), alcohol and drug use, travel, medication – dry mouth or altered taste, mental state, social – who does the cooking for you? A witness history from family and carers is also helpful.

The most powerful predictor of serious disease is presence of fatigue and weight loss. The amount of weight loss is not helpful in deciding on presence of physical illness. Failure to regain weight is not evidence of a physical cause. You should assess the stability of an intercurrent disease (e.g. diabetes) before deciding it is/is not relevant.

Table 6.7 Symptoms associated with unintentional weight loss.*Psychosocial*

Lack of social support
 Financial
 Unable to prepare meals
 Loneliness
 Lives alone
 Depression
 Anxiety

Intake

Lack of interest in food
 Dental or oral problems
 Swallowing problems
 Substance misuse (e.g. alcohol, drugs)
 Eating disorders

Co-morbidities

Acutely unwell
 Hospital admission
 Dementia
 Living with chronic disease(s)

- Diabetes not controlled
- Malabsorption
- Inflammatory bowel disease

 Living with pain
 Constipation
 Malignancy

Frailty

Poor mobility
 Falls
 Reduced self-care skills

Metabolic demand

Exercise
 Hyperthyroidism
 Infection
 Pheochromocytoma

6.11 Weight Gain

Patients may also present with concerns about weight gain. This may be physiological with age (24–55 years), behavioural (excessive exercise, amenorrhoea, preoccupation with food or weight and altered self-image). It is commoner in women than men and associated with pregnancy and menopause. Stopping smoking, hypothyroidism and ‘metabolic syndrome’ are other common causes.

Unintentional weight gain also occurs when weight rises in the absence of increased eating and drinking and without decreasing physical activity. Possible causes include fluid retention, abnormal growths, constipation or pregnancy. Unintentional weight gain can be intermittent, cyclical, continuous or rapid.

Periodic unintentional weight gain includes regular fluctuations in weight. One example of periodic, fluctuating weight gain is the menstrual cycle. There may be longer-term unintentional weight gain during and after pregnancy.

Rapid unintentional weight gain may be due to medication side effects (e.g. steroids). Many cases of unintentional weight gain are harmless. Some symptoms experienced along with rapid weight gain may signal a medical emergency (e.g. weight gain due to fluid retention, breathlessness and ankle swelling in heart failure).

6.11.1 Causes of Increased Appetite

- 1) Increased physical activity – whether from increased activity or new exercise routine, body's calorie needs rise resulting in an increased appetite
- 2) Illness – stimulates the immune system. This activation requires calories beyond normal basal metabolism
- 3) Post-surgery – metabolism is in an “anabolic” phase requiring increased calorie intake
- 4) Pregnancy – increased appetite is usual in pregnancy and breastfeeding for both mother and child's benefit
- 5) Diabetes – the onset of diabetes, particularly type 1 diabetes, may cause a sudden increased appetite, along with increased thirst and unintentional weight loss. Type 2 diabetes has a more gradual onset of symptoms
- 6) Weight loss – under usual circumstances weight loss increases levels of ghrelin, stimulating the appetite
- 7) Decreased food intake – reduced eating creates a calorie deficit, to which the body responds by increasing appetite to prevent weight loss
- 8) Dietary changes – appetite may increase where intake does not contain enough satiating foods, such as fat and protein. A high carbohydrate diet can result in fluctuation of insulin levels resulting in increased appetite
- 9) Stress – food may be used as a coping mechanism for perceived high levels of stress as both a relief and a reward
- 10) Decreased sleep – may stimulate appetite in some people. Lack of sleep may affect appetite-regulating hormones

6.12 Dizziness

Dizziness is a subjective sensation which may have a pathological basis. Patients may mean feeling disorientated, light-headed, a feeling of movement inside the head, feeling as though about to fall or a spinning sensation. Pathological dizziness is divided into four main types – vertigo, presyncope or syncope, disequilibrium and ‘light-headedness’.

Although dizziness significantly affects quality of life, it rarely signals a life-threatening condition. Some do not consider syncope/presyncope as a cause of dizziness. However, since patients will sometimes mention light-headedness and/or dizziness when presenting with syncopal symptoms, it is included here.

6.12.1 Anatomical Site

The site of any pathology will depend on the cause. In general, taking a history from a patient with dizziness will require you to ask about symptoms arising from the neurological, cardiovascular and ear, nose and throat systems as well as to enquire about symptoms of anxiety and depression.

6.12.2 Pathophysiology

Maintaining balance requires sensory inputs from vision, the vestibular system, proprioception and central processing in the brain [66] (Figure 6.4).

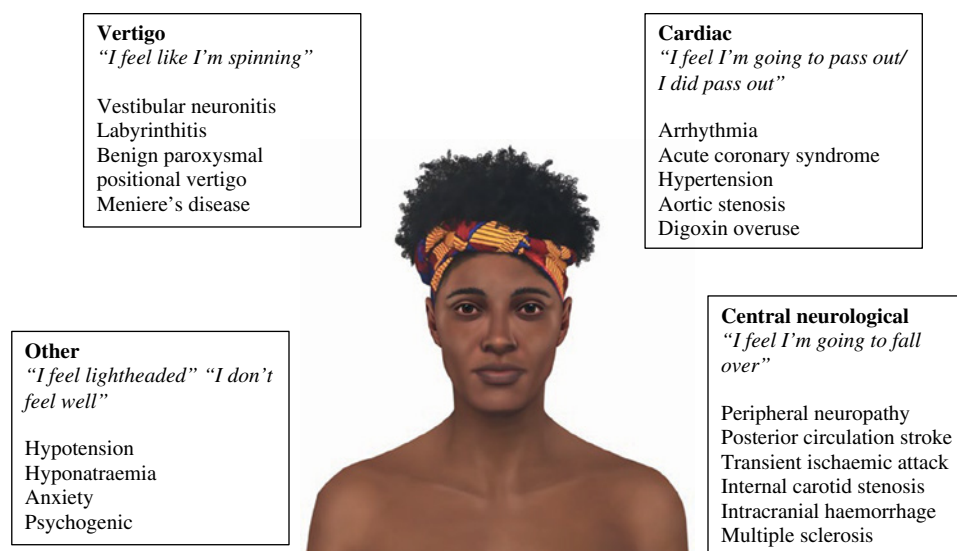


Figure 6.4 Pathophysiology of dizziness. *Source:* Dr Joanna Butler © www.medical-artist.com (2024). *Source:* Idil et al. [67].

6.12.3 Patient Experience

Patients will use a variety of terms to describe their dizziness and it is important to ask what they mean exactly. Again, their descriptions will usually distil down into one of four types each being a clue to the origin of any pathology (Table 6.8). It may help if you ask the patient: 'Tel me about your dizziness and how it feels?'

Each cause may have a characteristic description from the patient – Vertigo ('I feel like I'm spinning'); Presyncope or syncope ('I feel like I'm going to pass out'), Disequilibrium ('I feel like I'm falling') and non-specific where the patient describes symptoms of anxiety and depression.

Table 6.8 Conditions producing a sensation of dizziness.

Condition	Pathophysiology	Causes
Vertigo (an illusion of motion)	Vestibular disorder	Vestibular neuronitis Labyrinthitis Meniere's disease
Near-syncope (feeling of faintness)	Reduced cerebral perfusion	Volume depletion Neurocardiogenic syncope
Disequilibrium (gait disorder)	Factors affecting gait	Peripheral neuropathy Myelopathy Hydrocephalus
Light-headedness (ill-defined)	Anxiety	Phobias Anxiety disorders Depression

Source: Samuels et al. [68]/with permission of Massachusetts Medical Society.

6.12.4 Evidence Base

About one-third of people experience dizziness at least once during their lifetime [69]. Half of women and one-third of men are affected by dizziness by age 80 [66]. Vertigo may be due to labyrinthine disorders such as Meniere's disease or vestibular neuronitis. Presyncope or syncope is a cardiac phenomenon causing impaired perfusion of the central nervous system.

Disequilibrium may occur in elderly with other neurological symptoms. Light-headedness is associated with psychogenic conditions though it may occur with low blood pressure.

Patients may present with more than one subtype of dizziness particularly when elderly and/or on medications. It is important to clarify what the patient means by the term. It is not a 'pure' neurological symptom as cardiovascular and psychiatric causes account for 40–60% of cases. True central neurological causes (tumour, cerebrovascular, multiple sclerosis) account for up to 10%.

A retrospective study in Turkey of patients requiring admission found a mean age of 64 years of whom 64% were male [69]. Commonest causes of dizziness were central neurological (36.3%), peripheral vestibular (27.3%), cardiac (8.9%) and metabolic (8.0%) [69]. A systematic review of 31 studies in primary care found a similar distribution of aetiologies [70]. Only two of the 31 studies reviewed had a low risk of bias (Table 6.8).

Dizziness accounts for 30 consultations per 2000 patients per annum in primary care and forms about 11% of consultations in the neurology outpatient clinic. Approximately one in five people have experienced dizziness in the past month. About half of patients experiencing dizziness have associated anxiety and agoraphobia. Where dizziness or vertigo presents as a sole complaint and with no other features, causes divide between a mental health problem and an acute vestibular disorder.

In taking a history establish exactly what the patient means by dizziness, the effects on balance, associated auditory symptoms, associated palpitations and any postural or positional symptoms.

Take a cardiovascular history particularly where there is a suggestion of palpitations, arrhythmia or neurological disturbance, a history of disease of the ear, nose and throat or medication such as drugs affecting the heart rate, blood pressure or toxicity to the vestibular system.

The most common cause of true vertigo is benign paroxysmal vertigo usually a self-limiting condition. Symptoms originating from the ear suggest a peripheral cause of vertigo such as otosclerosis or Meniere's. Associated hearing loss is a red flag and acoustic neuroma should be considered. Where symptoms such as weakness, speech disorder or visual disturbance occur, a central nervous system cause should be considered.

6.13 Thirst and Polyuria

Thirst acts to correct the physiological balance of fluid in the body. Anti-diuretic hormone is important in water reabsorption in the distal renal tubule. The thirst stimulus decreases with age. This may contribute not only to dehydration but also to stroke. Heart failure patients may experience an increase in thirst. The main condition associated with thirst and polyuria is diabetes mellitus, but it is important to know other conditions in the differential diagnosis of thirst. These include diabetes mellitus due to hyperglycaemia and osmotic diuresis, diabetes insipidus, chronic kidney disease and psychogenic causes. Chronic kidney disease may be secondary to other cardiovascular and systemic diseases, amyloidosis, hypercalcaemia, hypokalaemia, myeloma and sickle cell disease.

6.14 Skin: Rashes/Bruising

A rash is a change in the skin which affects its colour, appearance or texture. It may be localised to one site, occur in several discrete sites or be generalised over the whole of the body. Endocrine conditions affect the skin as well as every other organ system. Patients may present to a GP or a dermatologist before their endocrine condition is diagnosed [71]. Symptoms from skin signs of endocrine disease can affect quality of life [71].

Easy bruising and abnormal bleeding are very common but also worrying to patients. Between 26% and 45% of healthy people have a history of epistaxis, easy bruising or bleeding gums [72]. Between 5% and 10% of women present with heavy menstrual bleeding and 29% of them have an underlying bleeding disorder [73]. Bleeding occurs when there is endothelial and vessel wall damage. Exposed subendothelial proteins interact with clotting factors to form a clot. Bleeding from small vessels results in petechiae while bruising results from a haematoma under the skin. [73]

6.14.1 Anatomy and Pathophysiology

The skin and mucous membranes may both be involved. Changes due to endocrine disease are related to the pathology causing the condition.

6.14.2 Patient Experience

“Everything seems to be slowing down. I’m putting on weight and my legs are more swollen. It’s a different sort of swelling. My mum’s legs used to fill with water and when you pressed on them it would leave finger marks. It was quite funny. That doesn’t happen with me though. It’s more of a doughy swelling. My skin is very dry. I’ve started putting cream on them because they are quite itchy to be honest”.

6.14.3 Evidence Base

The main skin changes in endocrine disease are coarse, dry and pale (hypothyroidism), dry and scaly (hypoparathyroidism), flushing of the face and neck (carcinoid syndrome), soft tissue overgrowth and axillary skin tags (acromegaly), xanthelasma (diabetes or hypothyroidism), bruising, thin skin, purple striae (Cushing’s syndrome), increased pigmentation (primary adrenal insufficiency, Cushing’s syndrome and acromegaly), decreased pigmentation (hypopituitarism) and localised depigmentation (vitiligo), Hashimoto’s disease (hypothyroidism) and Addison’s disease. (Tables 6.9 and 6.10).

Table 6.9 Aetiology of dizziness in studies with low risk of bias.

	Maarsingh 2010	Lawson 1999
Peripheral vestibular	14.4% (11.2–18.2)	34.0% (21.6–48.9)
BPPV		8.0% (2.6–20.1)
Vestibular neuritis		24.0% (13.5–38.5)
Morbus Meniere	—	2.0% (0.1–12.0)
Cardiovascular	56.8% (51.9–61.6) ^a	48.0% (33.9–62.4)
Neurological central	2.9% (1.6–5.1) ^b	10.0% (3.7–22.6)
Cerebrovascular	—	4.0% (0.7–14.9)
Psychogenic	9.8% (7.2–13.2)	—
Musculoskeletal	3.6% (2.1–6.0)	4.0% (0.7–14.9)
Other intrinsic diseases	0.7% (0.2–2.3)	—
Drug effects	2.4% (1.2–4.5)	—
Other	1.2% (0.4–2.9)	—
No specific diagnosis	8.2% (5.8–11.3%)	22.0% (12.0–36.3)

^a incl cerebrovascular.

^b excl cerebrovascular.

Source: Bösner et al. [70]/Springer Nature/CC BY – 4.0.

Table 6.10 Cutaneous manifestations of common endocrine conditions.

Endocrine disorder	Skin lesion	Incidence/prevalence	Usual sites	Other sites
Graves' disease	Thyroid dermopathy	5% in patients with Graves' disease and 15% in patients with Graves' disease and eye disease	Pretibial area, lower extremity, toes, areas of trauma	Warm, moist, and thin skin, onycholysis (Plummer's nails), thinning of hair
Hashimoto's thyroiditis	Nonpitting oedema	Common	Pretibial area	Cold dry skin, diffuse hair loss, macroglossia, chronic urticaria, carotenaemia
Pseudohypoadosteronism	Miliaria rubra	Common in a hot humid environment	Face, arms, trunk	Whitish periocular discharge
Primary hyperparathyroidism	Calcinosis cutis	Uncommon	Joints	Indurated white papules, or plaques, eschar, gangrene, eschar
	Calciophylaxis	Uncommon	Genital area	
Pseudohypoparathyroidism	Ecematous dermatitis	Uncommon	Nails, hair, skin	Coarse and sparse hair
Hypopituitarism	Hypogonadism, hypothyroidism, secondary adrenal insufficiency	Dependent on which hormones are deficient	Muscles, axillary, and pubic hair in men with hypogonadism, whereas breast tissue and genitourinary tract in women	Dry skin, facial oedema, short stature in children, increased fat mass
Cushing's syndrome	Central adiposity, moon facies, dorsocervical hump, easy bruising, thinning of the skin, purple and wide striae	Variable based on the severity of the disease	Abdomen and lower flanks	Acanthosis nigricans
Primary adrenal insufficiency	Hyperpigmentation	>90%	Skin, mucous membranes, hair, nails	Vitiligo
Diabetes mellitus	Acanthosis nigricans	Up to 70% of adult patients	Anterior shin, back of the neck	Cutaneous fungal and bacterial infection, NLD, diabetic bullae and autoimmune skin diseases

Source: Raj et al. [71]/Cureus/CC BY 4.0.

6.14.4 Key History-Taking Points

Start with open questions:

When did it start? Any triggers? Does anything help? Distribution of rash? Associated symptoms? (itchiness/swelling/temperature/sweating/weight loss).

You should consider endocrine disease as a cause if symptoms are not localised to one system and are associated with fatigue, night sweats, appetite and weight change, sleep disturbance and change in fluid balance.

6.14.4.1 Bruising

In bruising ask about:

What is the bleeding or bruising like? What causes it? (trauma, dental, spontaneous), medications, (oral contraceptive), trauma/abuse, nutritional status, alcohol use, liver disease, kidney disease, recent illnesses or infections and any family history of bleeding disorder (e.g. X-linked haemophilia's or Von Willebrand disease).

6.15 Flushing

Flushing is a subjective sensation of warmth that is accompanied by reddening of the skin anywhere on the body but tends to the face, neck and upper torso.

6.15.1 Anatomical Site

Flushing takes place predominantly in the upper parts of the body due to the high volume of cutaneous blood vessels and skin vascular response in these areas.

6.15.2 Pathophysiology

Under usual circumstances, flushing is a reaction of overheating. Flushing may be constant or intermittent [74]. It is mediated by endogenous vasoactive mediators though it can also be caused by medications [74]. Repetitive flushing over time may produce fixed facial skin changes with telangiectases and a cyanotic tinge to the skin [74].

6.15.3 Patient Experience

"I have these episodes where I can feel myself feeling flushed. People comment my skin is changing colour and is all blotchy around my face and neck. I think it happens when I'm feeling stressed or upset. Sometimes I get sweats with it at the same time. My periods are less often now so I wondered if it is a sign I'm going through the change."

6.15.4 Evidence Base

The differential diagnosis for flushing is wide (Table 6.11). The commonest causes are fever, overheating, emotion, menopausal flushing and rosacea [74]. Aside from carcinoid (20–30% of patients have flushing), malignancy as a cause is rare [74, 75]. In carcinoid, flushing may be present with diarrhoea. Around 80% of post-menopausal women experience flushing as do 65% of men following treatment for prostate cancer [75]. Flushing may be 'wet' due to simultaneous action of autonomic fibres on sweat glands or 'dry' where there are mediated vasodilators such as kinins, prostaglandins, serotonin and histamine [75].

6.15.5 Key Points in the History

Type of flushing, associated symptoms (light-headedness, low blood pressure, bronchospasm, tachycardia, full systems review) [76]. Triggers include emotion, food, medication, exercise, alcohol and stress. Ask also about symptoms of anxiety, depression and functional symptoms (see Chapter 14).

Table 6.11 Differential diagnosis of flushing.

<i>Common</i>
Emotion
Food or drink
Temperature
Alcohol
Fever
Menopausal flushing
Rosacea
<i>Uncommon, serious</i>
Carcinoid
Pheochromocytoma
Mastocytosis
Anaphylaxis
Medullary thyroid carcinoma
Pancreatic cell tumour
Renal cell carcinoma
<i>Neurological</i>
Autonomic epilepsy
Autonomic hyperreflexia
Horner's syndrome
Migraine
Multiple sclerosis
Orthostatic hypertension
Parkinson's
Trigeminal nerve damage
<i>Other</i>
Psychiatric and anxiety disorders
Fish ingestion
Idiopathic flushing

Source: Izikson et al. [74]/with permission of Elsevier.

6.16 Long Covid

Long Covid refers to prolonged symptoms following infection with SARS-CoV-2 which are not explained by an alternative diagnosis [77].

6.16.1 Anatomical Site

The effects have been noted across the body. There are both general symptoms (e.g. dizziness) and organ-specific (e.g. breathlessness, tachycardia and menstrual irregularity).

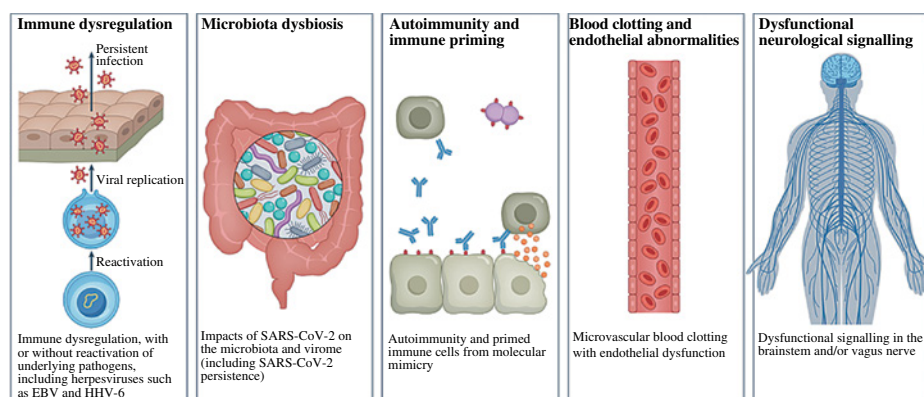


Figure 6.5 Hypothesised mechanisms of long Covid pathogenesis. *Source:* Davis et al. [78]/with permission of Springer Nature.

6.16.2 Pathophysiology

Understanding is at a very early stage. However, there are overlaps with other viral-onset illnesses including myalgic encephalitis/CFS and postural orthostatic tachycardia syndrome [78]. Mechanisms suggested currently include immune dysregulation, microbiosis, autoimmunity and immune priming, blood abnormalities and dysfunction neurological signalling (Figure 6.5) [78].

6.16.3 Patient Experience

Symptoms may occur across any system (Figure 6.6). Symptoms clusters have been identified. These include fatigue and lower exercise tolerance, exertional breathlessness, chest pain, dizziness and vertigo, neurocognitive, poor sleep, mental health and joint and muscle pain [77].

“I was so physically fit, a keen runner. I was preparing for a marathon when this happened. I was hit badly during the first wave – headaches, fever, dizziness, lost my taste and smell. Luckily, I was able to get a test which confirmed it was Covid. I followed all the rules, did the two weeks in isolation etc. I got back to work but still felt very low and lethargic. I decided to go and see my doctor after three months as I still couldn’t get back to my running. Sometimes I can barely walk. I still feel tired, my joints ache; I often have headaches, I can’t exercise, and I can’t focus concentrate on anything. I’m only 25. . .is this it?”

6.16.4 Evidence Base

In the United Kingdom, almost 2 million people report COVID-19 symptoms lasting more than 4 weeks, 807,000 more than a year and 403,000 more than two years [77]. Effects include reduced ability to perform activities of daily living, lower exercise tolerance, reduced ability to work and reduced quality of life [77]. For some, symptoms are constant while others experience a relapsing and remitting pattern.

Fatigue and low exercise tolerance are the commonest symptoms. Patients may develop post-exertional malaise [77]. Long covid is more common in people who were hospitalised, ages 35–69 years, females, living in deprived areas, working in healthcare, social care or education, high body mass index and more than one pre-existing, activity-limiting, health condition [77].

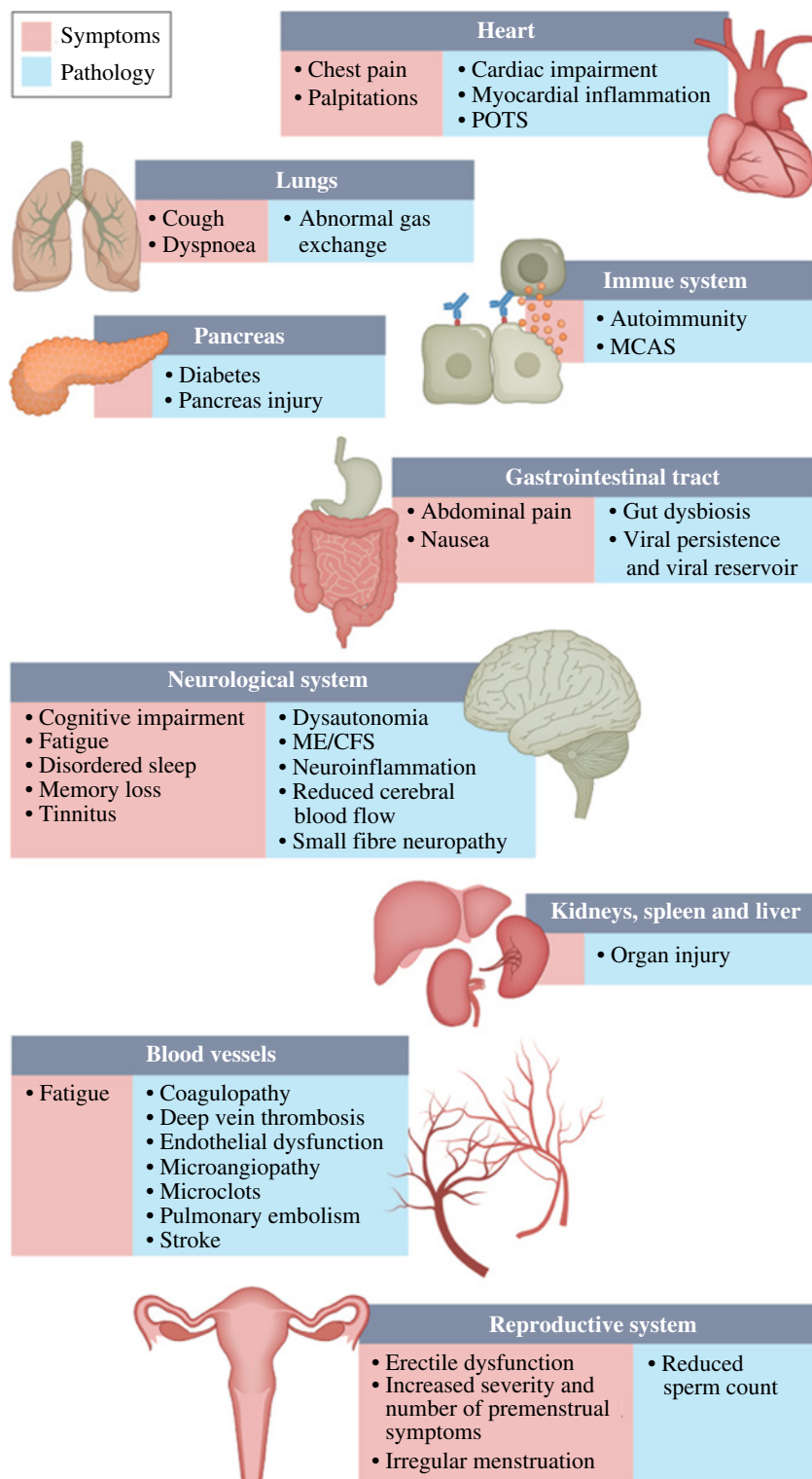


Figure 6.6 Symptoms of long covid. Source: Davis et al. [78]/with permission of Springer Nature.

6.16.5 Key Points in the History

Previous episodes of COVID-19 – confirmed or suspected; current symptoms – these are likely to be multisystem, so a detailed systems review is required; effect on activities (work, education, mobility and independence [79]. Explore the timing and duration of symptoms since COVID-19, any triggers for the symptoms, past medical history, other current conditions, exacerbation of pre-existing conditions and social history.

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7

Musculoskeletal

KEY POINTS

- Diagnosis of musculoskeletal disease is most often made by careful history and examination
- Investigations should be used to confirm a diagnosis suspected strongly from the history and examination
- Individuals from ethnic minority backgrounds have increased risk factors for musculoskeletal conditions
- Several 'joint' diseases have systemic manifestations and extra-articular features
- Joints may be damaged by trauma as well as by disease

7.1 Symptoms of Musculoskeletal (MSK) Disease

Pain – a protective sensation arising from injury, inflammation, infection or tumour

Stiffness – a perception of reduced mobility of a joint or obstructed mobility of a joint such that the normal range of movement of a joint is reduced.

Swelling – an increase in the apparent size or shape of a joint and/or the surrounding soft tissues including synovium, tendons and ligaments.

Loss of function – any alteration or reduction in function brought about by joint disease.

Activities of daily living (ADL) – the things people need to do daily to keep themselves safe, healthy, clean and feeling good.

Extra-articular manifestations – all the conditions and symptoms of a musculoskeletal which are not directly related to the locomotor system.

7.2 Burden of Musculoskeletal Disease

Musculoskeletal disease is defined as any type of discomfort to irreversible and disabling injury affecting the muscles, tendons, bones, cartilage, ligaments and nerves (Figure 7.1) [1, 2].

Globally, the age-standardised incidence rates and age-standardised disability-adjusted life-years (DALYs) have both declined in the period 1990–2019 while deaths have remained stable. Peak age of onset and DALYs in 2019 was 50–54 years. Females were affected more than males (1.29 more incident cases, 2.24 times more deaths and 1.45 times more DALYs). The most significant risk factors were occupational risk, smoking and high body mass index (BMI). Regions with a lower socio-demographic index (SDI) had higher rates of musculoskeletal disorders than those with higher SDIs.

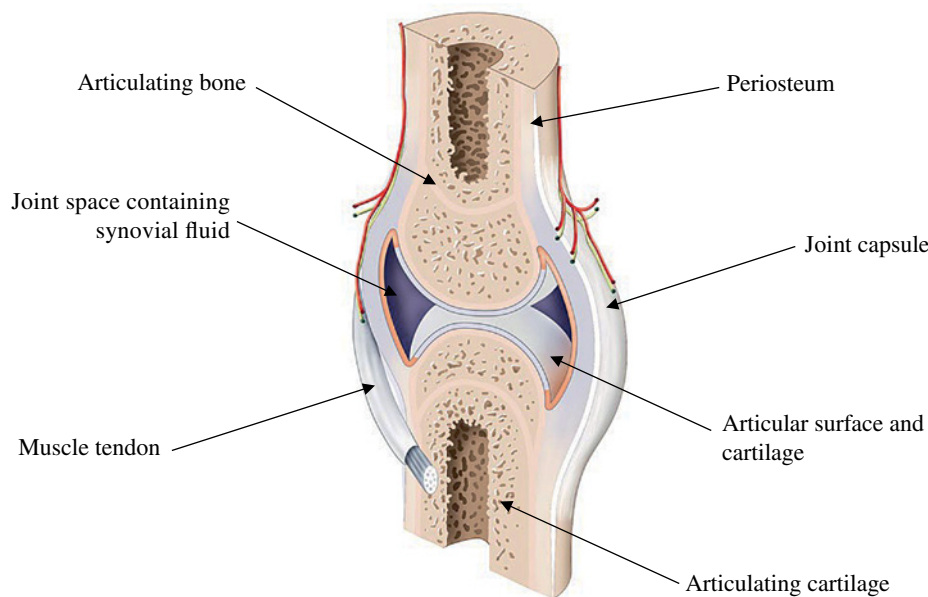


Figure 7.1 Anatomy of a synovial joint. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence. (Image may be resized as necessary.)

7.3 Community Prevalence of Symptoms

Musculoskeletal symptoms are common. A study in France of people of working age (mean age 38.4 years) reported a prevalence during the previous 12 months of 83.8% for men (95% confidence interval [CI] 82.8–85.3) and for women 83.9% (95% CI 82.0–85.7) [3]. The prevalence of symptoms lasting at least 30 days over the previous 12 months was 32.8% (30.9–34.8) for men and 37.3% (34.9–39.7) for women. Two-thirds of participants reported symptoms in more than one anatomical site with 20% reporting symptoms lasting at least 30 days in more than one anatomical site. The most frequent sites affected were the upper back, hip, elbow and neck. Most of these multisite symptoms affect at least two of the three anatomical regions (upper limb, axial and lower limb) [3]. A similar study in female middle-aged school meal workers in Korea found similar results for prevalence of symptoms (79.6%) [4] while a study in the United Kingdom reported similar distribution of sites and number of joints affected in both attenders and non-attenders [5, 6] (Table 7.1).

7.3.1 Ethnicity and Musculoskeletal Conditions

In the United Kingdom, Black, Asian and minority ethnic groups are disproportionately affected by risk factors for musculoskeletal conditions including levels of physical activity, vitamin D deficiency, socioeconomic factors, working in manual occupations, pre-existing long-term conditions (e.g. diabetes), poorer experience of services [7].

Musculoskeletal pain is more widespread among ethnic minorities and this may reflect social, cultural and psychological differences [7]. Conditions associated with musculoskeletal disorders are more prevalent in ethnic minorities. Sickle cell disease is more common in people from Africa, particularly Nigeria, and the Caribbean. Systemic lupus erythematosus (SLE) is more prevalent in people from West Africa (Nigeria and Ghana) and African-Caribbeans. South Asian women may be at more risk of developing osteoporosis.

Table 7.1 Community frequency of possible early symptoms in MSK and non-MSK attenders from the early inflammatory arthritis detection tool.

	MSK consulters (<i>n</i> = 2378)	Non-MSK consulters (<i>n</i> = 2171)
Joint pain	1920 (83.8)	1460 (70.4)
Hand and wrist pain	1124 (48.9)	929 (44.7)
Hands/wrists swollen	429 (18.8)	345 (16.7)
Difficulty making a fist	398 (17.4)	293 (14.2)
Early morning stiffness	1550 (67.8)	1117 (53.9)
Early morning stiffness > 60 min	802 (34.7)	55 (24.5)
Symmetrical joint involvement	948 (42.0)	756 (37.4)
Impact on self-care/work/leisure	1301 (57.4)	762 (37.5)
Told have RA	281 (12.2)	210 (10.0)
Family history of RA	696 (31.0)	615 (29.9)
Diagnosed with psoriasis	207 (8.9)	187 (8.9)
Total score, mean (SD)	4.14 (2.41)	3.39 (2.55)
Weighted score, mean (SD)	1.13 (1.55)	0.86 (1.51)
Number with a positive weighted score	1859 (78.2)	1619 (74.6)

Data are reported as *n* (%) unless otherwise stated. MSK, musculoskeletal; RA, rheumatoid arthritis.

Source: Hider et al. [6]/with permission of Oxford University Press.

7.4 Distribution of Symptoms and Signs

There are four main types of musculoskeletal disease:

- 1) Inflammatory arthritis
- 2) Autoimmune rheumatic diseases and vasculitis
- 3) Non-inflammatory musculoskeletal pain and pain syndromes
- 4) Bone disease

The five most common disorders worldwide are rheumatoid arthritis (RA), osteoarthritis (OA), low back pain (LBP), neck pain (NP), gout and other MSK disorders [1].

As well as the presenting and associated symptoms, diseases of the musculoskeletal system are characterised by different modes of onset, different distribution of symptoms across the joints and differences in the diurnal variations of symptoms. All these features should also be elicited as part of the standard history. They are crucial in developing diagnostic hypotheses for the cause of the patient's symptoms.

7.4.1 Mode of Onset

- Acute (sudden onset)
- Chronic (a problem for a while)
- Episodic (occurs occasionally)
- Migratory (moves around the body, from joint to joint)

7.4.2 Day-to-day Behaviour

Symptoms may vary across the day. Joints may be stiff in the morning, a common feature of inflammatory joint disease, or after a period of sitting down, as commonly seen in osteoarthritis affecting the lower limbs.

7.4.3 Pattern of Joint Involvement

Diagnosis in musculoskeletal disease involves pattern recognition (Figure 7.2). This includes recognising the number of joints affected, the distribution of joints affected (e.g. upper, or lower limb, hands) and the symmetrical or asymmetrical pattern of joints involved

7.4.3.1 Inflammatory or Degenerative (Non-inflammatory)

Inflammatory joint conditions are characterised by signs of acute inflammation – pain, colour change, warmth and swelling in one or more joints. In degenerative joint disease, the structures and tissues break down over time. Both pathologies cause loss of function of the joint. The distribution of symptoms across joints is a clue to the diagnosis

- Polyarticular (affecting several joints)
 - RA, Osteoarthritis (degenerative), Psoriatic arthropathy, Seronegative spondyloarthritis, Connective tissue disease
- Oligoarticular (affecting a few joints)
 - Reactive Arthritis and Psoriatic arthropathy
- Monoarticular (affecting a single joint)
 - Gout, Septic arthritis and Infection (e.g. tuberculosis [TB])

7.5 Key Points in History-taking

Number of joints affected, distribution of joints affected, soft tissue involvement or primarily joints, spinal (axial symptoms), speed of onset, any sinister features, inflammatory features, multisystem autoimmune features, local or general musculoskeletal symptoms and symptoms of systemic disease.

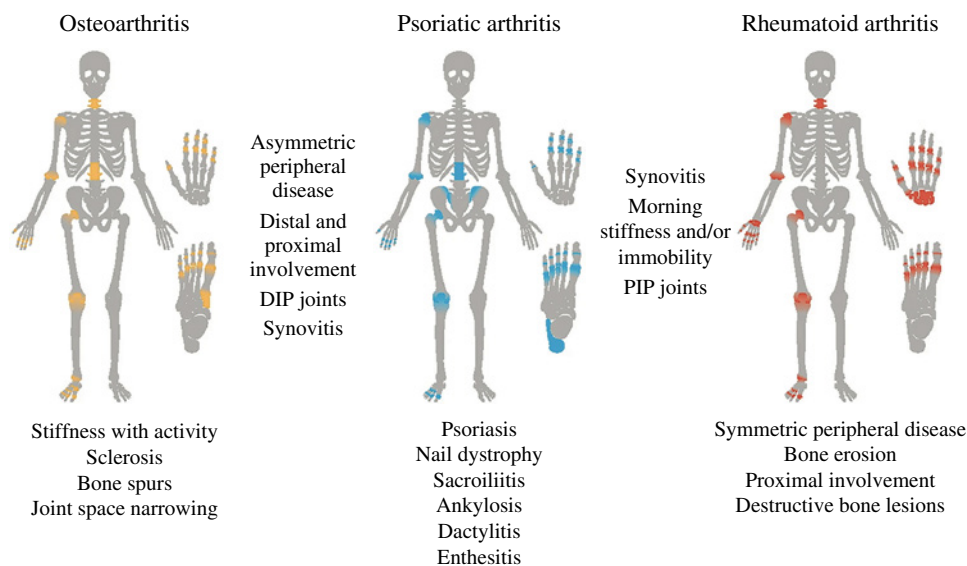


Figure 7.2 Pattern of joint distribution in inflammatory joint disease. *Source:* Saalfeld et al. [8]/with permission of Springer Nature.

7.6 Pain

Musculoskeletal pain is defined as acute or chronic pain that affects bones, muscles, ligaments, tendons and even nerves. Chronic musculoskeletal pain lasts more than 3 months and is characterised by functional disability and emotional distress [9]. Pain associated with musculoskeletal disorders is a common medical and socioeconomic problem worldwide. Pain is classified as primary if it is not attributable to a known disease or trauma and secondary if it occurs due to a disease or injury affecting the bones, joints, muscles and soft tissues [10]. Pain in and around joints is a protective sensation arising from injury, inflammation, infection or a tumour.

7.6.1 Anatomical Site

Pain may arise from any of the structures in or around a joint particularly the bones, ligaments, tendons, muscles and bursae [11]. In musculoskeletal conditions, pain may radiate or be referred to another site of the body. For example, lumbar nerve root irritation may radiate down the leg to the site supplied by the involved nerves (sciatica). Knee pain may be referred from the hip. Pain is usually referred only distally although both elbow and knee pain may be referred proximally and distally. Pain may be referred both from extra-articular structures and from other joints. It may be caused by extra-articular disorders such as polymyalgia rheumatica and fibromyalgia (see Chapter 14) [12]. Regional pain in a single joint is a common presentation [13].

7.6.2 Pathophysiology

Pain is mediated to the central nervous system by chemical mediators of inflammation, neural receptors and peripheral nerves. Severity and characteristics of the pain are dependent on the nature of the stimulus causing it. More than 80% of adult bone innervation is from A-delta and +C nerve fibres [14]. Bone is also innervated by adrenergic and cholinergic sympathetic fibres which serve with bone remodelling, regulation and immune response [15]. The periosteum is the most densely innervated component of bone [11] (Figures 7.3 and 7.4).

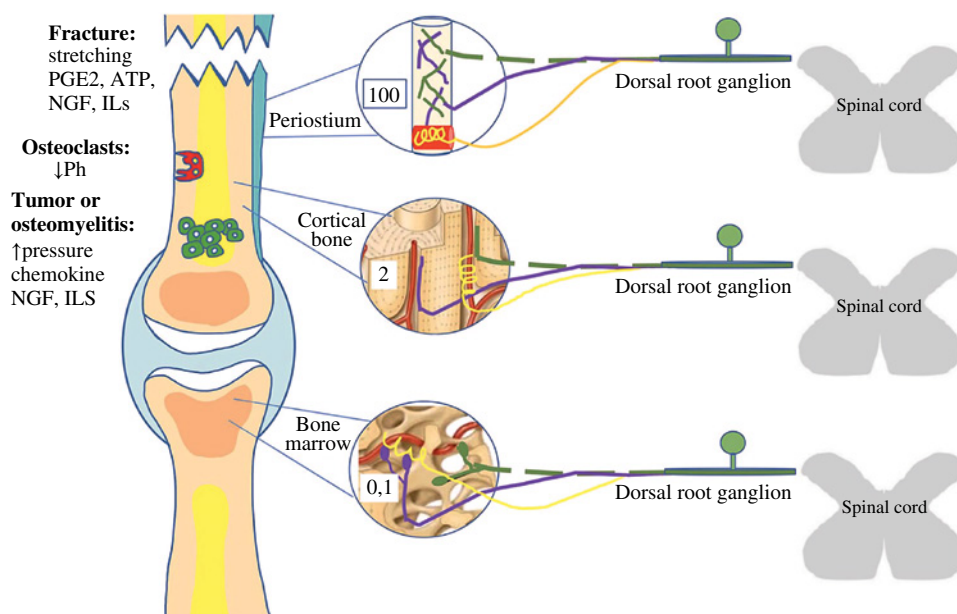


Figure 7.3 Organisation of bone innervation of the periosteum, cortical bone and marrow. *Source:* Puntillo et al. [11]/with permission of SAGE Publications.

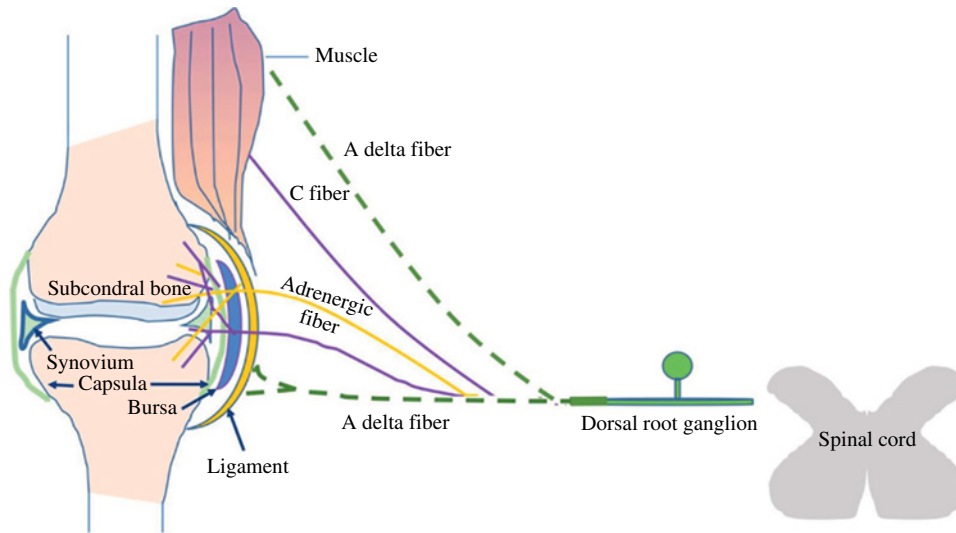


Figure 7.4 Joint and muscle innervation. *Source:* Puntillo et al. [11]/with permission of SAGE Publications.

The purpose of this innervation is to avoid inflammation and the occurrence of pain during normal daily joint loading [11]. In bone fracture, A-delta fibres in the periosteum are activated causing sharp stabbing pain initially followed by lower intensity, dull aching pain from the C fibres of the periosteum, bone and marrow [16].

During inflammation and injury, damaged cells and immune cells release inflammatory mediators including bradykinin, prostaglandin E2, cytokines and chemokines [17]. The presence of macrophages, T lymphocytes and mast cells in the synovium contributes to joint pain and its severity [18].

Pain may be exacerbated by movement or bearing weight on the joint. Arthritic pain is often described as aching while pain from nerve irritation (neuropathic pain) may be described as ‘burning’.

7.6.3 Patient Experience

‘I am carrying pain with me all the time. I feel soaked in it...it affects everything I do.....there are areas of my life where I can no longer go...exercising, going out, playing with the children. I rely on my family to look after me when I should be caring for them. I’m on so much medication, anti-depressants, painkillers, but none of them seem to work. I’m too tired and in pain to work. I’ve started jobs but they are not stimulating, and employers make you feel you are a burden. They’ll tick the boxes, but they don’t want to help in my opinion’

Depression and negative health beliefs affect the occurrence of primary musculoskeletal pain and disability [19]. One-quarter of adults report their pain as 7 out of 10 or above [20].

7.6.4 Gender Differences

Compared with men, women experience greater pain intensity, interference with function and more disability. Women report more pain-related depression and anxiety [21]. Women display an upregulation of pain receptors together with a stronger inflammatory response characterised by higher cytokine production [22].

7.6.5 Evidence Base

Chronic musculoskeletal pain is highly prevalent in the general population [11]. It is the main contributor to disability worldwide [23]. Chronic musculoskeletal pain is experienced by 20–33% of the world’s population [24]. It increases in the elderly. Osteoarthritis affects 43% of people over 65 years [20]. In Italy, 45% of patients referred to

pain clinics for non-cancerous pain had musculoskeletal pain [25]. The pattern of pain experienced across the joints may be like that which occurs in joint swelling. It may therefore help in making the diagnosis. The most prevalent forms of pain are low back, neck and pain from osteoarthritis and RA [26]. Between 13% and 47% of the adult population have experienced musculoskeletal pain from injury or overuse [26]. Pain originating from tissues has its own characteristics:

- Bone – local, boring, pain worse at night, usually no radiation
- Muscle – poorly localised, feels deep within the tissue, use aggravates the pain, may be associated with weakness, partial tears may be painful but complete ruptures not
- Chronic pain – usually present for 3 months or more, typical ‘trigger’ points may be present on examination, associated with sleep disturbance, stress and low mood or depression

Assessment of joint pain should cover the following domains – character, location, severity, precipitating and relieving factors and timing. Does pain occur on first using the joint or after prolonged use? Is it present on waking, or does it develop over the course of the day? Are there other current illnesses or a previous history of similar symptoms? What are the effects of current or previous therapies for the symptoms?

In general, pain originating from superficial structures is more easily localised than pain from deeper structures. Likewise, pain from small, distal joints is better localised than pain from large, proximal joints.

7.7 Stiffness

Muscle stiffness occurs following change of exercise routines, muscle overuse or prolonged periods of overactivity. Muscle stiffness may also be due to an underlying condition, including myopathy, neuromuscular disorders and neurologic disorders.

Joint stiffness is a perception of reduced mobility of a joint or obstructed mobility of a joint such that the normal range of movement of a joint is reduced. The perception of reduced motion may be limited movement, weakness or due to tiredness.

7.7.1 Anatomical Site

Stiffness can affect any joint. It is usually associated with arthritis – inflammatory or non-inflammatory – but may occur also secondary to injury when the onset is more sudden. Some musculoskeletal conditions affect the muscles either primarily (e.g. polymyalgia rheumatica) or as well as the joints. The patient may therefore complain of stiffness affecting the muscles themselves rather than the joints (e.g. around the shoulder and hip girdle).

7.7.2 Pathophysiology

The mechanism of stiffness is not entirely clear. However, it is often accompanied by other signs of inflammation such as pain or discomfort, swelling and warmth. Inflammatory processes may therefore bring about stiffness. Inflammation may cause thickening of the joint capsule and other periarticular structures. There may be synovitis, alterations in the consistency or amount of synovial fluid all of which contribute to the patient’s perception of stiffness.

7.7.3 Patient Experience

‘I wake up in the morning and I can barely roll over in bed to switch off the alarm clock. It takes me literally 20-30 minutes to get myself sitting up and then standing. I feel so stiff, everywhere, my shoulders, my back, my hands. I have a hot shower and rub my hands, opening and closing my hands and fingers to try and loosen them up. It takes about an hour before I’m ready to go downstairs and have breakfast. Sometimes, it’s even worse than that and my partner has to put my socks and shoes on for me’.

Prevalence of stiffness increases with age and affects quality of life. Impacts are affected by severity, effect on physical function, psychosocial impact, timing of stiffness and whether in the mornings or after any period of immobility [27]. Stiffness is less likely to have a psychosocial impact in otherwise healthy people [27].

7.7.4 Evidence Base

Sites of stiffness include joints, muscles, points of tendon origin and insertion (enthesopathy) e.g. tennis elbow, tendon calcification (e.g. supraspinatus tendonitis) and bursae.

There is a high prevalence of stiffness in the community [28]. Prevalence rates vary from 15 to 50% in healthy people including the young [6]. Stiffness is a feature of several diseases including RA, spondyloarthritis, osteoarthritis, polymyalgia rheumatica and psoriatic arthritis [29].

Stiffness is considered important in assessing disease activity in RA [30]. Morning stiffness (greater than 60 minutes) helps identify patients with RA and inflammatory diseases [31]. Even in healthy people, stiffness is experienced most often in the morning and after periods of immobility [27]. For joint stiffness, fewer than 2% experience it in more than a few joints [27]. Increasing joint stiffness with age may be associated with having a first-degree relative with RA, females and decreased grip strength [32]. Impacts of stiffness on physical health are felt from the age of 60 onwards [27].

You should ask about the pattern of stiffness during the day. For example, inflammatory arthritis, in conditions such as RA, is often worse in the mornings with subsequent easing. Stiffness due to inflammatory disease may lead to discomfort on movement following a period of rest. The duration and site of the stiffness may indicate its severity and degree of inflammation. For example, morning stiffness in peripheral joints may be an early symptom of rheumatoid disease or morning stiffness in the lower back may indicate spondylitis. Non-inflammatory arthritis (e.g. osteoarthritis) or mechanical pain is often worse after rest or towards the end of the day and will ease on movement. Getting mobile again on osteoarthritic knees after sitting down may require walking slowly until the stiffness eases.

Healthy people may experience stiffness for a couple of days or so after unusually strenuous exercise, and it is worth asking whether they have done any activity which they would not normally do.

Since many people imply stiffness to imply restricted movement, it is worth asking for a description of when they experience the stiffness. This should include gross motor activities such as getting up from lying or sitting, walking and lifting as well as more precise activities such as writing, combing hair or doing up buttons.

7.8 Swelling

An increase in the apparent size or shape of a joint and/or the surrounding soft tissues including synovium, tendons and ligaments. Joint swelling occurs either due to fluid in the joint space or in the surrounding soft tissues.

7.8.1 Anatomical Site

Swelling may occur in any joint. You should ask the patient to localise precisely the swollen joints. The distribution of swelling (and pain) may be a clue to its aetiology (e.g. symmetrical distribution in small hand joints found in RA).

7.8.2 Pathophysiology

Joint swelling may occur acutely or be the result of chronic disease. In the natural history of a condition, both types may be present either alone or in combination. For example, in RA of recent onset, the metacarpophalangeal joints of both hands may be acutely swollen and have other signs of acute inflammation such as colour change, pain and warmth. In chronic rheumatoid disease, chronic inflammation including pannus formation may cause a joint to appear swollen. Deformity due to joint destruction may also give the appearance of joint swelling.

Injury may produce sudden swelling due to bleeding into either the joint or the surrounding soft tissue. Injury to relatively avascular structures such as the cartilages (menisci) of the knees may cause swelling only slowly over hours or days.

7.8.3 Patient Experience

‘My grandmother and my mother both have arthritis, rheumatoid I think, the shape of their hands has changed a lot over the years especially when they have flare ups. My gran’s doesn’t flare up so much anymore. It’s always made me worried about getting the same, so I am very joint aware, if you know what I mean. I do worry my joints seem puffy at times. It’s mainly my fingers and sometimes my wrists. I think it’s worse during the week before my period, so I don’t know if it’s hormonal rather than arthritis. I think if it gets worse or I get other symptoms I will go and see someone...if I can get in’

7.8.4 Evidence Base

Swelling may be either diffuse within the soft tissues surrounding a joint or localised as a collection of fluid within the joint, bursa or tendon sheath. Patients will often report joint swelling only for the examination to indicate no joint swelling. Proven joint swelling will support a diagnosis of inflammatory arthritis.

The pattern of joint swelling may give a clue to the diagnosis.

- Single joint – acutely swollen
 - Septic arthritis, trauma, gout, pseudogout, haemarthrosis (secondary to haemophilia), seronegative spondyloarthritis
- Single joint – chronically swollen
 - Infection, seronegative spondyloarthritis, synovial chondromatosis
- Multiple joints – acute swelling
 - Infection, acute onset of chronic disease
- Multiple joints – chronic swelling
 - RA – usually symmetrical swelling of hands, wrists, elbows, knees, ankles and feet. Also affects the cervical spine.
 - Seronegative spondyloarthritis
 - Ankylosing spondylitis – sacroiliac joints and spine, hips, knees and shoulders
 - Psoriatic arthritis – asymmetric joint swelling, distal interphalangeal joints, sacroiliac joints
 - Primary osteoarthritis
 - Usually symmetrical, fingers, acromioclavicular joints, cervical and lumbar spine, knees, great toes

During the examination, careful palpation of the joints can reveal clues about the nature of swelling, for example, fluid within the joint (effusion), thickening of the synovial membrane around the joint, capsular or bone enlargement. First-degree relatives of RA patients may experience joint swelling with or without pain and stiffness [33]. Patient-reported joint swelling has little value in detecting onset of inflammatory arthritis and needs to be considered in the context of associated symptoms [34].

7.9 Loss of Function

The consequence of any other musculoskeletal symptom or combination of symptoms can reduce loss of function of a joint. This can be acutely (e.g. walking during an acute episode of gout or difficulty bending down during acute back pain) or chronic because of longstanding disease (e.g. RA in the hands). Muscle function is lost when a muscle does not contract or move normally. Complete loss of muscle function is paralysis.

7.9.1 Anatomical Site

Disease of any affected joint, or multiple joints, may result in a loss of normal function.

7.9.2 Pathophysiology

Loss of function may result from the patient's symptoms – stiffness, swelling, pain – all of which may prevent the patient from moving the joint, spine or limb normally. Chronic disease due to long-term inflammatory processes may also deform the joint rendering it incapable of performing its normal function. Loss of normal articulation of bone surfaces within the joint may lead to either partial (subluxation) or complete dislocation.

7.9.3 Patient Experience

“I am self-employed, run my own business. I use a lot of power tools, but they are all handheld. So, I need power grip for something like a drill but finer movements for putting in nails and screws, nuts and bolts that sort of thing. I can use both hands, but my right hand is my main one. Since, I've had the wrist pain and the tingling in my fingers that's affected how much I can do. I'm having to put work off or turn work away as I've had to cut my hours. Obviously, that is having an effect financially.”

7.9.4 Evidence Base

Apart from the pain, this is what matters most for the patient. Patients with musculoskeletal pain often report a reduction in their daily activities [35]. The effect of a joint disorder depends on the patient's expectations and occupation. A footballer's requirements are different from a musician, farmer or computer programmer. A useful concept is ADLs. These are useful both in initial assessment and monitoring the progress of treatment and disease.

Ask about functions such as [35]:

- Pinch grip – thumb and index finger
- Key grip – thumb and index finger
- Gripping taps, handles, bottle tops – hand and wrist
- Eating, cleaning teeth and face – hand and elbow
- Dressing, washing and hair – hand, elbow and shoulder
- Toileting – hand, wrist, elbow and shoulder

Physical activity is encouraged in the management of joint disease to facilitate joint mobility, physical function and to prevent cardiovascular disease and diabetes [36]. Several indicators of flares in both inflammatory and osteoarthritis include increased pain, fatigue and reduce mobility resulting in loss of function, at least temporarily [37]. Higher levels of previous physical activity are associated with lower risk of RA, milder disease and less severe joint pathology [38, 39].

7.10 Activities of Daily Living

ADL are things people do daily to maintain safety, health, cleanliness and feeling good: from getting out of bed, showering, preparing and cooking meals, shopping and travelling to maintaining the house, garden and taking exercise. Successful performance of ADLs is essential at every age [40]. These are sometimes subdivided into ADLs and instrumental activities of daily living (IADLs) [40]. ADLs concern taking care of one's own body – bathing, toileting, dressing, eating and drinking.

IDALs refer to maintaining independence within the home or community – financial management, housekeeping, shopping for groceries, making telephone calls, taking medications, leisure and social [41].

In terms of assessment of ADLs, the World Health Organisation (WHO) advocates use of the International Classification of Functioning, Disability and Health [42]. This promotes an emphasis on ‘activity’ rather than ‘disability’. Even so, there is still a tendency to evaluate ADLs in terms of disability, particularly since pain is so often the cause of limitation of function [35]. ADLs and IADLs are important in maintaining autonomy and ‘success’ in old age [43]. Older adults experience ADL and/or IADL disabilities in many ways including catastrophic injuries such as hip fracture or cognitive decline [44].

Symptoms of musculoskeletal disease together with lack of energy and fatigue all contribute to ADL problems. They may lead to increased support and financial costs for both the individual and services. ADL domains causing most problems to people with musculoskeletal disease include bending or kneeling (39.3%), climbing stairs up and down without walking aids (23.1%), walking 500 m without walking aids (22.8%), intense ‘heavy burden’ ADLs (58.2%), basic instrumental ADLs (29.2%), basic ADLs (23.0%) and hand-focussed ADLs (9.2%) [45].

Anxiety and depression, chronic musculoskeletal disease, female gender, higher age and pain intensity are all significant predictors of ADL problems [45].

7.10.1 Patient Experience

‘Before I had the fall, I was very active and independent. People think at my age I must need carers or can’t live life normally. That isn’t true but breaking your hip changes everything. It’s amazing how small the world becomes....just going into the next room has to be planned...”How am I going to get out of this chair?...”Will I need to move between the furniture to hold on, so I don’t fall”. Just concentrating on that meant a lot wasn’t getting done....cleaning, paying bills. If I didn’t have my daughter living close, I don’t know what I would have done’

7.11 Extra-articular Manifestations

These diseases may present not only as joint symptoms but also as problems in other systems. For example, psoriasis presents more frequently with skin disease than with an arthropathy. RA or ‘rheumatoid disease’, may present with eye disease or respiratory disease. Extra-articular manifestations are all the conditions and symptoms which are not directly related to the locomotor system (Figure 7.5). Several of the inflammatory, connective tissue diseases affect parts of the body other than the joints. Systemic symptoms including weight loss, anorexia, malaise and fever suggest inflammatory disease.

7.11.1 Pathophysiology

There are genetic factors contributing to development of lung involvement through HLA-DR associations [47]. Smoking may act as a mediator in this process [47]. Although the extra-articular manifestations of these diseases are known, clear evidence of their cause is lacking [48]. Mechanisms are likely related to the autoimmune and inflammatory mediators’ processes affecting the joints themselves [48].

7.11.2 Patient Experience

‘My first symptoms of arthritis were nothing to do with my joints. I noticed my breathing wasn’t good particularly when I was doing something. I thought it must be asthma or long-Covid or something. My doctor gave me an inhaler, but it never seemed to make any difference so eventually I had some lung tests. They diagnosed it was fibrosis and that’s when they started thinking about rheumatoid.... not at the beginning’.

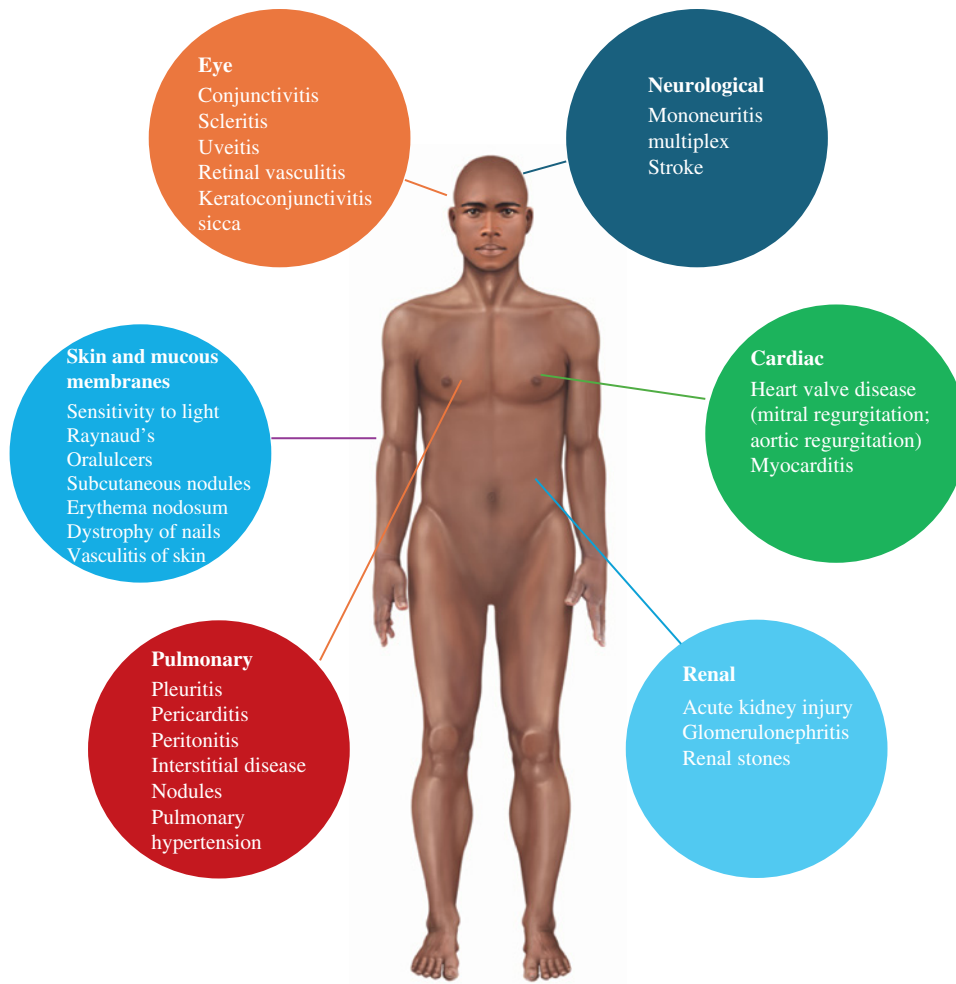


Figure 7.5 Extra-articular manifestations of musculoskeletal disease [46]. Dr Joanna Butler © www.medical-artist.com (2024). Permission granted under licence. (Image may be resized as necessary.) Adapted from Table 19.2.3 in Oxford Textbook of Medicine, 6th Edition, page 4387.

Screening for extra-articular features in the history is not only for future management but also as an aid to differential diagnosis.

7.11.3 Evidence Base

The commonest extra-articular feature of RA is lung involvement which affects up to 60% patients. Patients present with respiratory symptoms particularly breathlessness. Smoking is a risk factor for RA and for lung disease. There is a range of possible lung features including rheumatoid arthritis-interstitial lung disease (RA-ILD), bronchiectasis, pulmonary vasculitis and pulmonary hypertension [47].

7.11.3.1 Presence of Raynaud's Phenomenon

This is an abnormal response to cold. The digital arteries of the fingers go into spasm. The fingers turn white, blue and finally red. Females are more often affected, and it may be associated with conditions such as scleroderma.

7.11.3.2 Dry Eyes and Mouth

In association with connective tissue disease, particularly RA, dry eyes and mouth form Sjogren's syndrome.

7.11.3.3 Red Eyes

Associated with seronegative spondyloarthropathy and Behcet's syndrome.

7.11.3.4 Sexual History

Recent exposure to risk of sexually transmitted disease may be a factor in reactive arthritis or Reiter's disease.

7.11.4 Key Points in the History

Ask also about fatigue, weight loss, diarrhoea, generalised stiffness, fever, headache or pain on chewing – temporal arteritis.

7.12 Specific Joints

7.12.1 Key Points in the History

- Pain
 - Onset, acute or chronic, mechanism of any injury, effects on function and ADLs, pain at rest or solely on movement, any effect on sleep
- Associated symptoms
- Joint above and below involved
 - Radiation of symptoms
- Occupational factors, hobbies, systemic symptoms and signs, past medical history, drug history including reactions/intolerances

7.13 Neck

7.13.1 Where is the Neck Vulnerable to Injury?

The neck is descriptively divided into three zones. The base of the neck (Zone 1) is the area most vulnerable to injury [49]. Zone 1 lies between the clavicles and the cricoid cartilage. Penetrating injuries of the neck are likely to result in vascular injury as this area contains the innominate vessels, the origin of the common carotid artery, the subclavian and vertebral arteries, the brachial plexus, trachea, oesophagus, apex of lung and thoracic duct.

7.13.2 Neck Symptoms

All the key symptoms may arise in the neck but the most common is pain. About two-thirds of people experience NP during life [50]. Musculoskeletal NP arises usually from the structures of the back of the neck – the vertebrae, paraspinal muscles and nerve roots. Anterior NP may arise from the anterior neck muscles but may be referred from the oesophagus, trachea, thyroid glands or heart. Other causes of pain include trauma including hyperextension of the neck (whiplash), disc prolapse, disc degeneration, tendon and/or muscle strain from overuse (painters, cyclists, holding a phone between the shoulder and ear).

Patients may complain of numbness or tingling in the arms (radicular symptoms) following an injury. The symptoms usually follow the dermatomes of the nerve roots involved. In these patients, ask about lower body limb function and about bowel and bladder control. Stiffness may also be present.

The main causes of NP are no cause identified, cervical spondylosis and cervical disc disease [50]. It can be difficult to tell the three apart particularly since the x-ray changes of cervical spondylosis are common after the age of 40 years and correlate poorly with the patient's symptoms. Neck-shoulder pain including trapezius myalgia is experienced by 10–20% of people while chronic whiplash-associated disorders affect 1.5% [51, 52].

7.14 Thoracolumbar Spine

7.14.1 Where is the Thoracolumbar Spine Most Vulnerable to Injury?

The thoracolumbar junction between T10 and L2 is the area most at risk of injury. The area is a transition from the rigid and minimally mobile thoracic spine and ribs to the more mobile lumbar spine. It is subject to increased biomechanical strains. LBP affects 30–40% of adults (Figure 7.6) [53]

Most lumbar spine pain is from degenerative disease. Where there is nerve root irritation, the patient may experience radiation of the pain down the back of the legs as far as the heel. You should listen for location of the pain, sudden or gradual onset, radiation, effect of coughing, sneezing, straining or movement. Area of sensory disturbance may follow dermatomal patterns, and this provides a clue to level of nerve root involvement.

Pain is usually only referred distally. 'Pins and needles' arise only from nervous system lesions with the lesion lying proximal to the area of sensory disturbance. The commonest levels for nerve root involvement are L5/S1 followed by L4/L5. LBP is a leading cause for years lived with disability [54]. 'Red flags' for acute back pain are age less than 20 years or greater than 55 years, recent significant trauma, thoracic aneurysm, non-mechanical (infection/tumour/pathological fracture), fever (infection), difficulty in micturition, faecal incontinence, motor weakness and sensory change in the perineum.

Less common but alarm features are sexual dysfunction, gait change (cauda equina syndrome), bilateral sciatica, past medical history – cancer (metastases), previous steroid use (osteoporotic collapse) and weight loss/malaise without obvious cause e.g. cancer.

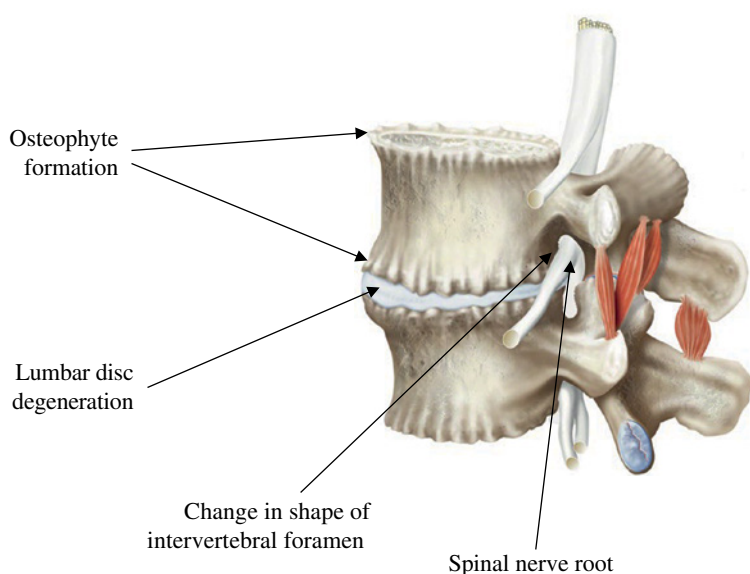


Figure 7.6 Degenerative disease of the lower lumbar spine. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence. (Image may be resized as necessary.)

7.14.2 Cauda Equina Syndrome

Diagnosis of this condition lacks sensitivity and specificity leading to late diagnosis [55]. A review of 105 articles identified 17 definitions [56]. It may develop in up to 2–3% of lumbar disc herniations requiring operation [57]. It may present in both sudden and delayed fashion, with the latter more likely to result in diagnostic delay [58]. Key features of the subgroups are given in Table 7.2 [58].

7.15 Shoulder

7.15.1 Where is the Shoulder Most Vulnerable to Injury?

The shoulder is the most frequently dislocated joint in the body. Anterior dislocations are the most common. Prior dislocation increases the risk of subsequent dislocation. The most vulnerable position for the shoulder is at the extremes of abduction and external rotation or horizontal abduction. Fractures can also occur of the clavicle and the surgical neck of the humerus. In older patients, one of the commonest shoulder pathologies is rotator cuff syndrome (Figure 7.7).

7.15.2 Shoulder Symptoms

Pain is the commonest symptom in patients with shoulder disorders. Shoulder pain affects 1 in 5 older people. The anatomy of the shoulder gives it great flexibility of movement but also predisposes the joint to the development of pathology leading to pain. It is the only joint in the body where tendons (the rotator cuff) pass between moving bones (the acromion and humerus) [59]. Key features to elicit between history and examination include location of pain, range of movement and strength of the rotator cuff muscles. Presence of a ‘painful arc’ (the presence of pain when the arm is elevated – abducted – from the side between an angle of 70° and 100°) suggests compression of subacromial tissues.

Table 7.2 Different subgroups of Cauda equina.

Signs and symptoms	CESS	CESI	CESR
Pain	Back pain with bilateral radiculopathy	Back pain ± radiculopathy	Back pain ± radiculopathy
Sensorimotor symptoms	Possible motor or sensory deficit	Possible motor or sensory deficit	Possible motor or sensory deficit
Bladder function	Preserved	Neurogenic bladder dysfunction (diminished desire to void, difficulty starting and stopping stream, altered sensation)	Painless retention, with possible overflow incontinence
Bowel function	Preserved	Diminished sphincter tone	Faecal incontinence
Saddle anaesthesia	Absent	Partial	Complete perianal sensory loss

CESI, cauda equina syndrome incomplete; CESR, cauda equina syndrome retention; CESS, cauda equina syndrome suspected.

Source: Kuris et al. [58]/with permission of Elsevier.

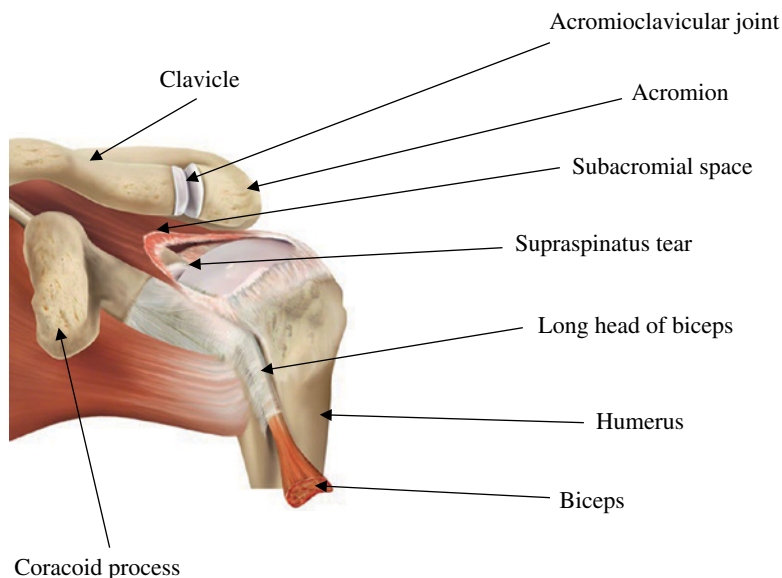


Figure 7.7 Rotator cuff lesion: supraspinatus tear. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence. (Image may be resized as necessary.)

Pain is felt usually over the front and lateral shoulder while pain over the top of the shoulder is more likely to originate from the acromion or neck. Movement at the shoulder (abduction, internal and external rotation) also produces movement at the sternoclavicular joint. Apparent shoulder pain may be referred from areas including cervical spine, cervical nerve roots, the diaphragmatic and subdiaphragmatic peritoneum via the vagus nerve and the heart.

Stiffness of the shoulder may occur after disease through injury or stroke. It is commonly due to adhesive capsulitis of the glenohumeral joint. Patients with a history of dislocation may describe feeling the arm is about to pop out of its socket. Loss of function may be experienced as inability to raise or keep the arms above the head or to reach around to the back.

7.16 Elbow

Fractured radial head is the commonest injury in adults and fractured radial neck in children. Other fracture sites are the olecranon, the coronoid process and the distal humerus. Mechanisms of injury are likely to be a fall onto an outstretched hand or a direct blow to the elbow. Patients may develop all the symptoms discussed. Common elbow conditions are lateral epicondylitis ('Tennis elbow') and medial epicondylitis ('Golfer's elbow') which affect the common extensor and flexor origins respectively. These are often related to overuse and repetitive activities. The history should explore both domains.

7.17 Hand

7.17.1 Where are the Wrist and Hand Most Susceptible to Injury?

The wrist is susceptible to injury from trauma or fall onto outstretched hand known as FOOSH. Common injuries include scaphoid, distal radius and ulnar fractures. Scapholunate dislocation may occur more rarely. In the hands, fractures may occur to the metacarpals and phalanges. Osteoarthritis is common at the base of the thumb (first carpometacarpal joint) and the small joints of the fingers. Compression of the median nerve in the carpal tunnel may lead to the pain and sensorimotor symptoms of carpal tunnel syndrome.

7.17.2 Hand Symptoms

All key symptoms of the musculoskeletal system may present in hand disorders. You should listen or ask about each of them in detail ensuring you ask the patient to carefully identify the part of the hand affected by each symptom (Figure 7.8). At the outset, you should also establish which hand is dominant as this may have a bearing on loss of function and prognosis.

- Pain – vague or diffuse (radiation from shoulder or neck; carpal tunnel syndrome), localised (arthritis, trauma, soft tissue)
- Stiffness – worse in the morning with RA
- Swelling – of the wrists may indicate arthritis or tendon sheath inflammation
- Deformity – small joints of fingers and hand in RA, fingers in osteoarthritis or gouty tophi, sudden onset suggests tendon rupture
- Locking of a finger (trigger finger) – inflammation of flexor tendon sheath (tenovaginitis)
- Loss of function – interaction of disorder of the hands and wrists; obtain detailed history of function affected (e.g. gripping, picking things up, doing up buttons, writing)
- Neurological symptoms – nerve compression (tingling/numbness, limitation of strength, loss of complex function)

7.18 Hip

Up to 14% of adults over 60-years experience hip pain for most days of the week [60]. Although hip pain may be referred to the knee, most pain in the lower limb is localised. Basic questions should cover onset, location, quality, relieving and exacerbating factors, occupational and leisure activities that may also be relevant, exercise tolerance including range of walking, ease of getting up and down stairs and night-time pain.

Pain presents usually around the groin but may be referred to the anterior thigh, knee, or buttock. For hip osteoarthritis, family history of OA (+LR = 2.13), history of knee OA (+LR = 2.06), groin or anterior thigh pain (+LR = 2.51–3.86), self-reported limitation of motion in one or both hips (+LR = 2.87), constant LBP or back pain (+LR = 6.50) and groin pain on the same side (+LR = 3.63) are significant historical factors [61]. Hip pain may be due to other causes including lumbar nerve root irritation, spinal or arterial claudication, inguinal or femoral hernia, intra-abdominal pathology and knee pain referred to the hip

Pain may be related to activities such as regular running for recreation or jumping down from a lorry or platform at work. Prolonged sitting may produce stiffness in the joint which eases only slowly on standing and moving again. Note the patient's age and build as a risk factor for the development of osteoarthritis. Ask about the presence of a limp when walking. Patients with a previous history of osteoarthritis and joint replacement on one side may develop a secondary arthritis on the initially unaffected side due to taking extra body weight on that side. The neck of the femur is vulnerable to direct blunt force causing fracture, particularly in osteoporotic bone.

7.19 Knee

The knee is a hinge joint made up of the articular surfaces of the distal femur and proximal tibia. In addition, the patella, a sesamoid bone within the quadriceps tendon articulates with the lower anterior surface of the femur. This arrangement has no inherent stability of its own and relies on the collateral ligaments, medial and lateral, to prevent sideways movement and the cruciate ligaments, anterior and posterior, to prevent backwards and forwards movement.

All these structures are susceptible to injury. Common mechanisms of injury involve blunt force trauma or twisting movements through the plane of the articular surfaces of the joint. Knowledge of their anatomy as well

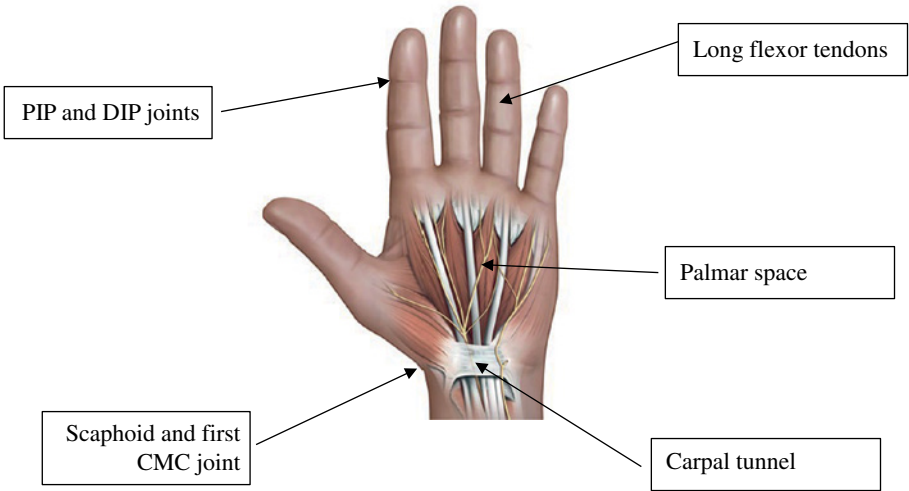


Figure 7.8 Hand – sites of possible injury or pathology. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence. (Image may be resized as necessary).

as surrounding bursae and muscle attachments is most useful for forming a differential diagnosis in the patient presenting with a knee complaint. You should note the importance of the history and examination in helping to explain any findings made on subsequent X-ray or magnetic resonance imaging (MRI). Diagnostic tests may mislead if relied upon exclusively. For example, about a quarter of normal people have changes on MRI scan consistent with a meniscal tear [62].

7.19.1 Pathophysiology

The infrapatellar fat pain and synovial fat pad are involved in the pathogenesis of osteoarthritis in the knee and associated pain [12] (Figure 7.9).

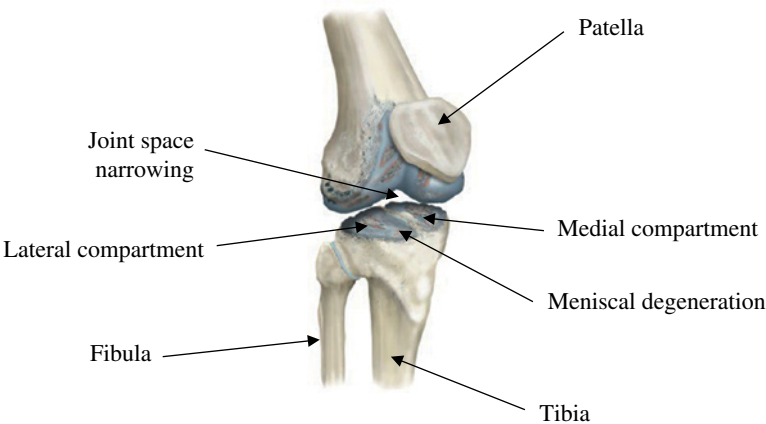


Figure 7.9 Osteoarthritis of the right knee. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence. (Image may be resized as necessary.)

7.19.2 Evidence Base

The prevalence of knee pain is 10–15% [63]. One-third of those over 60 years are affected and prevalence is 1.5–2 times higher in women [63]. Those living in poverty are more likely to develop pain and disability from knee osteoarthritis [64].

7.19.3 Key Points in the History

Careful use of the history and examination can be helpful in diagnosing over 80% of knee injuries [65]. In the patient presenting with a knee problem, you should cover each of the following areas in your history: location of pain, duration of pain, stiffness, recent changes in activity, recent injury, previous surgery, any sensation of ‘popping’, swelling including rate of onset, giving way, locking or catching, instability of the patella. Ask also about pain in the back, hip or thigh.

Ask the patient to point to the site of pain to localise it. The commonest causes of knee pain will be trauma and osteoarthritis. Factors predicting progression of knee pain due to osteoarthritis include age, a varus deformity of the joint, osteoarthritis in other joints and X-ray change of osteoarthritis. BMI is also a strong predictor of long-term progression [66].

Factors in the history and examination predicting likely radiographic osteoarthritis include age, gender, BMI, absence of whole leg pain, traumatic onset, difficulty descending stairs, palpable effusion, fixed-flexion deformity, restricted range of flexion and knee crepitus [67].

7.19.4 Foot and Ankle

The ankle is a hinge joint whose movements are dorsi and plantar flexion. Collateral ligaments contribute to joint stability. Foot movement occurs at the midtarsal and subtalar joints to produce inversion and eversion. The lateral aspect of the ankle is the most susceptible to injury and accounts for a quarter of all musculoskeletal injuries. The lateral talofibular ligament is site of most ankle sprains. Medial and lateral malleolar fractures are associated with fractures of the fibular head (Figure 7.10).

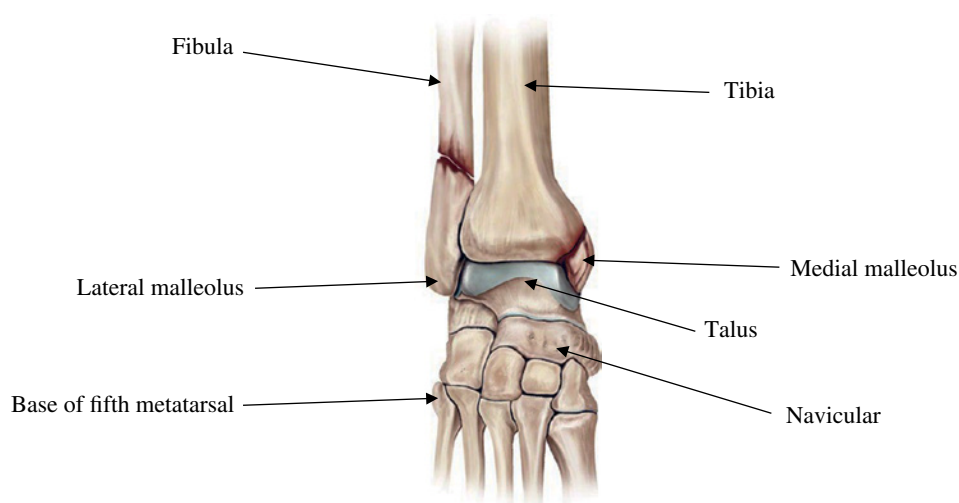
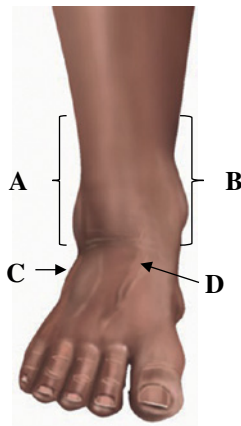


Figure 7.10 Bimalleolar ankle fracture. *Source:* Dr Joanna Butler, 2024/with permission of Medical Artist Limited. Permission granted under licence. (Image may be resized as necessary.)

A – posterior edge or tip of lateral malleolus and distal 6 cm of fibula
B – posterior edge or tip of medial malleolus and distal 6 cm of tibia
C – base of fifth metatarsal
D – navicular



Ankle X-ray required only if there is any pain in malleolar zone and any of:

- Bone tenderness at **A**
- Bone tenderness at **B**
- Inability to bear weight both immediately and in emergency department

Foot X-ray required only if there is any pain in midfoot zone and any of:

- Bone tenderness at **C**
- Bone tenderness at **D**
- Inability to bear weight both immediately and in emergency department

Figure 7.11 Ottawa ankle rule. Sensitivity of the rule is 100% and allows clinicians to reduce number of X-rays by one-third. *Source:* Adapted from Stiell et al. [68]. Dr Joanna Butler © www.medical-artist.com (2024). Permission granted under licence. (Image may be resized as necessary.)

The Ottawa ankle rule combines elements of history and examination and is used in emergency departments to select patients requiring x-ray (Figure 7.11).

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8

Neurological

KEY POINTS

- The history remains the main method of diagnosis in neurology
- Thinking about the underlying anatomy as you listen to the patient helps formulate diagnostic ideas
- Imaging reveals the site of the lesion but not the effect on the function and quality of life
- Witnesses to the patient's symptoms are an important source of information
- Neurological interviewing should always include screening for risk factors of cardiovascular disease

8.1 Impact of Neurological Disease

Worldwide, neurological conditions are the largest cause of healthy life lost to death or disability with 3.4 billion living with neurological conditions [1]. They are the second leading cause of mortality worldwide after cardiovascular disease [2]. This will increase with population ageing. Globally in 2019, there were nearly 10 million deaths and 349 million disability-adjusted life-years (DALYs) due to neurological disorders [3]. Acute neurology accounts for 10–20% of all hospital medical admissions [4]. Alzheimer's disease, other dementias, Parkinson's disease, idiopathic epilepsy and bipolar disorder showed the largest increases over the period 1990–2019 [3, 5]. Four regions showed the largest rises in incidence of neurological disease during 1990–2019, East Asia, tropical Latin America, Southern Latin America and Western Europe together with three countries China, Ecuador and Italy [5]. The highest age-standardised DALYs in 2021 were for stroke, neonatal encephalopathy, migraine, Alzheimer's disease and other dementias, diabetic neuropathy, meningitis, epilepsy, neurological complications of preterm birth, autistic spectrum disorder and nervous system cancer [1].

8.2 Ethnicity

UK Biobank data shows increased risk of dementia and stroke in Black individuals compared to Whites, whilst Asians have similar odds to Whites [6]. Asians have decreased risk of mortality whilst White and Black individuals show no difference from one another [6]. In the US, African American and Hispanic Americans have higher symptom severity and overall disability relative to Whites [7]. Access for ethnic community patients is an issue in many societies. Black individuals in the United States are 30% less likely to see an outpatient neurologist than a White person whilst for Hispanics the figure is 40% less likely [8]. Black patients are more likely to attend through the emergency department and to have longer hospital stays [8]. Minoritised groups are less likely to be represented in neurological research [9].

8.3 LGBTQ+

Research into neurological conditions in the lesbian, gay, non-binary, transgender, queer + (LGBTQ+) community is limited [10]. There appear to be disparities in headache, sleep duration, cardiovascular risk factors and stroke [10]. Half of published research is from the United States where most studies include solely gay/bisexual cisgender men [11]. Nearly three-quarters of published studies focus on neurological conditions in human immunodeficiency virus (HIV)-positive individuals [11]. The commonest themes were neuroinfectious disease (57.5%), cognitive neurology (17.2%), cerebrovascular disease (4.6%) and autism (4.6%) [11]. Dementia is the most common documented disability in LGBTQ+ people [12]. LGBTQ+ patients often conceal their gender orientation and sexual orientation due to fear of discrimination [12]. This develops into disparities in health care and a lack of services to meet their needs [12].

8.4 Approaching the Neurological History

A detailed history establishing the timeline of symptoms is essential. Whilst imaging has augmented the diagnosis of conditions such as stroke and multiple sclerosis, the history remains most important in headache and epilepsy, whilst diagnosis of movement disorders also requires neurological examination [13].

‘Different from all other medical specialties, save perhaps psychiatry, the neurologist is heavily dependent on listening to and interpreting what the patient tells us. . . If you don’t know what is happening by the time you get to the feet you are in real trouble’

(Jerome Posner, 2013) [14]

Diagnosis in neurology relies on clinical/anatomical correlation. Both history and examination should be taught and learnt to facilitate this. This requires several steps – recognition of impaired function, localisation to sites of the nervous system affected, differential diagnosis of the cause and use of testing to confirm the diagnosis [13].

You should allow the patient to make a full opening statement. Where possible this should encourage the patient to describe in detail their symptoms and the effects on function. Listening to the patient, and questioning where appropriate, should aim to define the anatomical location of the symptoms and aetiological risk factors (Table 8.1). You should also establish the timeline of the onset of symptoms and their subsequent evolution.

Once symptoms have been identified they can be grouped; this can suggest their anatomical basis and whether one or more sites are involved (Table 8.2).

The timeline of onset and evolution of symptoms are also clues to pathology (Table 8.3).

Neurological history-taking is an excellent example of when understanding the underlying anatomy and physiology will inform how pathology develops and aid formulation of diagnostic hypothesis and differential diagnosis. Since cardiovascular disease and risk factors are so often aetiological in neurological conditions (e.g. stroke and transient ischaemic attack [TIA]), the neurological history should always include screening for these.

8.4.1 The Basic Four Approach

The basic four approach is a model for facilitating case-based discussion around neurological symptom presentations. The learner applies four questions to a scenario [16]:

- 1) What is the level of the lesion?
- 2) On which side is the lesion?
- 3) What is the timeline of the presentation?
- 4) What is the most likely pathology?

Table 8.1 Correlation between patient's symptoms and diagnostic domain.

Symptom	Possible problem
Disturbance of speech	Aphasia
Disturbance of articulation	Dysarthria
Heavy limb	Motor or sensory
Tingling/paraesthesia	Positive sensory
Numbness	Negative sensory
Bladder function	Neurological Urological
Double vision	Diplopia Visual acuity
Impaired vision in right eye unaltered by sequential closure of either eye	Hemianopia
Awareness of temperature and pain disturbed in 'good' leg in some forms of spinal cord disease (e.g. Brown-Sequard syndrome)	Spinal sensory pathways

Source: Compston and Kennard [15]/Oxford University Press.

Table 8.2 Correlation of symptoms with anatomical site.

Hypothesis	Site of pathology
Cognitive	Cerebral cortex • Diffuse or focal • Dominant or non-dominant hemispheres • Frontal • Temporal • Parietal
Incoordination of more than one motor skill (eye movement, speech, limbs and balance)	Brainstem-cerebellar connections
Hemianopia field defect	Supratentorial
Lower cranial nerve palsies	Below the tentorium
Motor and sensory symptoms in limbs with altered sphincter function	Spinal cord disease
Male patient with unreliable bladder	Possible neurological but linking urgency, frequency, impotence and constipation
Diffuse distal symmetrical motor and sensory	Peripheral nerve
Shoulder and pelvic girdle weakness	Primary muscle disease
Ocular, bulbar, respiratory and upper-limb weakness	Neuromuscular junction

Source: Compston and Kennard [15]/Oxford University Press.

Table 8.3 Relevance of onset and timeline of neurological symptoms.

Timing of symptom onset	Possible pathology	Examples
Abrupt	Vascular or electrical	Cerebrovascular, seizure
Subacute	Demyelinating or inflammatory	Myasthenia gravis
Slowly	Structural deficits or degeneration	Tumour
Subsequent course (evolution)		
Self-limiting	Vascular	Transient ischaemic attack (TIA)
Paroxysmal	Electrical or demyelinating – dependent on duration	Multiple sclerosis
Progressive	Compressive or degenerative	Tumour, dementia, motor neurone disease
Circumstance of onset		
Structural	Trauma	Subdural haematoma
Preceding infection	Demyelinating	Postinfectious encephalomyelitis
Drug exposure	Toxic	Delirium
Pregnancy	Thrombotic	Cerebrovascular

Source: Compston and Kennard [15]/Oxford University Press.

The model's structure and approach facilitate the learning of neuroanatomy and the clinical reasoning necessary to formulate diagnostic categories and ideas from this knowledge. It can be used in a range of settings from lectures and small group to online [16].

8.5 Key Neurological Symptoms

We will discuss – Headache – Altered mental status – Seizures – Weakness – Sensory – Tremor – Visual symptoms – Hearing – Gait – Speech

8.6 Headache

A headache is any pain or discomfort around the head and neck. Headache is the commonest neurological symptom and accounts for 1–4% of all emergency department attendances [17]. Dependent on cause, the pain may be localised to a particular anatomical site. You should try to localise this as well as characterise the pain. A headache may be acute or chronic (more than 15 days per month for more than 3 months) [18]. Common types of headaches which may be chronic are migraine, tension-type and medication overuse. The International Classification of Headaches (ICHD-III) categorises headaches as primary headaches (e.g. tension, migraine, cluster), secondary including life-threatening pathologies (acute brain injury and vascular disorders) and cranial neuropathies (e.g. trigeminal neuralgia) [18].

Primary headaches have no identifiable underlying cause whilst secondary headaches have an underlying pathology. Primary headaches are much more common than secondary. Secondary headaches are often obvious when considered in the context of their associated symptoms. The SNOOP mnemonic can facilitate recognition of red flags (Table 8.4) [20].

Table 8.4 SNOOP4 mnemonic to assess for secondary causes of headache.

Systemic symptoms and signs	Possible causes
Fever, rigours, sweats, weight loss	Infection, giant cell arteritis, neoplasia
History of immunosuppression or cancer	
Pregnancy	Secondary vascular cause, especially cerebral venous sinus thrombosis
Family history of intracranial aneurysm	Subarachnoid haemorrhage
Obesity	Idiopathic intracranial haemorrhage
Neurological symptoms and signs	
Focal neurological deficit	Any secondary cause (migraine aura may cause focal deficit, but this evolves over minutes and usually resolves over hours)
Meningism	Infection, subarachnoid haemorrhage
Visual obscurations, pulsatile tinnitus	Idiopathic intracranial haemorrhage, mass lesions
Onset sudden	
Did the pain reach maximum intensity within 60 seconds (thunderclap headache)?	Secondary vascular cause
Onset for the first time over 50 years	Any secondary cause (especially giant cell arteritis)
Progressive headache (in intensity or duration of episodes)	Consider possibility of neoplasia or medication-overuse headache
Precipitated by Valsalva manoeuvre	Chiari malformation, intracranial structural lesion – especially posterior fossa, intracranial hypertension
Postural relationship	
Worse when standing	Intracranial hypotension
Worse when lying	Raised intracranial pressure
Papilloedema	Raised intracranial pressure

Secondary causes include intracranial infection, inflammation including giant cell arteritis, neoplasia and vascular disease. Vascular disease includes stroke, subarachnoid haemorrhage, venous sinus thrombosis, reversible cerebral vasoconstriction syndrome and arterial dissection.

Source: Chinthapalli et al. [19]/Elsevier.

They are more challenging to distinguish where headache is the only symptom. Serious causes of secondary headaches include (Figure 8.1) [19]:

8.6.1 Pathophysiology

There are no pain receptors in the brain itself. Perception of pain and headache arises from stimulation of pain receptors in adjacent tissues such as meninges, bone, blood vessels and cranial or spinal nerves. It is unlikely all primary headaches have a single mechanism, and the cause of a secondary headache will depend on the underlying pathology. This will depend on the cause of the headache:

Migraine – this is usually unilateral (often described as throbbing). It may be preceded by an ‘aura’ including sensitivity to light, perception of light (fortification spectra), nausea and vomiting.

Tension headache – usually bilateral and often felt around the temporal or frontal areas. Patients may complain of pain around the neck and shoulders. The headache may last several days.

Cluster headache – felt around one eye and often of sudden or quick onset. May be associated with excess lacrimation, runny nose and flushing. Occurs in exacerbations lasting a few days, weeks or months.

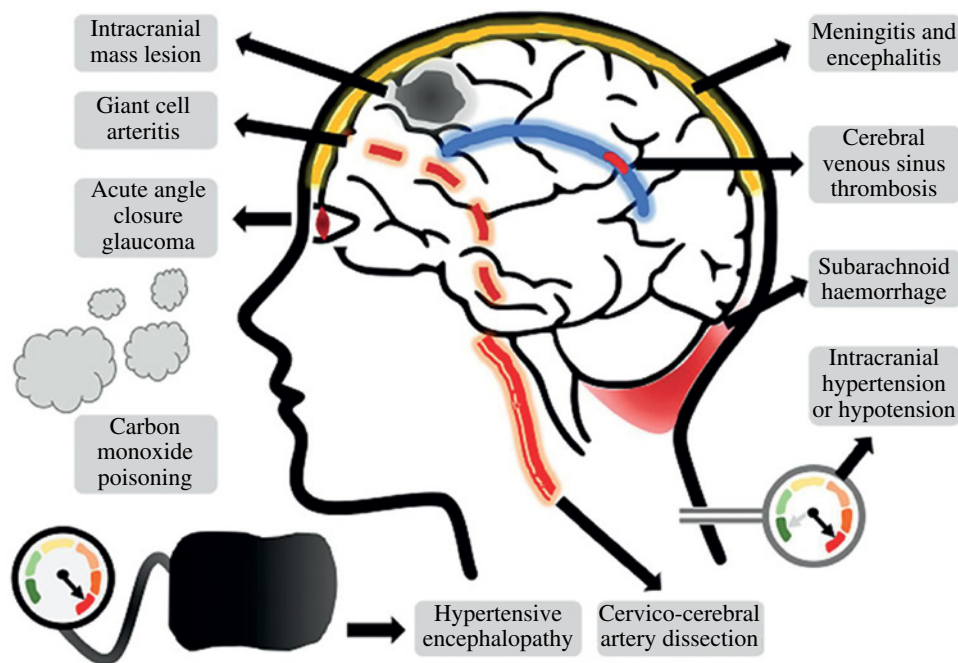


Figure 8.1 Some important secondary causes of acute headache. *Source:* Chinthapalli et al. [19]/Elsevier.

Medication overuse headache – this is caused by long-term use of medication taken originally to relieve headaches. Headaches occur almost daily and can be present on waking. Associated with nausea, anxiety, difficulty concentrating and low mood.

More serious headaches include:

Raised intracranial pressure – exacerbated by any activity which raises intracranial pressure – lying down, coughing, exertion and straining. The patient may have headache on waking or have been woken from sleep by the headache. As it progresses, the patient may develop other symptoms and signs such as altered consciousness and/or systemic upset (e.g. vomiting).

Cranial arteritis – patient complains of a unilateral headache around the temporal area. The pain may be aggravated by jaw movements such as when speaking or chewing food. Visual disturbance may develop signifying impending visual loss. The patient may also have symptoms of morning stiffness around the limb girdles characteristic of polymyalgia rheumatica.

8.6.2 The Patient Experience

In the United States, around 96% of people will experience a headache of some kind during their lifetime [21]. About 90% of men and 95% of women have a least one headache per year [22]. It is unclear if regional differences exist as measuring these is affected by diagnostic criteria, methodology and culture [23]. The prevalence peaks between 25 and 40 years before then decreasing with age. Women are affected more than men with 20.7% experiencing migraine or severe headaches whilst 9.7% of men experience these [24].

An intermittent headache may become chronic. A systematic review of the lived experience of patients with chronic migraine, tension or medication overuse headaches identified three overarching themes

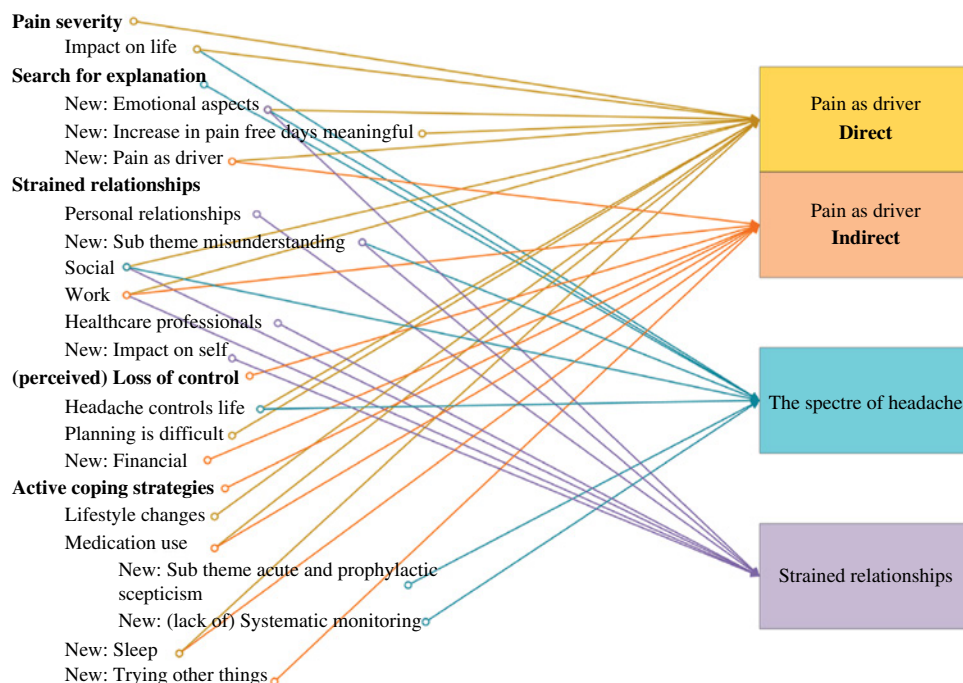


Figure 8.2 Patient perspectives on the lived experience of headaches. *Source:* Nichols et al. [25]/BMJ Publishing Group Ltd./CC BY 4.0. **Open Access** This is an Open Access article distributed in accordance with the terms of the Creative Commons Attribution (CC BY 4.0) license, which permits others to distribute, remix, adapt and build upon this work, for commercial use.

‘headache as a driver of behaviour’ (directly and indirectly), ‘the spectre of headache’ and ‘strained relationships’ (Figure 8.2) [25]. Patients also identified common coping strategies across all three headache types.

‘I get this throbbing headache, usually just on one side. The first time I noticed it, I was sitting in traffic waiting for the lights to change, you know, watching the red light to change. The licence plate on the car in front caught my eye, I don’t know why. As I looked at it, it seemed to become blurred, and my eyes felt uncomfortable. I could see ok, so I kept on driving. By the time I got home, I felt really sick and actually vomited as soon as I got inside. The right side of my head was throbbing by then, so I shut the curtains and spent the afternoon in bed’.

8.6.3 Evidence Base

Characteristics of low-risk patients include age under 50 years, features typical of primary headaches, history of similar headaches, normal neurological examination, no change to the usual pattern of headache, no high-risk co-morbidities and no new or concerning findings in the history or examination [26].

Most headaches are benign, but the symptoms can herald a serious pathology. In most cases, the cause is either tension or migraine. Serious concerns are raised by the progression of a headache or the onset of new associated symptoms occurring over weeks or months. Sudden onset with severe headache is a common reason for presentation with a major concern being exclusion of subarachnoid haemorrhage (SAH) [27]. Sudden onset severe headache is predictive of significant pathology (sensitivity 65%; specificity 62%) [17]. The Ottawa SAH rule for new, non-traumatic severe headache has sensitivity of up to 100% and specificity of 15% for the condition [28].

Approximately 4% of consultations in primary care are due to headache. Migraine and tension headache account for about two-thirds of headaches across both primary and secondary care. Headache due to a brain

tumour is rare although it is often this possibility which is of most concern to patients with both a new and/or a chronic headache. A study of the UK's 2-week wait referral pathway in a general neurology department found headache to be the commonest reason for referral but with no significant association with brain tumour [29]. Positive predictive values for tumour were highest for behavioural/personality change (5.3%) and subacute neurological deficit (3.2%) [29]. Patients having migraine or tension headache often have a history of more than a year. A new headache is a cause for concern. The distribution of headache is not always significant. Headaches of all causes may be either focal or diffuse. Description of severity is subjective, and evidence of systemic upset should be sought (e.g. visual disturbance, nausea or vomiting). Precipitating factors may include exposure to cold, alcohol or post-orgasm. Focal neurological signs on examination suggest a more serious pathology.

8.6.4 Key Points in the History

Timeline, character, severity, site, duration, frequency, radiation, precipitating and relieving factors, associated symptoms particularly those suggestive of secondary causes and medications (including anticoagulants). A full neurological and ear, nose and throat examination is then mandatory.

8.7 Altered Mental Status

Consciousness is defined by wakefulness and awareness. Wakefulness is open eyes and motor arousal whilst awareness refers to the experience of thoughts, memories and emotions [30]. Altered mental status describes a nonspecific change in baseline level of awareness [31]. Common synonyms include 'acute confusional state', 'confusion', 'acute brain failure', 'encephalopathy' and 'disorientation' [31].

Delirium is a more specific term for an acute episode of fluctuating altered mental status. Altered mental status may herald the onset of a life-threatening or of a reversible condition. Changes in mental status may involve a change in wakefulness, a change in awareness or both.

8.7.1 Anatomical Site

The main types of altered mental status arise from either disturbance of cerebral blood flow (syncope) or from epileptic seizures affecting cerebral function. It may arise from organic disease of the central nervous system (CNS) or from chronic cardio-respiratory, liver disease or from metabolic disturbances such as diabetes, hypoxia or infection.

8.7.2 Pathophysiology

Arousal is activated in the ascending reticular system [32]. Neurons from this system are in the midbrain, pons and medulla and control arousal from sleep. Metabolic causes, including those causing hypoglycaemia and hypoxia, decrease acetylcholine synthesis in the CNS, causing delirium [32]. Dependent on the cause, it may be possible to identify neurological, cardiovascular, metabolic or drug factors from your history, any, or all of which may affect the patient's mental state.

8.7.3 Evidence Base

Altered mental status may be categorised as [32]:

- Delirium – usually developing over hours or days. There may be rapid fluctuations in hypoactive and hyperactive states with periods of lucidity. Symptoms may be worse at night

- Depression – rarely rapid fluctuation of symptoms. Patients are usually orientated and able to follow commands
- Dementia – slow, progressive loss of mental capacity with deterioration in cognitive function and behaviour
- Coma – patients do not respond to basic stimuli but often have brain stem reflexes

Between 5% and 10% of adults presenting to an emergency department may have altered mental status, particularly among elderly [31]. It is a common reason for admission and is associated with poor outcomes including mortality in 10% [31]. Delirium is associated with prolonged hospital stay, readmission, loss of independence and accelerated cognitive decline [31]. The Glasgow Coma scale is the gold standard for assessment of consciousness particularly in acute settings [33]. Other causes of disturbed consciousness may arise as part of a presentation of vertigo, due to postural hypotension, cerebrovascular disease including TIAs, cardiac arrhythmia or anxiety. Metabolic causes such as hypoglycaemia or more rarely Addison's disease should also be considered.

Conditions contributing to altered mental status include epilepsy, sudden or traumatic (e.g. epidural haematoma, subdural haematoma, SAH), structural brain abnormalities (e.g. intracerebral tumour), infection (e.g. epidural abscess, intracerebral abscess), stroke (e.g. brainstem lesions, intracerebral haemorrhage, hemispheric stroke), chronic kidney disease, delirium and sepsis [32].

Patients may exhibit fluctuating changes in attention, awareness and cognition non-attributable to a cognitive condition [34]. They may have sleep disturbance, hallucinations, delusions, inappropriate behaviour and emotional instability [34].

8.7.4 Key Points in the History

The patient's condition may make interviewing difficult or impossible initially. Immediate urgent care may need to be provided to the patient. Collateral information may need to be gathered from family, friends or witnesses. Initial changes may be subtle and not noticed by the patient. Questioning should be precise. Consider an assessment tool to formally examine the patient's mental status. What is the patient's baseline level of function? Is the patient's mental status fluctuating? Is there pre-existing cognitive impairment?

Other domains include medication, substance misuse, immune status and systems review (headache, stiff neck, fever, cough, breathlessness and urinary symptoms).

8.8 Seizures

A seizure is 'a transient occurrence of signs or symptoms due to abnormal, excessive or synchronous neuronal activity in the brain' [35].

8.8.1 Anatomical Site

The brain and CNS.

8.8.2 Pathophysiology

Abnormal electrical activity spreads through the brain [35]. Focal seizures begin in one part of the brain and spread to involve the entire brain [35]. Patients have no awareness of a generalised seizure but may do so in a focal seizure [35]. A diagnosis of epilepsy requires two unprovoked seizures at least 24 hours apart [35].

Generalised tonic-clonic seizures (GTS) occur either from synchronous excitation of the bilateral thalamo-cortical pathways or spread from an initial focal area of the cerebral cortex [36]. GTS may be accompanied by brief muscular jerks (<1 second) or absence of up to 10 seconds of staring and unresponsiveness with maintained

postural tone [36]. Focal clonic limb jerking may spread over one side of the body as the seizure spreads along the motor homunculus (Jacksonian march) [36].

8.8.3 Patient Experience

'I don't really remember what happened to me. I remember going into the kitchen and just standing there for some reason, I don't remember what it was, I think I was aware my partner was there. The next thing I remember is someone standing over me and saying my name over and over. Eventually I responded. They said I'd had a turn and asked had it happened before. I still felt drowsy and was just opening and closing my eyes for a while. I saw my partner who was quite tearful, was checking how I was and saying how frightening it had been. . . I had been shaking all over for about a minute and then passed out. My mouth was sore, and I had blood on my lips. My life has changed completely since then. I've had to be off work from my driving job whilst it gets investigated. That's affected us financially. I cannot get insurance to go on holiday because I don't have a diagnosis yet'.

8.8.4 Evidence Base

The lifetime risk of a seizure is up to 10% in adults [37]. Risk increases from age 55 onwards. Low- and middle-income countries account for 80% of epilepsy worldwide due to greater prevalence of risk factors including congenital conditions, infection and traumatic brain injury [38]. Seizures are increased where there is inadequate access to healthcare [39]. Up to 40% of people with presumed first seizure have had a previous tonic-clonic seizure or other seizure type including absence, myoclonus or temporal lobe auras [40].

Seizures may be either provoked (situational) or unprovoked (Table 8.5). Provoked seizures are due to an underlying condition which disrupts neuronal circuitry or homeostasis. An underlying cause is found in 96.9% of patients with focal neurological findings [42]. Unprovoked seizures occur in patients older than one month. They may result from an epileptogenic brain injury or a pre-existing neurological disorder. They are more common in men and in patients younger than 1 year or older than 65. Infants are more likely to have generalised seizures and older adults have focal seizures [43].

8.8.4.1 Generalised Tonic-clonic Seizures

These consist of five phases – onset, pre-tonic clonic, tonic, early clonic and clonic. One in five patients with GTS have an aura. The average duration of all phases is about 1 minute. There may be an initial partial or focal seizure. Establishing this is important as it may suggest a structural lesion and has implications for further investigation [36].

8.8.4.2 Focal Seizures

A focal seizure arises from a specific focus in the brain. Symptoms range from sensory symptoms to motor symptoms and altered consciousness [44]. They are often preceded by an aura [44]. Auras include feelings of familiarity (*déjà-vu*), unfamiliarity or sensations including panic, smells, sounds and visual disturbance. There may be a prodrome of headache, sensory change, nausea or dizziness. Usually, they last seconds to minutes. The seizure may be followed by localised paralysis of the affected area (Todd's paralysis). This can last minutes to hours.

8.8.4.3 Psychogenic Non-epileptic Seizures (PNES)

Psychogenic non-epileptic seizures (PNES) are episodes of altered movement, emotion, sensation or experience which arise from emotional causes and do not fit the pattern of seizures (see also Chapter 14) [45]. They often occur in response to external (time, witness) or internal triggers (distress, emotion). Red flags for PNES are non-response to anti-epileptic drugs, very high frequency of episodes (several times daily), atypical triggers (stress, emotion, pain, situation), tendency to occur with witnesses and co-morbidities such as fibromyalgia, chronic pain [36].

Table 8.5 Causes and differential diagnosis of epilepsy.***Causes of epilepsy***

Genetic
 Generalised epilepsies
 Focal epilepsies
 Malformations of cortical development
 Trauma
 Tumour
 Cerebrovascular disease
 Infection
 Dementia
 Multiple sclerosis
 Antibody-mediated epilepsy
 Alcohol
 Metabolic disorders

Differential diagnosis of epilepsy

Syncope
 Micturition syncope
 Cough syncope
 Cardiac syncope
 Carotid sinus syncope
 Transient ischaemic attack
 Migraine
 Hyperventilation
 Narcolepsy and cataplexy
 The parasomnias
 Dissociative seizures

Source: Adapted from Sen and Johnson [41].

8.8.4.4 Differentiating Seizures from Cardiac Syncope

Important in the diagnosis of transient loss of consciousness is distinguishing seizure from syncope (see also Chapter 4) [46]. Pre-ictal factors favouring seizure over syncope are absence of nausea, diaphoresis, spinning sensation and reduced vision. Ictal signs favouring seizure are cyanosis, frothing at mouth and absence of pallor. Post-ictal findings favouring seizures are unconsciousness for greater than 5 minutes, disorientation, sleepiness, aching muscles and tongue biting. Features which do not distinguish seizures from syncope are pre-ictal light-headedness or sensory disturbance, injuries, urinary incontinence and whether sitting or standing at onset.

8.8.5 Key Points in the History

Patient may have little or no recollection of the event and witness statements are helpful [36, 38, 47]. A seizure is more likely if there is tongue biting, head turning or twisting, body stiffening, limb jerking and/or urinary incontinence. Prodromal symptoms increase likelihood of seizure (e.g. déjà vu, mood changes, hallucinations, confusion and post-event amnesia). In an unwitnessed including nocturnal event, explore possibility of tongue biting, blood on the pillow, urinary incontinence and unexplained injuries. Ask about medication and substance misuse including recently stopped and started drugs and about withdrawal from alcohol, opioids, stimulants and cocaine.

8.9 Weakness

Symptoms of weakness include difficulty with activity of daily livings (ADLs) (e.g. washing, dressing) or problems with gait and loss of balance. Many people use the term weakness as a synonym for tiredness, weariness, lack of energy or fatigue, although this is not correct in medical terms [48]. Weakness occurs in 5% of the US population aged above 60 years [48].

8.9.1 Anatomy and Pathophysiology

There are four main sites of muscle weakness (Figure 8.3):

- Upper motor neurone – originates above the ‘pyramids’, the level of the brainstem where motor fibres cross over to the opposite side before descending in the spinal cord (corticospinal tract)
 - Space-occupying lesion, cerebrovascular disease, multiple sclerosis

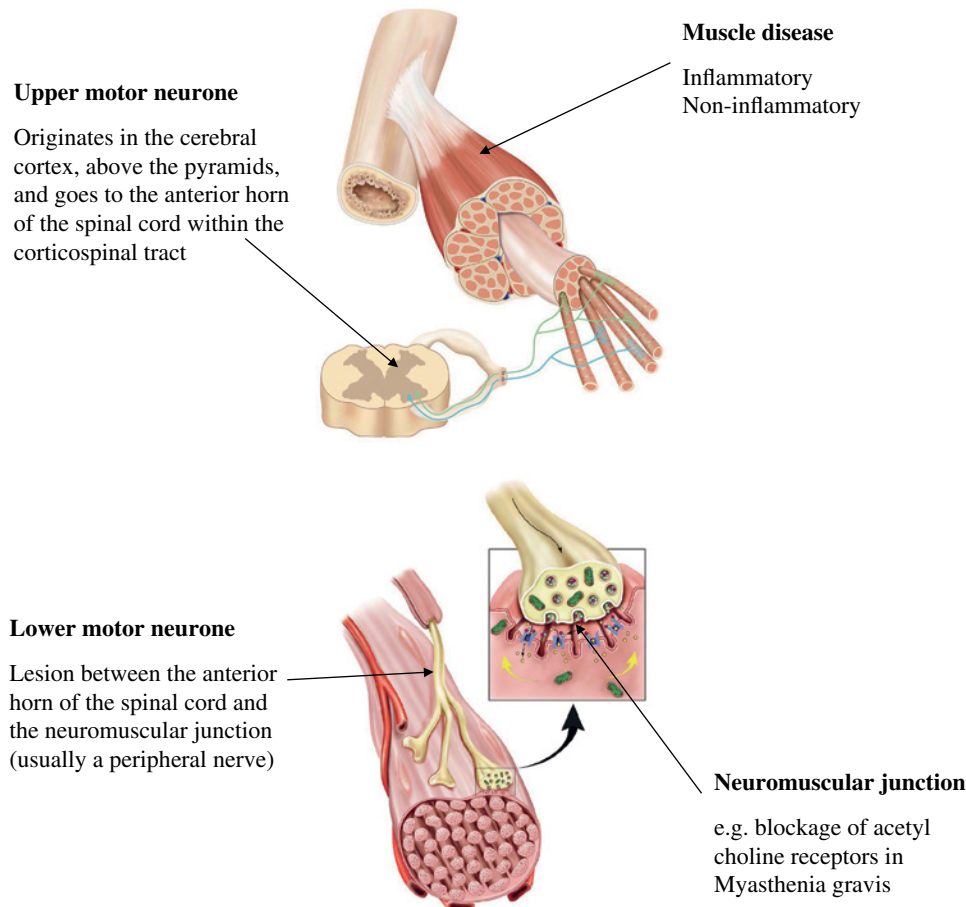


Figure 8.3 Sites of pathology causing the symptom of true weakness. *Source:* Adapted from Joanna Butler, www.medical-artist.com. Permission granted under licence. (Image may be resized as necessary.)

- Lower motor neurone – a lesion within the spinal cord or a peripheral nerve
 - Peripheral nerve trauma, entrapment (e.g. carpal tunnel syndrome) or metabolic disturbance (diabetes, vitamin B12 deficiency)
- The neuromuscular junction
 - Blockage of acetyl choline receptors at the neuromuscular junction (NMJ)
- Muscle disease
 - Either inflammatory (dermatomyositis, polymyositis) or non-inflammatory (steroid myopathy, thyroid disease)

8.9.2 Patient Experience

'I'd been feeling a bit fluey and thought I must have a virus or be developing a cold. I started getting a kind of tingling, pins and needles feeling in my toes and feet and though it must have been the way I had been sitting... but it didn't go away and then it started in my fingers. It got really frightening as I thought I was losing power in my legs. There was no one at home with me and I tried to go upstairs to sleep it off. I found I couldn't climb the stairs or even walk in a straight line. I thought I must be having a stroke, so I rang the emergency services. When I told the paramedic what was happening, they said it didn't sound like a stroke as both sides of my body were affected'

8.9.3 Evidence Base

Clarify if a feeling of weakness is due to associated illness (tiredness, infection, depression, musculoskeletal disease, pain) or to true neurological disease [49]. In true weakness the patient has difficulty achieving a specific task e.g. getting off a chair. Personal definitions can include poor coordination, slowness of movement (bradykinesia) and loss of sensation.

Symmetrical weakness in the proximal muscle groups of a limb should raise consideration of muscle disease as the cause. Both upper and lower motor neurone disorders usually affect more distal muscles in either a symmetric or asymmetric pattern. Proximal muscle weakness is present in up to 92% of patients with muscle disease.

8.9.3.1 Proximal Muscle Weakness (Limb-girdle)

Patients may have difficulty rising from a chair, climbing stairs or lifting their arms above the head [50]. Distal weakness may result in difficulty opening jars, dropping objects or foot drop.

Unilateral weakness is due usually to a spinal or brain disorder. Isolated weakness of a limb can be due to disease of the CNS but may also be caused by a nerve root or peripheral nerve problem. Weakness of all four limbs may relate to brain stem, spinal cord, muscle or peripheral nerve disorder. Distal weakness in a limb suggests peripheral neuropathy (Table 8.6 and Figure 8.4).

Symptom screening should include dysphagia, dysarthria and visual disturbance which may suggest inflammatory myopathy, multiple sclerosis or myasthenia gravis respectively [50]. There may be differences on how stroke presents between genders [51]. These may be around non-focal symptoms only with presentation of focal symptoms being similar in men and women [52]. However, further research is needed on this [51].

8.9.4 Key Points in the History

Ask about onset and timeline [48]. Where is the weakness? (proximal, distal, both, symmetric or asymmetric [53].

Progression of symptoms

Acute (hours to days) – vascular, infectious, inflammatory, metabolic, toxin

Subacute (days to weeks) – electrolyte, inflammatory, rheumatological

Progressive (gradual) – neurological, genetic, metabolic, inclusion body myositis

Medication and substance misuse

Table 8.6 Possible causes of weakness by site of pathology.

Upper motor neurone	Lower motor neurone
Cerebrovascular	Cervical spondylitis
Multiple sclerosis	Critical illness neuromyopathy
Epidural abscess	Guillain-Barre syndrome
Space-occupying lesion	Heavy metal poisoning
Syringomyelia	Mononeuritis multiplex
Transverse myelitis	Motor neurone disease
Trauma	Phrenic nerve injury
	Poliomyelitis
	Sarcoid
Neuromuscular junction	Muscle disorders
Lambert Eaton syndrome	Acid maltase deficiency
Medication (anticholinesterase inhibitors)	Dermatomyositis
Myasthenia gravis	Hypokalaemia
Organophosphate poisoning	Malnutrition
Shellfish poisoning	Mitochondrial myopathy
	Muscular dystrophy
	Myotonic dystrophy
	Polymyositis
	Thyroid disease

Sex differences in presentation of stroke: a systematic review and meta-analysis

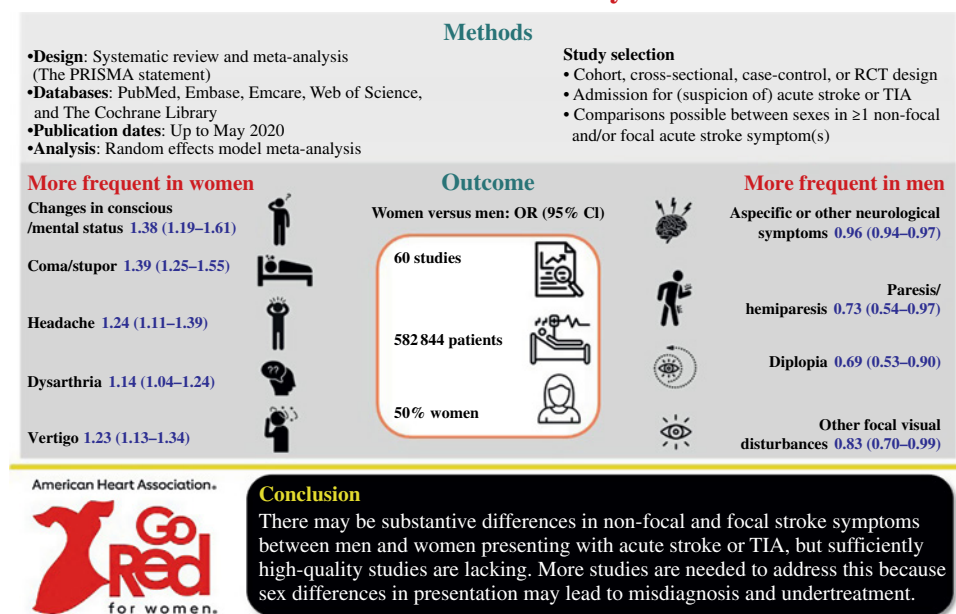


Figure 8.4 Gender differences in the presentation of stroke. *Source:* Ali et al. [51]/American Heart Association, Inc./CC BY 4.0. This is an open access article distributed under the terms of the Creative Commons CC BY license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

8.10 Sensory Symptoms

Numbness is a loss of feeling in a part of the body [49]. Numbness can occur along a single nerve on one side of the body or numbness may occur on both sides of the body. Numbness is used to include feelings of tingling, pins and needles, burning, itching and vibration felt on the skin or mucosal surfaces.

8.10.1 Anatomical Site

Peripheral nerves convey all sensory modalities to the dorsal root of the spinal cord. Pain, temperature and light touch are conveyed contralaterally in the spinothalamic tracts whilst discriminative and fine touch, vibration and proprioception pass ipsilaterally in the dorsum columns. Both tracts converge in the pons before going to the thalamus and thence to the sensory cortex. Interpretation of sensory input requires a functional parietal lobe.

8.10.2 Pathophysiology

Perception of sensory changes results from altered patterns of sensory stimuli followed by abnormal responses to the stimuli [54]. Perceptions may be increased, decreased or distorted. Altered sensation can occur either in a dermatomal pattern if there is nerve root compression or higher damage or in the territory of a specific nerve if there is compression or nerve damage below the level of the nerve root(s) which may radiate up the nerve.

Causes may be categorised as follows:

- Compression due to prolonged sitting or standing in the same position (e.g. with the legs crossed)
- Nerve irritation or injury (e.g. neck pain, fractured fibula and the common peroneal nerve)
- Nerve root irritation caused by a prolapsed intervertebral disc
- Compression of a nerve from other structures (e.g. blood vessels, tumour, infection, local tissue swelling)
- Infection (e.g. shingles)
- Other medical conditions including carpal tunnel syndrome, diabetes, migraines, multiple sclerosis, seizures, stroke, TIA, underactive thyroid, Raynaud's phenomenon
- Metabolic or electrolyte (e.g. of potassium, sodium or calcium), vitamin B12 deficiency
- Secondary to smoking or alcohol
- Drug-induced

8.10.3 Patient Experience

'I feel my concentration has gone. I don't seem to understand where things are...I see a chair in my way and still walk straight into it...I did it in a restaurant last night...I bumped into someone, and they shouted at me thinking I was drunk. I put my hand in my pocket, and I can't find my key even though I know I put it there. I have to completely empty my pockets and look at everything to find my key to open my front door. It's so embarrassing... I feel I'm going mad'.

8.10.4 Evidence Base

Patients with loss of spinothalamic sensation may notice altered awareness of temperature (e.g. when taking a bath). Dorsal column sensory loss may cause clumsiness or difficulty in identifying and manipulating objects which cannot be seen. Peripheral sensory neuropathy is experienced initially in the feet and/or hands. Ascending sensory disturbance indicates a spinal cord lesion.

8.10.4.1 Parietal Lobe Symptoms

Normal parietal lobe function requires intact cognition and peripheral sensory pathways together with open eyes [55]. Symptoms involve difficulty with spatial judgement. Patients may report clumsiness, bumping into objects, knocking things over or spilling drinks. Patients may use similar terms to describe difficulties due to limb apraxia such as difficulty opening tins, jars or toothpaste. Witnesses may report the patient has inattention to objects either to the side or in front of them.

8.10.5 Key Points in the History

Localise the area of sensory change and determine sensations affected. For parietal lobe symptoms ask about identifying and drawing objects, telling right from left and spatial disorientation.

8.11 Tremor

Tremor is an involuntary, rhythmic and oscillatory movement involving one or more body parts [49, 56]. It can also occur in the arms, legs, head, vocal cords and torso. Its rhythmic pattern is caused by unintentional (involuntary) muscle contractions.

8.11.1 Anatomical Site

Tremor may reflect dysfunction in the cerebellum, or substantia nigra (Parkinson's disease) in the CNS although disease in other organs or extraneous factors such as drugs (beta-agonists in asthmatics), metabolic disturbance (CO₂ retention) or alcohol may be responsible.

8.11.2 Pathophysiology

Each body part is connected to the nervous system via sensory and motor fibres. In stable posture, sensory and motor impulses are in balance producing stability. Aberration of this will produce increased amplitude in the natural frequency of movement of a body part particularly when it is unsupported [57]. Important causes include shivering in the cold, anxiety, physiological tremor, acute thyrotoxicosis and benign essential tremor – an inherited disorder with no other signs.

8.11.3 Patient Experience

Patients with essential tremor experience more disability and reduced independence. They struggle with ADLs and rely on carers for practical and emotional support. They may have problems with movement and balance, risk of falls, depression, anxiety, poor sleep and social embarrassment and withdrawal [58].

'I have these episodes of shaking when I'm trying to do something. It's very difficult if I'm trying to do something quite precise like writing or doing up shirt buttons. I hardly write anymore but you still have to sign things occasionally so that is difficult. I was at a meal recently and picked up to bottle of wine to refill people's glasses....poured it all over my neighbour....I think my arms and legs are moving ok otherwise although walking is a bit slow...not unexpected at my age'.

8.11.4 Evidence Base

Tremor is the commonest movement disorder presenting in primary care [59]. Essential tremor is the commonest cause of non-physiological tremor [60]. This is understood usually as shaking of a limb (often the hand or arm) at either rest, on movement or postural (e.g. standing on one leg). Patients will be worried they have Parkinson's disease, suggested by a tremor at rest. It is a common symptom with about 50% of cases being benign essential tremor. Intention tremor worsens as the object of a movement is approached and is suggestive of cerebellar disease. Worrying associations include sudden onset, rapid progression, new medications and change in mental function.

8.11.4.1 Essential Tremor

This is an isolated bilateral upper-limb tremor [61]. Head, voice and lower limb tremors may also occur. Diagnostic features include tremor during action (writing, holding a cup and saucer, pouring) and lack of bradykinesia. Presence of other neurological features are referred to as Essential Tremor Plus and justify more detailed investigation [56].

8.11.4.2 Physiological Tremor

The normal physiological tremor may be increased by triggers including anxiety, alcohol, caffeine and hyperthyroidism. It does not limit function.

8.11.4.3 Tremor with Parkinsonian Features

Classically a 'pill-rolling' tremor at rest with a frequency of 4–7 Hz. It is one of the three key features of Parkinson's disease along with rigidity and bradykinesia. Jaw, tongue, foot and lower limb tremors may be present [56]. The tremor classically disappears on action but may recur after a pause on assuming a new posture.

8.11.4.4 Isolated Focal Tremors

These occur either in isolation or on specific tasks [56]. They affect the head, voice or limbs. They may reflect dystonia, a genetic abnormality or an underlying lesion.

8.11.4.5 Intention Tremor

Considered cerebellar in origin, they may be part of wider syndromes accompanied by cerebellar signs or dystonia [61].

8.11.5 Key Points in the History

Age, anatomical distribution (head, voice, hands, symmetry), timeline, effect on function, when is the tremor worst? (e.g. writing, using a cup, relaxing), family and personal histories, medication, alcohol and drug exposure, caffeine intake and associated neurological symptoms (bradykinesia, muscle stiffness, aching, gait abnormality) [61].

8.11.5.1 Red Flags

Sudden onset, rapid progression, mental and cognitive changes.

8.12 Visual Disturbance

An alteration in the perception of visual information resulting in altered, abnormal or reduced eyesight [49].

8.12.1 Anatomical Site

It may arise anywhere between the lens, anterior and posterior chambers of the eye, the optic disc and the visual pathway all the way through to the visual cortex in the two occipital lobes of the brain.

8.12.2 Pathophysiology

Visual loss may be sudden or gradual. Loss occurring suddenly may be temporary or permanent. Temporary visual loss occurs in migraine or transient retinal ischaemia (amaurosis fugax). Sudden permanent loss occurs usually due to vascular disease.

Cataracts, refractive error and senile macular degeneration are the commonest causes of gradual visual loss [62]. Patients may complain of glare from bright lights or distortion of the edges of objects. Compression of the optic chiasm by a tumour may also cause gradual loss.

8.12.3 Patient Experience

'I've been having problems with my vision for about two years. I notice there is a glare when I look at bright lights and I prefer for the room to be slightly darkened. I can't read as well or see the TV that well now. It's stopping me enjoying reading the sports reports or seeing the match on TV'

8.12.4 Evidence Base

Disturbance of vision includes visual loss resulting in partial sight or blindness. This can be gradual (e.g. cataract, macular degeneration) or sudden (e.g. retinal ischaemia, migraine) in onset. This is due usually to an ocular problem (e.g. cataract). Macular degeneration in the elderly patient may cause distortion of objects in the visual field.

The most reported symptom is 'blurring'. Check what the patient means by this as most commonly it occurs due to an acute problem due to infection (e.g. conjunctivitis), or a refractive error in the lens, cornea or the gels of the anterior chamber.

8.13 Gait Abnormality

Abnormal gait is when a person is unable to walk in their usual way [49]. It may be due to injuries, underlying conditions or problems with the legs and feet.

8.13.1 Anatomical Site

Depending on the cause, any of following may be involved – cerebral hemispheres, cerebellum, spinal cord and peripheral nerves, skeletal muscles and joints including supporting structures.

8.13.2 Pathophysiology

It occurs from a combination of the upper motor neurone, lower motor neurone and cerebellar pathways. Muscle disorders and joint pathologies may also contribute to an abnormal gait.

8.13.3 Evidence Base

Coordination of the gait relies on adequate muscle strength to raise a limb off the floor, sensory input to the brain on the leg's position, followed by voluntary muscle power and relaxation of the limb. This needs to be coordinated through motor and sensory inputs by the cerebellum (Figures 8.5 and 8.6). Malfunction during any one of these stages results in a gait abnormality. When assessing gait, ask about lower limb muscle weakness and difficulty working out the position of the legs or feet when attempting to walk. Do the muscles relax when walking or do they feel stiff? Are there difficulties with balance, unsteadiness, tendency to fall?

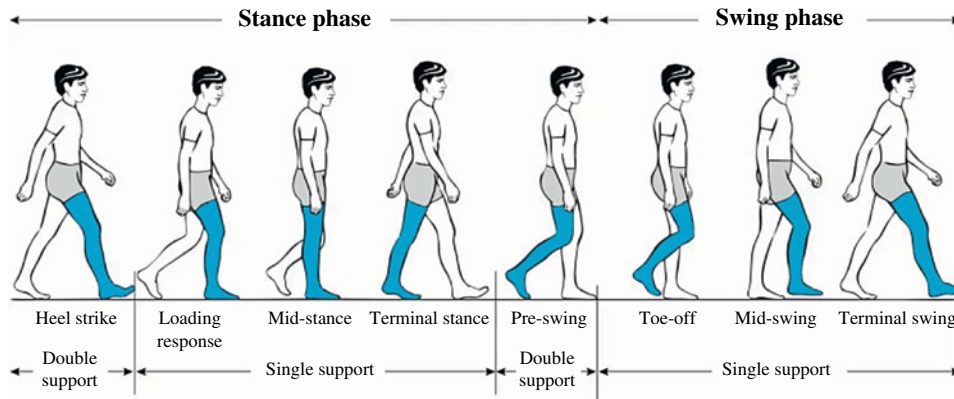
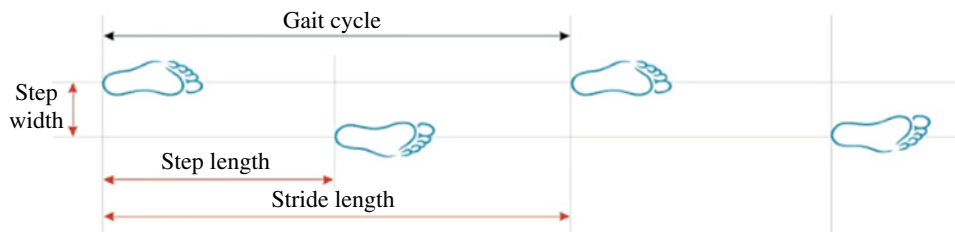


Figure 8.5 The normal gait cycle. *Source:* Pirker and Katzenschlager [63]/American Heart Association, Inc./CC BY 4.0. **Open Access** This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.



Basic terminology describing the gait cycle

Figure 8.6 Basic terminology of the gait cycle. *Source:* Pirker and Katzenschlager [63]/American Heart Association, Inc./CC BY 4.0. **Open Access** This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

8.14 Speech Abnormalities

The patient has difficulty producing their usual, fluent pattern of speech including choice of words and correctly constructed sentences in a pattern usual for them. Common speech disorders involve forming of words and articulation. A hoarse voice is not a speech disorder. It should always first be considered a red flag for laryngeal and vocal cord pathology (e.g. malignancy).

8.14.1 Anatomical Site

This is related to the cause and is classified as dysarthria – due to local disease in the upper airway or to damage to the neuromuscular pathways; dysphonia – resulting from vocal cord or vagal nerve damage and dysphasia – suggesting damage to the cortical areas responsible for comprehension (Wernicke's area) and expression of language (Broca's area).

8.14.2 Pathophysiology

In dysarthria language function is intact but the patient is unable to articulate properly. Pathology may occur within the cerebellum, extrapyramidal system, lower motor neurones or the muscles of the oropharynx. Dysphonic patients usually have pathology of the larynx, nerve supply or muscular disease such as myasthenia gravis.

8.14.3 Patient Experience

Patients with dysphasia may experience it in several ways. In receptive dysphasia, the patient is unable to understand the spoken or written word. Expressive dysphasia – the patient understands but is unable to respond and speech is non-fluent. Nominal dysphasia is an inability to name objects. Conductive dysphasia is when the patient can follow commands but repeats statements and names objects poorly.

Dysarthria does not affect reasoning *per se*, but the patient has difficulty with finding words, sentence structure and following a train of thought. In dysarthria, there is no disorder of the content of speech but with the articulation of sound. This may occur at several sites including pseudobulbar palsy, bulbar palsy, facial muscle weakness, extrapyramidal disease and cerebellar speech.

A sudden loss of speech can be terrifying for patients. They may be unable to ask questions about what is happening to them and/or unable to understand explanation. Speech is a dimension of our self-expression and self-esteem. Loss of speech may lead to feeling diminished, humiliated and isolated. Patients describe feelings of depression and mourning.

8.14.4 Evidence Base

Problems with speech may be readily apparent during the consultation whilst interviewing the patient. Dysarthria is characterised by slurring and altered rhythm of speech. ‘Scanning’ speech is found in cerebellar disease with slurring, low volume and slow pace. In Parkinson’s disease, an extrapyramidal disease, the patient may speak in a quiet monotone.

In dysphasia, the defect is of language rather than speech alone. Consequently, the patient may also be unable to read or write anything. Dysphasia may be global with both Broca’s and Wernicke’s areas affected. Production of language is affected by lesions of Broca’s area with speech being non-fluent and with altered word order. In receptive dysphasia (Wernicke’s) the patient is unable to understand language, words or commands. The speech may be fluent but may be meaningless with grammatical errors.

The main causes of dysphasia are stroke, Alzheimer’s disease, Parkinson’s disease, brain tumour, epilepsy and traumatic brain injury.

Patient at risk of speech disorders include those at older ages (e.g. Parkinson’s, cerebrovascular disease), young people with head injury, tumour and neurological infection, multiple sclerosis, motor neurone disease, laryngeal malignancy and cerebral palsy.

8.14.5 Communication with Patients with Speech Difficulties

Check which strategies patient uses and allow plenty of time [64]. Speak slowly and enunciate clearly. Use the patient’s first language if possible, avoiding the use of jargon. Discuss one topic at a time using short, simple sentences. Chunk information and check to ensure the patient understands. Use non-verbal communication including diagrams, drawing and writing. Unless the patient also has a hearing problem, there is no need to speak loudly.

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9

Urinary

KEY POINTS

- The urinary system filters the blood and produces urine to eliminate waste
- Elimination of urine from the bladder is under voluntary control
- Urinary symptoms are common across all populations
- The commonest urinary tract pathology is infection
- There are differences in urinary tract cancer across ethnicities
- Black men have higher rates of prostate cancer and present at younger ages

SYMPTOMS OF THE URINARY TRACT

- Dysuria – pain or discomfort experienced on passing urine
- Frequency – passing urine an increased number of times per day and night
- Urgency – strong, overwhelming urge to pass urine
- Nocturia – the need to get up at night regularly to pass urine
- Haematuria – the passage of blood in the urine
- Renal colic – severe pain resulting usually from presence of a calculus (stone) in the urinary tract
- Incontinence – involuntary passage of urine at a time which is not convenient
- Prostatic symptoms – difficulty with initiating and controlling the passage of urine from the bladder due to enlargement of the prostate gland

9.1 Burden of Urinary Problems

The period 1990–2019 saw a 2.4-fold increase in global deaths from urinary tract infection (UTI) [1]. The age-standardised incidence (ASIR) has increased in countries with higher socio-demographic (SDI). This may be attributable to ageing populations in these countries. There are also variations across countries, regions, sex and age [2]. The prevalence of lower urinary tract symptoms (LUTS) increases with age and is affected by the presence of benign prostatic hypertrophy (BPH) and diabetes [3].

9.2 Community Prevalence of Urinary Symptoms

Urinary symptoms are common across all populations. A community survey in Leicestershire, UK of 16,000 adults aged 40 and over reported 34% experiencing urinary symptoms. Prevalence and severity of symptoms increased with age. Only 2% of the sample considered their symptoms clinically significant, bothersome and

Table 9.1 Percentage of community-living adults over 65 years in Japan reporting urinary symptoms.

Symptom	Male (%)	Female (%)
Frequency	68.0	68.3
Nocturia	89.0	80.0
Urgency	16.0	11.0
Incontinence	3.7	7.4
Overactive bladder (OAB)	4.3	8.5

Source: Adapted from Takahashi et al. [5]

socially disabling [4]. Although historically urinary symptoms have been considered a female problem, rates between genders are close to one another. A community study in Japan of 916 adults over 65 years reported the symptoms prevalences in Table 9.1 [5].

In males, lower functional ability was associated only with nocturia (Adjusted OR 1.71, 95% CI 1.05 to 2.79) whilst in females' lower functional ability was associated with frequency (AOR 1.61, 95% CI 1.04 to 2.49), urgency (AOR 2.06, 95% CI 1.08 to 3.95) and overactive bladder (OAB) (AOR 2.43, 95% CI 1.15 to 5.11)

A study using the International Continence Society's symptoms definitions reported 45.2% of the global population over 20 years old have at least one LUTS [6]. Over age 60, prevalence of at least one LUTS increases to 80.7% of men and 79.3% of women [7]. Despite these high prevalences, consultation rates for these symptoms are low [8].

9.3 Ethnicity and Urinary Symptoms

Bladder cancer is the commonest urological malignancy and has a higher incidence in southern and eastern Europe, Africa, the Middle East and in North America [9]. In the United States, non-Hispanic Whites have the highest incidence followed by Blacks, Hispanic Whites and Asian and Pacific Islanders. Survival in Black patients is lower than in Whites [9]. In the UK, there is a lower incidence of urological cancer in non-White groups apart from prostate cancer which has a higher incidence in Black patients [10]. There are differences in risk between Indians, Pakistanis and Bangladeshis for kidney, bladder and prostate cancer ($p < 0.001$) and between Black Africans and Black Caribbeans for kidney, bladder, prostate and testicular cancer ($p < 0.001$) [10].

LUTS and OAB are common in both men and women of all ethnicities and increase with age [3, 11]. There are higher rates in African American men for prostatic symptoms and urgency than Hispanics and Whites (10% versus 6%) [11]. Lowest rates occur in Asian and Hispanic men [3]. African American and White women have higher rates of urge incontinence than Hispanic women (19% versus 16%) [11]. Rates of presentation to doctors may account for some of these differences [12]. Women of all ethnicities are equally likely to be bothered by their symptoms [13].

9.4 LGBTQ+ Experience

Among women who have sex with women (WSW), OAB is reported as moderate to severe in 23% and stress urinary incontinence in 18% [14]. An OAB is associated with diabetes, history of UTI and gynaecological surgery [14]. Stress urinary incontinence impacts sufferers' sex lives [14]. Less is known about urinary symptoms in Gay and Bisexual men though they may experience worse symptoms than heterosexual men [15].

In transgender patients, LUTS may arise after gender affirmation surgery. Patients may have altered urinary tract structure including the bladder outlet. Urethral meatal stenosis may occur post-vaginoplasty in around 40% of people [16]. The autonomic nerve supply to the bladder may be affected [17]. Metoidioplasty and phalloplasty may be complicated by urethral strictures in 35–38% and urethral fistulae in 15–70% [18]. Both these can lead to LUTS and urinary retention [17].

9.5 Anatomy and Physiology of the Urinary Tract

The urinary tract is made up of the kidneys, ureters, bladder and urethra (Figure 9.1). It ensures the elimination of metabolic substances and toxins produced in the kidneys. As a whole, the tract produces, collects, transports, stores and expels the urine [19]. Expulsion (micturition) is under the voluntary control of the patient. Key features in the anatomy and physiology are the constant flow in the upper tract and expulsion from the lower tract which together ensure a cleansing function to reduce infection [19]. The ureters drain urine from the renal pelvis to the bladder. They are around 22–30cm in length. The oblique entry of the final 1.5–2.0cm of the ureter through

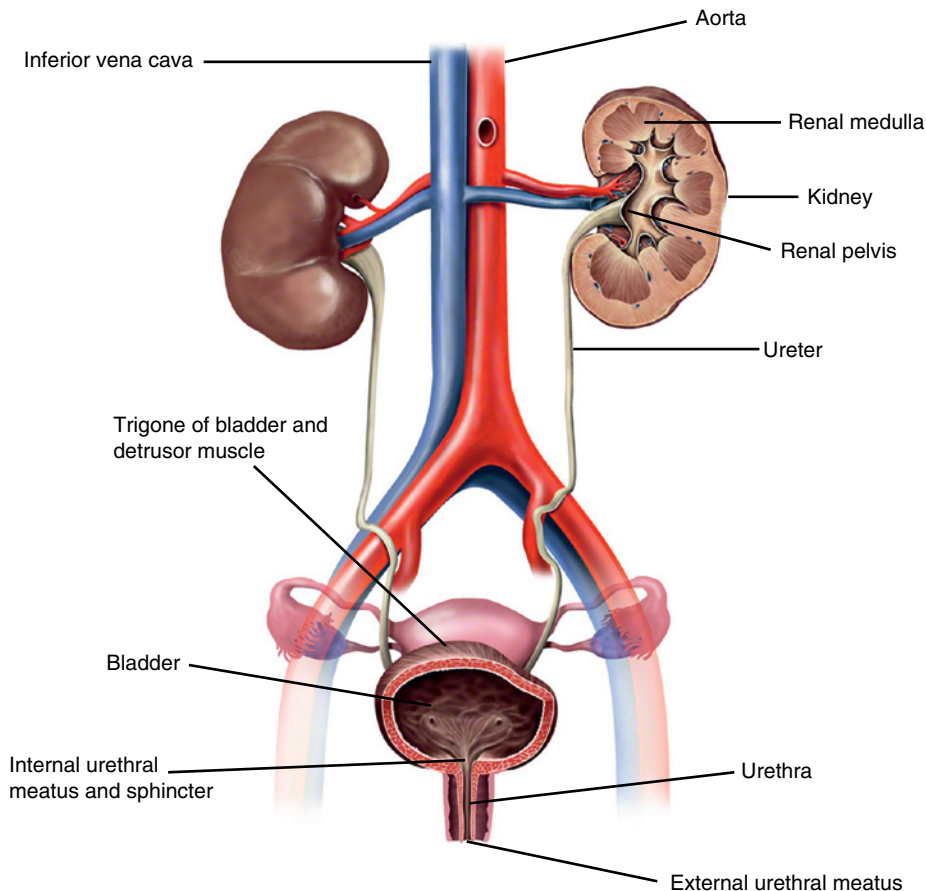


Figure 9.1 Anatomy of the female urinary tract. Source: Dr Joanna Butler © www.medical-artist.com (2024). Permission granted under licence.

the bladder wall results in compression by the bladder wall passively during storage and dynamically during micturition [19]. This is essential in preventing vesicoureteric reflux [19]. Descriptively, the urinary tract may be divided into upper (kidneys and ureters) and lower (bladder and urethra).

The bladder is a hollow, distensible viscus which is tetrahedral when empty and ovoid when full. The urethra is continuous with the bladder neck and begins at the distal end of the internal urethral sphincter. In males, the urethra is between 13 and 20 cm [19]. It is divided, descriptively not functionally, into prostatic, membranous and penile sections. The prostatic section of the urethra is about 3–4 cm in length. The penile urethra is up to 20 cm long and contained within the corpus spongiosum of the penis. It exits at the external urethral meatus [19].

In females the urethra is much shorter (3.8–5.1 cm). It passes obliquely from the bladder neck to the external meatus along the anterior vaginal wall. Though not part of the urinary tract, the vagina plays an essential role in defence against UTI. During female reproductive years, lactobacilli within the vagina produce an acidic pH which inhibits growth and colonisation of uropathogenic bacteria [19].

9.6 What Causes Symptoms of the Urinary Tract?

The commonest cause of urinary tract symptoms is infection. The prevalence of UTI increases with age, though there is a spike in females aged 14–24 years [20]. More than 50% of women and 12% of men are affected over a lifetime [21]. The major categories of UTI are summarised in Table 9.2 [22]. Fifty to sixty percent of adult women will have at least one UTI in their lifetime whilst 10% of postmenopausal women report a UTI in the previous year [2]. The frequency of uncomplicated cystitis in young women in the US is 0.5 episodes per person per year with the peak rate occurring during the years of maximum sexual activity (18–39 years) [23]. Most UTIs in adults are caused by a single bacterial species [23].

Recurrent uncomplicated UTIs are also common in young women with 27% reporting confirmed recurrence within 6 months and 2.7% experiencing a second recurrence over the same time [2] (Table 9.3). There are around quarter of a million episodes of acute pyelonephritis annually in the United States with more women affected than men. Seven per cent of patients require hospital admission. Recurrence of pyelonephritis is much less common with 9% of women and 5.7% of men experiencing a second episode within a year [2]. UTIs are associated also with sepsis [25]. In healthcare settings, around 9.4% of patients may develop UTI with an associated mortality in 2.3% among hospital patients in the United States [26, 27].

Table 9.2 Definition of the main categories of UTI (German guidelines).

Classification	Definition
Uncomplicated UTI	No relevant functional or anatomical abnormalities in the urinary tract, no relevant impairment of kidney function, no relevant concurrent diseases promoting a risk of UTI or its complications
Acute uncomplicated cystitis	A UTI in which only the lower urinary tract is involved, and the symptoms include urgency, dysuria and pain above the symphysis pubis
Acute uncomplicated pyelonephritis	An upper urinary tract infection including renal angle, flank pain, tenderness and fever (often greater than 38°)
Asymptomatic bacteriuria	Positive urine culture (of greater than 10 ⁵ colony-forming units/ml) in the absence of urinary symptoms
Recurrent uncomplicated UTIs	The occurrence of two or more symptomatic episodes within 6 months or three or more symptomatic episodes within 12 months

Source: Adapted from Kranz et al. [22].

Table 9.3 Risk factors for urinary tract infections with complications including treatment failure.

Patient Factors	Urological Conditions
Male	History of childhood or recurrent urinary tract infections
Postmenopausal	Indwelling catheter
Pregnant	Neurogenic bladder
Symptoms for seven days or more before presentation	Polycystic kidney disease
	Recent urinary tract instrumentation
Medical Conditions	Renal transplant
Diabetes mellitus	Urolithiasis
Immunosuppression	Urinary tract obstruction
	Presence of urological stents

Source: Adapted from Michels et al. [24].

9.6.1 The Patient Experience of UTI

Recurrent UTI is associated with depression and anxiety. Patients feel distressed at being unable to do their usual activities, and the impact on their social activities [2, 5].

“I get it a lot, all the time it seems. If I haven’t drunk much or gone to the toilet for a while whilst I’m at work, it leaves me at risk of an episode. I know when it is happening as I start to feel uncomfortable and a bit sick. Then it starts to feel a bit sore down below. I start drinking extra water to try and flush it out. The discomfort from passing water gets worse over the next few hours. I can never avoid that. If I don’t increase my fluids, I’ll start getting back pain, vomiting and end up in bed for a few days”.

9.6.2 Benign Prostatic Hyperplasia (BPH)

BPH is one of the commonest urological conditions in men. Overgrowth of prostatic tissue around the prostatic urethra results in LUTS including urgency, frequency, nocturia, poor flow and incomplete emptying of the bladder [28]. Complications include urinary retention, renal impairment and failure and bladder stones requiring surgery.

9.7 Dysuria

Dysuria is a sensation of pain, burning, stinging or itching of the urethra or urethral meatus. It occurs solely on passing urine (micturition). Dysuria is experienced by most people during their lifetime.

9.7.1 Key Points for the History

Timing of symptoms, severity, duration, risk factors (pregnancy, calculus, trauma, tumour, recent surgery), associated symptoms (frequency, urgency, nocturia, incontinence, haematuria), systemic symptoms (back pain, fever, nausea or vomiting, rigours), sexual symptoms (vaginal discharge, menstrual history, current contraception) [29].

9.7.2 Anatomical Site

Although it occurs in the lower urinary tract (i.e. bladder, prostate or urethra), patients of all genders localise it most often to the urethra and the external meatus.

9.7.3 Pathophysiology

It is the effects of a change in pH of the urine (either up or down) and acute inflammation of the walls of the lower urinary tract. Detrusor muscle contraction and urethral peristalsis stimulates pain and sensory receptors producing the pain, burning and itching [29]. Urine passing over the inflamed areas produce the sensation of burning meaning patients experience it only whilst voiding. The sensation settles once micturition ceases. Usually, dysuria occurs early in a lower urinary tract condition.

9.7.4 The Patient's Experience

“It starts with a feeling of irritation on the outside and I am aware of needing to go to the loo. I know it's going to feel uncomfortable so that makes me anxious about starting. Once I've a good going infection, it feels like scalding hot water coming out of me or like razor blades. It lasts the whole time I'm actually passing water and it's a relief when the stream actually stops and I can start to feel more comfortable again, at least for a while”

9.7.5 Evidence Base

Patients usually associate dysuria with passing urine and localise it to the area of the external urethral meatus. Patients and doctors usually take the symptom as suggestive of lower UTI and this is the commonest cause (Table 9.4). You should ask where the sensation of discomfort or pain is felt – deep within the body or at the urethral meatus.

Table 9.4 Differential diagnosis of dysuria in adults.

Category	Gender	Aetiology
Inflammatory		
Dermatological	Both	Irritant or contact dermatitis, lichen sclerosis, lichen planus, psoriasis, Stevens–Johnson syndrome, Behcet syndrome
Infectious	Both	Cystitis, urethritis, pyelonephritis, other sexually transmitted diseases
	Women	Vulvovaginitis, cervicitis
	Men	Prostatitis, epididymo-orchitis
Non-infectious	Both	Foreign body (e.g. stent or calculus)
Noninflammatory		
Anatomical	Both	Urethral stricture or diverticulum
	Men	Benign prostatic hyperplasia
Drug- or food-related	Both	Spermicides, topical deodorants, cyclophosphamide, opioids, ketamine, nifedipine, bladder-irritating foods
Endocrine	Women	Atrophic vaginitis, endometriosis
Idiopathic	Both	Interstitial cystitis/bladder pain syndrome
Neoplastic	Both	Bladder or renal cancer, lymphoma, metastatic cancer
	Women	Vaginal or vulval cancer, paraurethral leiomyoma
	Men	Prostate or penile cancer
Trauma/iatrogenic	Both	Genitourinary instrumentation or surgery, pelvic irradiation, foreign body, horseback or bicycle riding

Source: Adapted from Michels et al. [24].

Presence of any one symptom of urinary tract infection gives a 50% probability of UTI. Ruling in (e.g. frequency) or out (e.g. presence of vaginal discharge) raises this probability to 84–90% [30, 31]. Dysuria, urgency, frequency and tenesmus (a feeling of incomplete emptying of the rectum on defaecation) in combination are predictive of UTI while genital discomfort, dyspareunia and vaginal discharge decrease the likelihood ratios for it [32]. Dysuria may be a recurrent symptom and lead the patient to self-diagnose ‘cystitis’. It is much rarer in men although 60% of men with LUTS in primary care prove to have UTI [33]. The incidence in men rises with age so by the age of 89 years the incidence is similar to women [34]. Dysuria in men is associated independently with UTI [35]. Untreated dysuria lasts up to 5 days [35]. Pain at the onset of micturition suggests a urethral problem whilst at the end it may be from the bladder or prostate [29]. Dysuria is often the first symptom of a UTI and may be associated with frequency and urgency [36].

9.8 Urinary Frequency

An increase in the number of episodes of micturition or abnormally frequent urination (e.g. once every hour or two) is termed urinary frequency. It does not necessarily imply an increased volume of urine is being passed, this would be polyuria (see Chapter 6). It is often associated with dysuria, urgency and incontinence. Normal urinary frequency varies according to habits, fluid intake and bladder capacity.

9.8.1 Anatomical Site

The symptom arises from the bladder.

9.8.2 Pathophysiology

Accumulation of urine in the bladder produces stretching of the wall to increase capacity [36]. The maximum capacity is 500 ml in women and 700 ml in men [37]. The desire to micturate develops once the volume of urine in the bladder reaches 250–300 ml. Inflammation of the bladder wall by infection, calculus or tumour limits bladder capacity. Compliance of the bladder wall is reduced by inflammation. Stretching of the inflamed wall produces pain and a desire to micturate. In disease, once compliance of the bladder wall is reached, the desire to pass urine can become agonising. This may result in incontinence.

9.8.3 The Patient's Experience

“I go to pass urine more when I have an episode. It's strange because although I feel I need to go more often, as though my bladder is full, in fact when I go, first it takes me a while to start passing urine and then there doesn't actually seem to be much coming out at all. Sometimes, it seems to just be a few drops. A short time later and I feel the need to go again, not a pain as such, but it feels my bladder is full again. If I've been drinking a lot of tea, coffee or just water, it can be overwhelming, and I can feel myself leaking. I know you're supposed to flush things out if you've got an infection but at times like these I try to keep the liquids down, you know, so I don't embarrass myself”

9.8.4 Evidence Base

A smaller bladder capacity in inflammatory or similar conditions results in a perception of the bladder becoming full more quickly and often [36]. Hence the patient feels the need to pass urine. Discomfort may also produce a

sense of having to rush urgently to the toilet ('urgency'). This desire may be almost constant during severe infection. The bladder has reduced time to fill and consequently with each voiding only a small amount (a few millilitres) of urine is passed. Chronic bladder disease may cause stiffening of the walls due to fibrosis and reduced compliance. Causes include radiation cystitis, interstitial cystitis and bladder calculi.

Interstitial cystitis is prevalent in young women; 22% in a survey of young American medical students [38]. The condition is characterised by urinary frequency with negative urinalysis. Associated symptoms include urgency, chronic pelvic pain and dyspareunia (87%) [38]. Frequency during the day without the need to get up at night or frequency lasting only a few hours may suggest nervous tension [35].

9.8.5 Key Points for the History

Check for ingestion of liquids or medications which may increase micturition – alcohol, caffeine, fizzy drinks, citrus fruits, spicy food, chocolate and diuretics [36].

9.9 Urgency

Urgency is an abrupt, strong, often overwhelming, need to urinate. It may occur with and without voiding. Urgency may also cause incontinence [39]. It often occurs with dysuria and frequency.

9.9.1 Anatomical Site

Trigone of the bladder and the posterior urethra.

9.9.2 Pathophysiology

Hyperactivity and irritability of the bladder, particularly the trigone, produces an overwhelming desire to suddenly pass urine [36]. This may even be experienced as pain. Symptoms may result from bladder inflammation, neuropathic or bladder outflow obstruction. Patients may experience intermittent loss of small amounts of urine or complete incontinence.

9.9.3 The Patient's Experience

"I get this overwhelming urge to rush to the toilet. It's something which seems to have worsened over the years. I can be standing talking to someone and suddenly there is this feeling of a sharp pain and ache around my groins. I can't concentrate on what's being said to me. It's so embarrassing as I have to make excuses and leave. It must look so odd, and I've certainly had people check on me afterwards to make sure I'm ok. Sometimes, I laugh about it with friends, who are my age, but it's not really a joke. If I didn't rush off I'm sure I'd wet myself. You can understand how embarrassing that would be....I try to sit near the door in the office or in the staff room so I can quietly leave if I have to, you know, if I have to rush to the toilet"

9.9.4 Evidence Base

Urgency occurs most often in the context of dysuria and frequency as part of a UTI. Alternatively, it may be experienced as incontinence of urine, and this is considered below.

9.10 Nocturia

Nocturia is waking up at night to pass urine during the main sleep period [40]. The patient must fall asleep and then wake due to needing to pass urine to be classed as nocturnal voiding. Nocturia is often described as the most bothersome of all urinary symptoms and is also one of the most common. It is more common in females than males at younger ages though this is reversed at older ages [41]. Nocturia occurs in significant proportions of all populations, nationalities and gender groups [41]. Prevalence data suggests getting up once at night to void may be a 'normal' behaviour [42].

9.10.1 Anatomical Site

The symptom arises from the bladder though it may reflect disease of the renal parenchyma or the prostate.

9.10.2 Pathophysiology

The bladder's capacity to store urine during the hours of sleep is exceeded. Renal parenchymal disease may cause loss of concentrating power of the urine. Other causes may be loss of bladder wall compliance and outflow obstruction such as in prostate disease. The main causes are nocturnal polyuria, global polyuria, bladder storage issues and sleep disorders.

In nocturnal polyuria, more than 20% (33% in older people) of the total 24-hour urinary volume is produced at night [43]. Global polyuria is continuous overproduction of urine day and night. It is always associated with increased fluid intake such as polydipsia, hypercalcaemia, diabetes mellitus and diabetes insipidus.

Patients with bladder storage problems often experience multiple, frequent voiding of small volumes [44]. Frequency and urgency are often present. Fifty percent of patients with daytime urgency will have significant nocturia [43]. Nocturia will also occur in 50% of people with sleep apnoea. A retrospective review of 1000 consecutive patients found the combination of snoring and nocturia to have a sensitivity of 97.4% for obstructive sleep apnoea [45].

9.10.3 What Does the Patient Say?

Most people with nocturia less than twice per night experience minimal bother. More than 2–3 voids per night are more likely to produce serious health problems [41]. These include poor sleep, reduced quality of life, mood disturbance, reduced work productivity, increased falls and fractures. By day, there may be increased fatigue, inattentiveness and cognitive dysfunction. It may also affect the health of bed partners whose sleep may also be disturbed.

"I take it for granted now I will have to get up at least twice each night to go to the toilet. After all, it's what happens to men my age isn't it? It's usually between 2 and 3; I'm doing well if I don't wake for the first time until 4. Usually, I get straight back to sleep but it can take a while sometimes. We were away recently; we had a drink with the meal so that meant I was up more. I don't like putting the light on otherwise it wakes my partner up and two of us have a disturbed night. I tripped over a chair and bruised my leg so that made walking uncomfortable for a few days when we were supposed to be relaxing"

9.10.4 Evidence Base

A systematic review of 43 articles found prevalence rates for younger men (20–40 years) of 11–35.2% for one or more nocturnal voiding and 2–16.6% for two or more voids [46]. In women, prevalence rates for 1 or more voids

and 2 or more voids were 20.4–43.9% and 4.4–18% respectively [46]. Approximately, one in 5 or 6 younger people experience nocturia rising to 60% in older people [46].

Nocturia may be a significant cause of insomnia or poor sleep. Excessive amounts of fluid in the evening may be a factor particularly if caffeinated or containing alcohol. Fluid retention may be caused by conditions such as heart failure, venous insufficiency or diabetes mellitus. The retained fluid may lead to nocturia.

Nocturia is a risk factor for falls and fractures. Predictors of nocturia include prostatic symptoms, OAB, obesity, sleep apnoea, post-partum, postmenopausal and excessive evening fluid intake (coffee, alcohol).

Those with three or more nocturnal voids per night have higher overall mortality than the general population [43]. It is associated with obesity, diabetes, depression and heart disease [43].

9.11 Haematuria

Haematuria is the presence of blood in the urine. Blood may be visible ('frank' or 'macroscopic' haematuria). Blood may be seen at the beginning of the urinary stream, during the whole of the flow or only at the end of micturition. Alternately, blood in the urine may be seen only on bedside urine testing or under a microscope. This is microscopic haematuria and it may also indicate serious urinary tract disease. Haematuria of either type is always a red flag symptom until it is completely explained as it may be a predictor of urological malignancy [47]. In conditions such as UTI, haematuria may be present only on urinalysis or microscopy. It is important to test the urine for blood when other urinary tract symptoms are the sole presenting feature of the disease. Physical examination is also mandatory. In any condition, haematuria may occur either only macroscopically or microscopically or alternate between the two types.

9.11.1 Anatomical Site

Bleeding may occur from any one or several locations in the urinary tract (Figure 9.2). The point of occurrence of the blood during micturition may provide clues to its site of origin. Initial blood suggests the anterior urethra; bleeding at the end of the stream suggests posterior urethra, bladder neck or the trigone muscle of the bladder. Haematuria throughout micturition suggests pathology above the level of the bladder.

9.11.2 Pathophysiology

Bleeding occurs with any change resulting in damage to the endothelial cells lining the urinary tract. These include renal, ureteric or bladder calculus or inflammation from infection or malignancy. Bleeding may occur intermittently in malignancy.

9.11.3 What Does the Patient Say?

"I was passing water, when I noticed it was different, like a pink sort of colour. I thought i must be the light giving the effect. It seemed to be normal next time I went, but a couple of days later the pink colour came back and during the stream it went a deeper almost red colour. That happened 2-3 times over the next couple of days. There were also a couple of times when it looked as though I had passed something solid, like a clot. Maybe I'm just panicking but I'm worried it was a sign of bleeding somewhere"

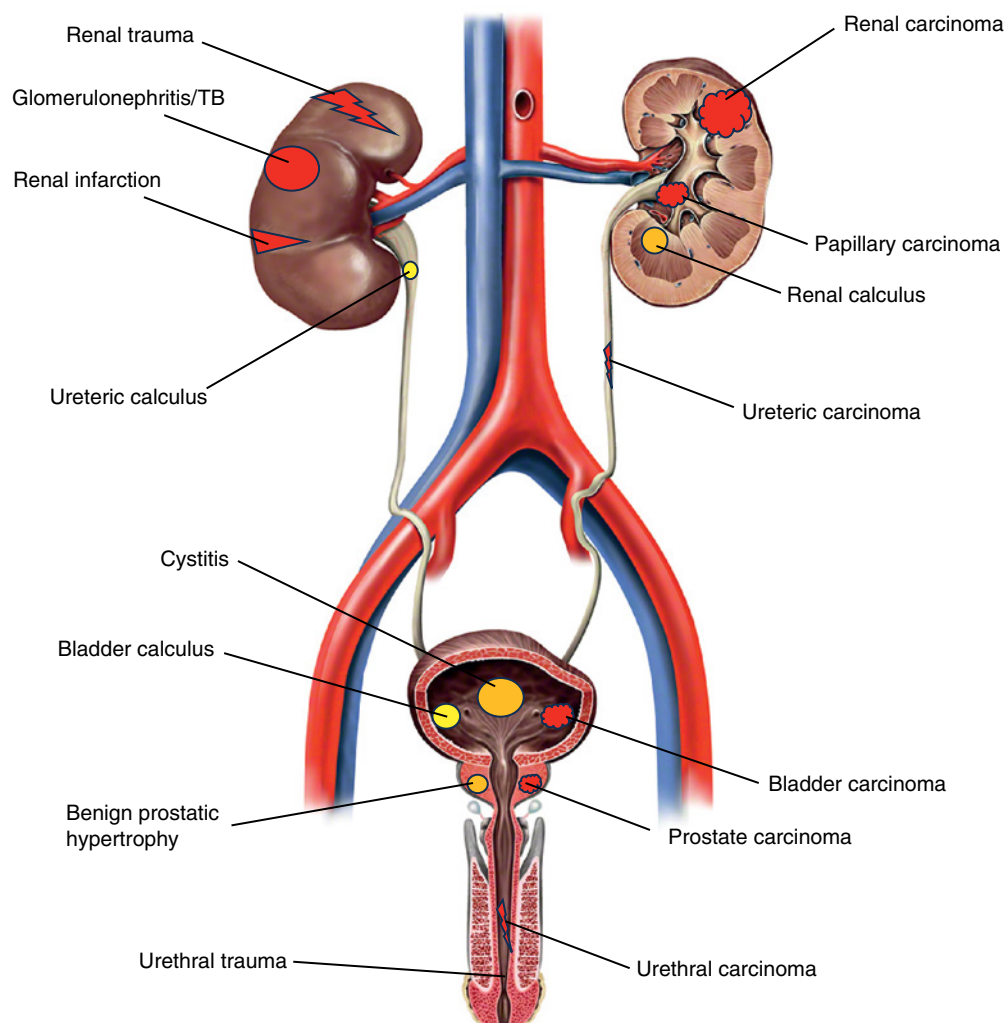


Figure 9.2 Sites and possible causes of microscopic and macroscopic haematuria in male urinary tract. *Source:* Dr Joanna Butler © www.medical-artist.com (2024). Permission granted under licence.

9.11.4 Evidence Base

Macroscopic haematuria is always a red flag symptom signifying potentially serious disease. The prevalence of haematuria in the community is 1% [48]. Cancer is the cause in over 10% and the presence of haematuria may have a predictive value of 11% for cancer [49]. Bladder cancer may occur in 8.3% of patients with the symptom and renal and prostate cancer in 2.0%. Non-malignant causes include BPH (12%), calculi (4%) and strictures or stenosis (3%). No cause is found in 72% of patients [50].

In patients on anticoagulant therapy, haematuria may cause earlier presentation of urological malignancy [51]. Table 9.5 shows risk factors for urinary tract malignancy in patients with haematuria [52, 53].

Table 9.5 Risk factors for urinary tract malignancy in patients with haematuria.

-
- Age – it is rare under age 40 and uncommon under age of 60 years
 - Macroscopic rather than microscopic
 - Whether blood was noticed at the beginning or throughout the stream rather than at the end
 - A history of no more than one UTI
 - Associated obstructive symptoms especially hesitancy
 - Irritative lower urinary tract symptoms
 - Smoking (current or past history)
 - Occupational exposure (dyes, benzenes, aromatic amines)
 - Cyclophosphamide exposure
 - Chronic urinary tract infection
 - History of pelvic irradiation
-

Source: Adapted from Bruyninckx et al. [52] and O'Connor et al. [53].

Where patients with macroscopic haematuria are referred to secondary care, malignancy as a cause rises to 14–21% [50].

A single episode of haematuria is as important as multiple episodes meaning all episodes should be investigated. Associated dysuria, frequency and urgency may suggest infection. Malignancies, particularly bladder, may present solely with LUTS [53]. Malignancy is found in 5% of patients with microscopic haematuria and 30–40% with gross haematuria [54]. In men when associated with symptoms of bladder outflow obstruction (hesitancy, poor flow, incomplete emptying) haematuria may be indicative of prostate pathology. Renal or flank tenderness may suggest a renal origin.

9.12 Pain from the Urinary Tract

Pain arising from any or several organs of the urinary tract. Pain may be local or referred to another site. Men and women of any age can experience dysuria, but it is more common in women. UTIs are commonly associated with dysuria and discomfort. Renal calculi may occur in one or both kidneys. They pass into the ureter where they may become impacted causing pain and obstruction (Figure 9.3). A ureteric calculus may cause severe pain referred to as renal colic.

9.12.1 Anatomical Site

Renal pain (T10–12, L1) is felt in the costovertebral angle and below the 12th rib [36]. It may spread along the costovertebral angle and towards the umbilicus. Ureteral pain (T11–12) is felt from the costovertebral angle along the course of the ureter to the lower anterior abdominal quadrant. In men, it may be felt in the bladder, scrotum or testicle or the vulva in women. Bladder distension may be felt in the suprapubic area. Chronic urinary retention tends to be painless whilst pain due to acute urinary tract infection is referred to the distal urethra.

9.12.2 Pathophysiology

Renal pain is caused by distension of the renal capsule [55]. So acute pyelonephritis with resultant oedema or acute obstruction secondary to a calculus will cause renal pain. Disease of slower onset such as cancer, polycystic kidney or chronic pyelonephritis tends to be painless. Ureteric pain is acute, colicky and occurs with sudden obstruction by, for example, stone or clot. The colicky contractions attempt to expel the obstructing contents

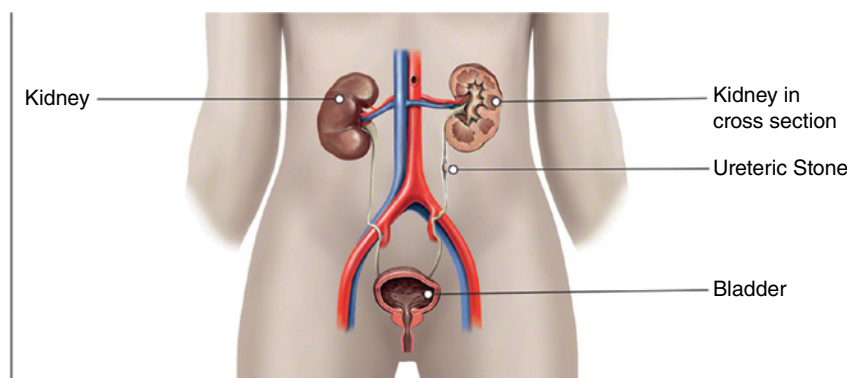


Figure 9.3 Renal colic secondary to a ureteric calculus. Calculi impact commonly at the renal pelvis, the pelvic brim or at the ureterovesical junction. Proximal peristalsis attempts to overcome the obstruction. As well as the pain, prolonged obstruction may cause hydronephrosis on the affect side leading to irreversible loss of renal function. *Source:* Dr Joanna Butler © www.medical-artist.com (2024). Permission granted under licence.

towards the bladder. Obstruction in the upper ureter often radiates to the groin whilst a stone or clot in the mid-ureter may radiate round to McBurney's point on the right or the sigmoid colon on the left. In the lower ureter, pain is accompanied by urinary symptoms such as frequency and urgency. Bladder pain secondary to acute retention causes a painful aching in the suprapubic area.

9.12.3 Patient Experience

Often the patient will be in so much pain, they will say very little. However, they are likely to indicate the site of pain and may have a level of distress which makes pain obvious as a possible cause.

"I've had this constant aching in my back over the past few days. I woke up this morning in absolute agony and I couldn't control it. I've just been walking around the room and rolling over in bed but nothing's working. I've tried painkillers and a hot water bottle but it's no good. The pain has come round to my groin now. It's worse than giving birth. I feel if I could just pass some water it would relieve it but there isn't anything to pass."

9.12.4 Evidence Base

The annual incidence of renal colic in the population is 1–2 per 1000 [48]. Over 70% of calculi occur in adults between 20 and 50 years of age. Men outnumber women by 2 : 1. Prevention of aetiological factors is essential in preventing recurrence [56]. Key features are abdominal pain of less than 12 hours duration, loss of appetite, loin or renal tenderness, haematuria (macroscopic or microscopic).

The presence of all features gives a sensitivity of 84% and specificity of 99% for renal colic with a combined likelihood ratio of 84 [48]. The main risk factors and differentials for flank pain are in Table 9.6.

9.12.5 Key Points

Patients often have a dull ache with episodes of colicky pain. Patients may be systemically unwell. LUTS (dysuria, frequency, urgency) may develop as a calculus moves down the tract into the bladder. Patients or witnesses may report extreme pain and constant moving around to gain relief.

Table 9.6 Risk factors for calculus formation and main differential diagnoses for flank pain.

<i>Risk Factors for Calculi</i>
Obesity
Hypertension
Family history of renal calculi
Irritable bowel syndrome
Diabetes mellitus
Inadequate fluid intake
Inadequate daily volume of urine (daily optimum is 2–2.5 litres)
Hypercalciuria
Hyperoxaluria
Hyperuricosuria
Proteus or <i>Klebsiella</i> infection stones (urea-splitting organisms)
Hypocitraturia
 <i>Main Differentials for Flank Pain</i>
Abdominal aortic aneurysm
Endometriosis
Local mass
Neuropathic pain
Musculoskeletal pain
Papillary necrosis
Pleuritic pain
Pyelonephritis
Renal abscess
Retroperitoneal abscess
Ureteral stricture
Ureteric calculus

Source: Adapted from Patti and Leslie [56]

9.13 Incontinence

Urinary incontinence is the unintentional passing of urine without warning. It is a common problem and is thought to affect millions of people worldwide. It may be intermittent or constant [36]. Women commonly experience stress or urge incontinence or a combination of the two with approximately equal frequency whilst men experience overflow due to prostate problems or stress incontinence due to its treatment [57].

9.13.1 Anatomical Site

This centres on the bladder. In particular, the trigone muscle whose contractions increase intravesical pressure during micturition. The urethral smooth muscles are responsible for voluntary control of micturition. Congenital or acquired neurogenic diseases may also be involved in bladder or sphincter dysfunction. The integrity of the

pelvic floor is crucial in maintaining continence. Damage to the floor and perineal body (e.g. in childbirth) increases the risk of subsequent incontinence.

9.13.2 Pathophysiology

Weakness of the urethral sphincters may lead to involuntary loss of urine when intra-abdominal (and therefore intra-vesical pressure) is raised [36]. This is stress incontinence (the stress of the intra-abdominal pressure). This occurs with laughing, sneezing and changes in posture. The sphincters may be damaged in childbirth or following procedures such as radical prostatectomy. Neurogenic bladder may also cause stress incontinence.

The urge to micturate may be so intense that there is involuntary loss of urine. This may occur acutely in cystitis or with more chronic conditions such as bladder instability or interstitial cystitis.

Overflow incontinence is associated with chronic urinary retention or a flaccid bladder. Intravesical pressure increases until it equals or exceeds urethral resistance and urine then leaks out (Figure 9.4).

9.13.3 What Does the Patient Say?

“I’ve had bladder problems since having my second child. It was a forceps delivery, and they were late cutting me, so I tore quite a bit and needed stitches. Since then, I’ve always tended to leak when I cough or sneeze. I worry someone will notice and think I don’t keep clean. Since going through the change 5 years ago, I’ve found the problem is worse and I must rush to the toilet quite often, even more if I’ve got cystitis. I’m really worried I going to need incontinence pads if it carries on like this. I’ve avoided going out if I can’t be sure I’ll be close to a toilet.”

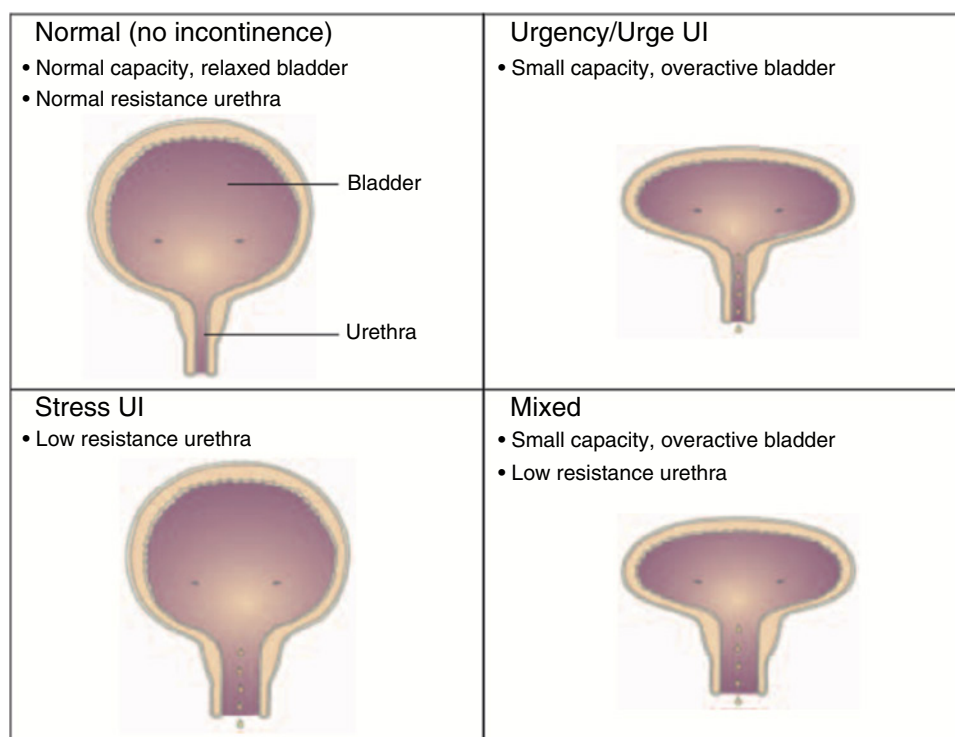


Figure 9.4 Normal continence compared to different forms of urinary incontinence. *Source:* Viktrup et al. [58]/with permission of John Wiley & Sons.

Interview studies reveal women are focused on leaking urine and the shame and embarrassment of being discovered [59]. Depression, limited social and sexual function and dependence on caregivers are all sequelae of chronic urinary incontinence.

9.13.4 Evidence Base

Prevalence varies according to the population studied. Over the age of 60 years, studies suggest a prevalence of 4.5–44% dependent on population and the definition of incontinence used. The definitions used in the studies are linked usually to the frequency of leakage. Estimates of prevalence increase with inclusion of rarer or even ‘once in a lifetime events’ [60]. Even in young and middle-aged women, it is a significant cause of morbidity [61]. In general, the incidence rises with age. Risk factors for any incontinence of urine and stress incontinence in particular are any history of pregnancy, previous vaginal delivery, postpartum incontinence, hysterectomy and age over 40 years [62].

There appears to be no association between obesity and previous caesarean section in younger women. Increasing body-mass index with age increases the risk of stress incontinence and OAB [63]. In older women, the prevalence of incontinence becomes associated also with co-morbidities. Stress incontinence and urgency become more likely to occur together giving a picture of mixed urinary incontinence [63]. Stress incontinence is associated with cystitis, obesity, multiple sclerosis and joint pain.

OAB is associated with bowel urgency, osteoporosis, ankle swelling, cystitis, poor health, old age, deep vein thrombosis and diabetes [64].

Previous perineal trauma is an important feature of the history with the risk being increased threefold following three or more deliveries, and with a history of operative vaginal delivery. A history of recurrent UTI against this obstetric background also increases the risk of all types of incontinence of urine [65].

9.13.5 Key Points for History-taking

Timeline and progression of symptoms, trigger events, is loss constant, intermittent or provoked? Associated urinary symptoms, history of prolapse, of faecal incontinence, co-morbidities (e.g. diabetes), low mood, obstetric history, previous pelvic surgery, neurological problems and medications (e.g. HRT, diuretics, ACE-inhibitors, sedatives and muscle relaxants).

9.14 Prostatic Symptoms

Prostatism is a syndrome associated with symptoms arising from outlet obstruction at the bladder neck. The commonest cause is BPH which occurs progressively. BPH affects 50% of men over 50 years and rises to 75% by the eighth decade [57]. BPH is initiated by the third or fourth decade [57]. Causes also include prostate cancer. Features can be categorised as:

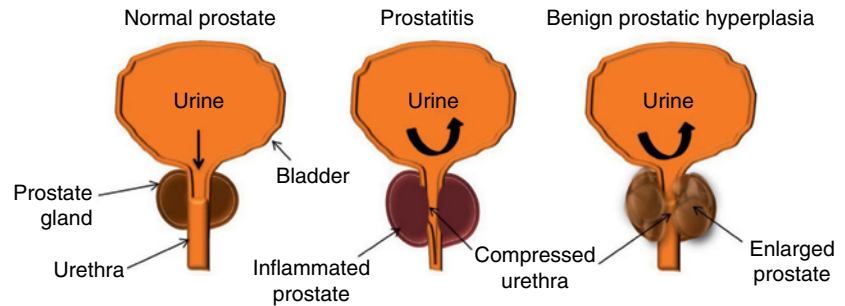
Voiding symptoms – hesitancy, weak stream, straining to void, terminal dribbling, sensation of incomplete emptying, double voiding, overflow incontinence and acute retention.

Filling symptoms – nocturia, frequency, urgency and urge incontinence.

9.14.1 Anatomical Site

Generation of these symptoms is centred around the prostate and its enlargement with age. The prostate is approximately the size of a golf ball. The prostatic urethra passes through it. The calibre of the prostatic urethra is

Figure 9.5 Representation of normal prostate gland, prostatitis and benign prostatic hyperplasia. Source: Dos Santos Silva et al. [66]/with permission of Elsevier.



narrowed by the verumontanum onto which open the seminal ducts. With age, particularly over 50 years, the prostate swells both internally and externally. A prostate of apparently normal size on rectal examination may still have a narrowed prostatic urethra secondary to prostatic hypertrophy (Figures 9.5 and 9.6). Black men may present with prostatic symptoms much earlier than 50 years. They also have a higher rate of prostate cancer, and this should always be considered at the first presentation.

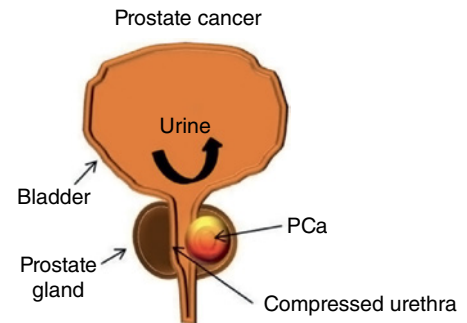


Figure 9.6 Prostate gland with cancer tumour, PCa, compressing the urethra. Source: Dos Santos Silva et al. [66]/with permission of Elsevier.

9.14.2 Pathophysiology

Micturition is affected by a combination of increased intravesical contraction secondary to bladder (trigone) contraction and relaxation of the urethral sphincters. With a full bladder, normal urinary flow should reach a maximum of 20 mL/s. The hypertrophied prostate, particularly around the prostatic urethra acts as a valve which increases resistance of urinary flow. Once this is appreciated, the origin of the obstructive symptoms arising from abnormal voiding becomes clear. Likewise, the filling symptoms can be understood by appreciating the effect on the bladder's capacity and wall compliance of the obstruction to outflow of urine through the prostate.

9.14.2.1 Hesitancy

Difficulty starting or maintaining a urine stream is called urinary hesitancy.

9.14.2.2 Poor Urinary Flow

A weak flow of urine requiring straining when passing water and feeling unable to fully empty the bladder.

9.14.2.3 Terminal Dribbling

Terminal dribbling occurs when the patient continues to leak urine after micturition has ceased. In extreme cases, the volume passed may amount to incontinence. It denotes abnormal sphincter function. Bladder outflow obstruction is the commonest cause when it is associated with other LUTS.

9.14.3 The Patient's Experience

"There are two things that really bother me; I can never get a good night's sleep, up and down 4 or 5 times a night. I feel exhausted during the day. I'm always dozing off. Everyone else thinks it's very funny. Then I wake up feeling

Table 9.7 Differential diagnosis of benign prostatic hypertrophy: other causes of bladder outflow obstruction.

-
- Prostate cancer
 - Urethral obstruction (strictures and valves)
 - Paradedtrusor contractility (neurogenic, myogenic or psychogenic origin)
 - Detrusor instability
 - Hyperreflexia
 - Inflammatory and infectious conditions (cystitis)
 - Radiation
 - Carcinoma in situ
 - Prostatitis syndromes
-

Source: Adapted from McVary [57].

I'm about to burst. I was on a coach trip a week back. Stopped at a service station and we all popped for a 'dash and a splash'. I was desperate but then just standing there waiting for it to start flowing. Then it starts stopping and starting. I never thought I'd have to push. Last one back on the bus. Felt a right idiot."

9.14.4 Evidence Base

Prevalence of BPH varies by population, being lower in Chinese and Japanese men than white populations [57]. Symptoms correlate poorly with prostate size and their urinary flow rates [48]. BPH is the commonest cause of haematuria in men over 60 years [57] (Table 9.7). Prevalence increases with age with 88% of men in their 80s describing symptoms [48]. Most limiting factors on the patient include role limitation due to physical symptoms, fatigue, role limitation due to emotional problems and general perception of their health [67].

Factors most likely to predict the need for surgery include age over 60 years, poor urinary flow, a feeling of incomplete emptying and an enlarged prostate.

Black men and first-degree relatives of patients with prostate cancer have an increased risk of prostate cancer. Black men in the United Kingdom have an incidence three times higher than White males [68]. Case-specific mortality is 35% higher in Black men, possibly due to a later stage of presentation [69]. Delayed diagnosis is related to poor access to healthcare and to poor awareness of prostate cancer with symptoms often interpreted as unimportant [70].

9.14.5 Key Points for History-taking

The International Prostate Symptom Score (IPSS) is widely used as a structured tool in assessing the symptoms of BPH and has been validated for use as an interviewing tool. It is used in recommending treatments for patients. However, self-administration by patients can lead to misunderstanding by patients of terms such as incomplete emptying and frequency. This can result in incorrect scoring [71].

9.15 Symptoms of Chronic Kidney Disease

Although chronic kidney disease is the 16th leading cause of years of life lost worldwide, only 5% of patients report early awareness of their symptoms [72, 73]. CKD is more likely to be diagnosed through screening and incidental findings such as blood pressure measurement, urine testing and serum biochemistry. Patients may present with haematuria, foamy urine (due to albuminuria/proteinuria), nocturia, flank pain or reduced urine output. In advanced CKD, symptoms may include fatigue, anorexia, nausea, vomiting, metallic taste, unintentional weight

loss, pruritis, cognitive symptoms, breathlessness and peripheral oedema [74]. CKD should be considered in patients presenting with symptoms in the following situations [74]:

- Systemic cause – haemoptysis, rash, lymphadenopathy, hearing loss and neuropathy.
- Urinary obstruction – hesitancy, urgency, frequency and incomplete emptying.
- Risk factors – NSAIDs, phosphate-based bowel preparations, herbal remedies (e.g. aristolochic acid), antibiotics (e.g. gentamicin), chemotherapy, renal calculus and recurrent UTI.
- Co-morbidities – hypertension, diabetes mellitus, autoimmune disease and chronic infection.
- Family history of kidney disease.
- Genetic risk factors (e.g. sickle cell trait).

In acute presentations, acute kidney injury (AKI), there may be symptoms related to poor oral intake, vomiting, diarrhoea, over-diuresis, heart or liver failure.

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10

Gender, Sexuality and Reproduction

KEY POINTS

- As well as the physical symptoms, the experience of symptoms in this system is closely bound to psychosocial and cultural aspects of an individual's self-identity and self-esteem
- There are many situations where patients will expect to be asked a sexual history
- Evidence in United Kingdom, France and United States shows change in sexual orientation with increasing numbers of people having same-sex relationships
- There are barriers from both clinicians and patients to taking a sexual history and signposting is important
- Subtle cues need to be recognised to enquire about a history of sexual violence

SEXUAL AND REPRODUCTIVE SYMPTOMS

- Gender dysphoria – a feeling of distress at the difference between a patient's experienced or expressed gender and the one they were assigned at birth
- Sexual orientation – the gender of those to whom one is sexually and romantically attracted
- Vaginal discharge – an increase in the amount of discharge from the vagina over the level normally experienced
- Dysmenorrhoea – the presence of menstrual cramps of uterine origin
- Heavy menstrual bleeding – heavy or prolonged menstrual bleeding sufficient to prevent normal activities
- Erectile dysfunction – the recurrent inability of a man to obtain and/ or maintain a penile erection that is satisfactory for sexual performance
- Fertility problems – the inability of a couple to conceive naturally after one year of regular unprotected intercourse
- Female sexual dysfunction – persistent or recurrent inability to attain sexual arousal, or to maintain arousal until the completion of sexual activity
- Pelvic pain – pain arising from the female reproductive organs of the pelvis
- Menopause – the absence of periods for 12 months
- Breast symptoms – symptoms arising from the anatomy or physiological function of either or both breasts

10.1 The Scope of the Sexual History

A sexual history is necessary where a patient presents with sexual symptoms (e.g. genital discharge), with a psychosocial presentation related to their sexual life (e.g. relationship problems) or with a medical condition which may either affect sexual function or be perceived to be affected by sexual function (e.g. coronary heart disease) [1].

Patients attending a Genitourinary (GUM) Clinic may feel embarrassment and guilt about their presentation but will expect to talk in detail about their sex lives and sexual practices. There may be few barriers to this discussion.

Table 10.1 Medical conditions in which it may be relevant to take a sexual history.

-
- Stroke
 - Spinal cord injury
 - Parkinsonism
 - Genital atrophy
 - Genital surgery
 - Diabetes
 - Hyperprolactinaemia
 - Liver failure
 - Renal failure
 - Peripheral vascular disease
 - Coronary heart disease
 - Sexual abuse
 - Psychological factors/stress
 - Interpersonal/relationship problems
 - Medication
 - Antihistamines
 - Anticonvulsants
 - Antihypertensives
 - Anticholinergics
 - Oral contraception
 - Psychotropic
 - Antioestrogens
 - Alcohol
 - Smoking
-

In primary and secondary care, the requirement for a sexual history may not be so clear. Doctors underestimate the prevalence of sexual concerns among patients [2]. Sexual symptoms are associated with many medical conditions (Table 10.1) [3]:

Sexual health advice may also be appropriate in the following situations:

- Attendance for cervical smear
- Presentation of symptoms suggestive of Sexually Transmitted Infection (STI) (e.g. vaginal discharge)
- Prescription of contraception
- Becoming sexually active or the beginning of a new relationship
- Possibility or wish for pregnancy
- Suspected substance misuse
- Attendance for travel immunisation or advice

10.2 Epidemiology of Gender, Sexual and Reproductive Symptoms

For women aged 15 years and over, the burden of benign gynaecological conditions is greater than the conditions of malaria, tuberculosis and HIV/AIDS combined [4]. Rates of years lost to disability (YLDs) are 3.94% of all YLDs

Table 10.2 Gender identity, 2021, England and Wales.

Gender Identity	2021 (number)	2021 (percent)
Gender identity the same as sex registered at birth	45,389,635	93.46
Gender identity different from sex registered at birth but no specific identity given	117,775	0.24
Trans woman	47,572	0.10
Trans man	48,435	0.10
Non-binary	30,257	0.06
All other gender identities	18,074	0.04
Not answered	2,914,625	6.00

Source: Office for National Statistics – Census 2021 (Units: number and percent)

in high-income countries and 5.35% in low and middle-income countries [4]. The highest impact is during the reproductive years where conditions exacerbated by female hormones are the major conditions.

Sexual dysfunction affects 43% of women and 31% of men [5]. A systematic review of 50 studies of Asian and European men showed erectile dysfunction (ED), low satisfaction and hypoactive sexual desire disorder to be the main sources of male sexual dysfunction [6]. Sexual dysfunction has a significant effect on relationships and quality of life [5].

The prevalence of gender dysphoria (GD) has increased in the past 50 years. In part, this will be due to increased recognition of the condition and increased confidence of individuals to present to services. A meta-analysis of prevalences in Europe, United States and Australia estimated prevalence as 0.46/10000; 0.68 for birth-assigned males (aM) and 0.26 for birth-assigned females (aF) [7]. Self-report data from the United Kingdom Census is shown in Table 10.2.

10.3 Sexual Orientation

We understand increasingly well that human sexuality is often experienced and expressed as a range of attractions [8]. This may be solely with people of the opposite gender to one's own, attraction to people of other gender identities or exclusively attraction towards people of one's own gender. The concept of gender itself has become more fluid as more and more people identify as neither exclusively male nor female. A UK National Survey of British adults aged 16–74 years during 2010–2012 and published in 2013 reported 8.0% of men and 11.5% of women have same-sex experience at some time. This may be fleeting adolescent experience followed for many by partnerships exclusively with people of the opposite sex. A smaller proportion report same-sex partnerships involving some form of genital contact (3.5% of men and 6.1% of women). Similar findings occur in France and the United States. Most people with same-sex partners have had heterosexual sex at some time. Exclusively same-sex experience is relatively unusual [8, 9].

Age at first sex has declined steadily [8]. In the United Kingdom, the legal age of consent is 16 years. For 34.1% of men and 30.9% of women aged 16–19 in 2010–2012 first sex was before 16 years. Increased vulnerability determines the timing of Human Papilloma Virus immunisation. Sexually transmitted infections and termination of pregnancy are more common in 16–24-year-olds than older people.

10.4 Barriers to Taking a Sexual History

Barriers exist on both sides to discussion of sexual symptoms though patients often have a greater expectation of needing to discuss sex than professionals perceive to be the case. Doctors' reported barriers to communication include [10, 11]:

- Language including terminology
- Ethnic differences
- Lack of training in sexual history-taking
- Pressure of time
- Presence of the patient's partner or relative
- First meeting with the patient
- Fear of embarrassing the patient
- Age difference between patient and doctor
- Asymptomatic patient
- Close professional relationship with the patient
- Lack of familiarity with some sexual practices

Asking about sexual behaviour in patients without symptoms is important for individuals at risk of 'silent' infections such as Chlamydia [12]. Discomfort in sexual history-taking may affect the quality of counselling of patients at risk of STI [10]. Sexual dysfunction is prevalent in primary care. Assessing sexual problems may be required in chronic disease management. Doctors may need to raise these issues 'out of the blue'. Signposting of the intention to do so is important in avoiding misunderstanding:

“There are some routine questions I would like to ask around your sexual history, is that OK?”

Patients may be embarrassed about sexual symptoms and prefer to see an unfamiliar doctor rather than their usual one. However, the embarrassment of the doctor may outweigh that of the patient. Patients presenting with sexual problems expect to be asked about sex even if the discussion is embarrassing for both parties. Most patients feel sexual problems are appropriate for discussion with their GP. Use of a pre-consultation questionnaire or a structured interview format has both been advocated as a means of 'breaking the ice' [13].

Barriers to disclosing sexual orientation affect doctor-patient communication around sexual health. A US study in 2019 reported that 8–15% of adults had discussed sexual health concerns with a healthcare professional in the previous year [14]. Between 23 and 42% of all US adults report a persistent sexual problem of whom 18% were gay/lesbian women, 20% were heterosexual women, 22% were bisexual women, 30% gay men, 31% were heterosexual women and 37% were bisexual men

Eight percent of gay/lesbian women and 70% of gay men had disclosed their sexual orientation to their doctor but only 24% of bisexual men and women had done so. Of those described as “out” 30% had discussed a sexual problem with a clinician versus 17% of those “not out”.

10.5 Non-consensual Sex

Non-consensual sex, including sexual assault and rape, has both immediate and long-term consequences. Lives can be transformed with long-lasting physical and psychological impacts [2]. Estimates suggest between 1 in 4 and 1 in 6 women have a history of non-consensual sex. In men, the figure is 1 in 33. Acutely, there may be injury, risk of pregnancy, sexually transmitted disease, pain and sexual dysfunction. Long-term consequences last

from days to lifelong. Patients report generalised pain, eating and sleeping problems, emotional problems, anxiety and depression, flashbacks and phobias, post-traumatic stress and substance misuse as all related to their previous sexual experiences.

Patients are understandably reluctant to discuss a history of sexual assault. They may wish to discuss such a history but may not necessarily volunteer the information. The American College of Obstetricians & Gynaecologists advises a history of sexual assault should routinely be screened for in patients presenting with pelvic pain, painful periods and sexual dysfunction. Cues may be very subtle but include panic-anxiety around breast and/or pelvic examination or gynaecological procedures [3]. Men also experience high rates of sexual violence but are less likely to report it.

Most sexual violence in the Western World occurs when young people socialise in alcohol-centred environments. This includes healthcare students, usually young men and women at a formative stage of their own development and often engaging in recreational environments centred around alcohol [15].

10.6 Health Professionals' Roles in Discussion and Treatment of Non-consensual Sex

These fall into two domains: clinical (e.g. testing for sexually transmitted diseases, psychotherapeutic support) and interpersonal (e.g. giving support, acting as the patient's advocate). Barriers to fulfilling these roles include internal (e.g. discomfort with the topic, prejudice); doctor-patient communication and system factors (e.g. competing priorities for time) [16]. Many medical schools do not include teaching in sexual violence [15]. In practice, clinicians often fail to screen patients for a history of sexual assault. Education in this area can promote screening for sexual assault and help to dispel misconceptions such as rape-myths sometimes prevalent in societies [17].

10.7 Gender Dysphoria

Gender incongruence is where an individual's experience of their gender identity does not match their biological sex [18]. GD describes unease or distress a person may feel because of inconsistency between the gender identity they perceive themselves to be and their physical anatomy and secondary sexual characteristics. This distress can be severe and increases the incidence of depression and anxiety. This reduces an individual's quality of life. Not all individuals experiencing gender incongruence experience GD. GD is related to sexual health and wellbeing. Gender identity does not describe sexual orientation. A transgender man (biological female) may identify as heterosexual and be sexually attracted to women [19]. Recognition of the diversity in gender identity and sexual expression requires an understanding of the terminology people use to identify themselves (Table 10.3). Words have an impact and a long-lasting, sometimes adverse, effect which can reduce confidence in approaching health services, patient wellbeing and clinical safety.

Also relevant is gender expression which refers to the ways in which an individual's gender identity is presented to those around them. Gender expression does not always align with either gender identity or cultural expectations. Whilst there is increased understanding of the range of identities individuals may experience between traditional male and female, individuals who do not experience or express their gender within the confines of male and female often find themselves stigmatised. As a result, they may also experience relationship difficulties with family, friends and peers, societal rejection, poor wellbeing and self-esteem, depression, anxiety, increased risk of self-harm and suicide and increased risk of substance misuse [20].

Symptoms of GD include distress, anxiety, depression, negative self-image, strong dislike of your sexual anatomy and strong preference for the toys and activities associated with the other gender (in children).

Table 10.3 Definitions and terminology related to LGBTQ+ identities and experience.

Allosexual/ Alloromantic (Allo)	Allosexual people experience sexual attraction, and alloromantic people experience romantic attraction. Allo is to asexual and aromantic identities, as straight is to LGB+ spectrum identities. It is important to avoid using ‘normal’ as the opposite of asexual/ aromantic identities, which is stigmatising
Aromantic/Aro	Someone who experiences little to no <i>romantic</i> attraction. Aromantic people may or may not experience <i>sexual</i> attraction (see asexual), and this sexual attraction may be in any orientation, e.g. homosexual, bisexual etc
Asexual/Ace	Someone who experiences little to no <i>sexual</i> attraction. Asexual people may or may not experience <i>romantic</i> attraction (see aromantic), and this romantic attraction may be in any orientation, e.g. homoromantic, biromantic etc. Asexual people may experience sexual pleasure but feel little to no sexual attraction to other people
Ally	Someone who supports and advocates for equal civil rights and actively challenges discriminatory behaviour and institutions
Bisexual/Bi	Someone who is sexually and/or romantically attracted to people of their own gender and those of a different gender. See also Pansexual
Biphobia	The dislike of or prejudice specifically against bisexual people
Butch/Masc	A descriptive term used for someone who expresses themselves in a typically masculine way. Whilst it can and is often used as an affirmative label of identity expression, this term has been used in a derogatory manner for lesbians, so caution is advised in its use
Cisgender/Cis	Someone whose gender identity matches the sex that they were assigned at birth
Coming out	The act of first telling someone about their sexual orientation/gender identity. This process may be repeated if meeting new people
Deadnaming	A specific subclass of misgendering, deadnaming is to call someone by their birth name if they have changed it as part of their transition. This may be accidental or malicious and purposeful
Femme/Fem	A descriptive term used for someone who expresses themselves in a typically feminine way
Gay	Someone who is sexually and/or romantically attracted to people of their own gender. Gay is often used as an umbrella term for non-heterosexual sexual orientations; however, some homosexual women will identify as lesbian, not gay
Gender	The identities and characteristics of women and men are socially constructed. The definitions and expectations of what it means to be of a given gender change between cultures and over time. Gender is a sociocultural expression of particular characteristics and roles associated with certain groups of people, often concerning their sex as assigned at birth
Gender dysphoria	The feeling or experience of distress/discomfort provoked by the mismatch between their sex assigned at birth and their gender identity Gender dysphoria is also the clinical diagnosis for this experience when distress impacts social, occupational, or other important areas of functioning. Trans and non-binary gender identities are not in and of themselves a psychiatric condition
Gender expression	The external and outwardly expression of one’s gender, which may include use of specific pronouns, changes to their name or expression through clothing behaviour and body characteristics. This expression may or may not conform to societal expectations of gender
Gender identity	One’s innate, internal sense of their own gender, which may or may not correspond to the sex assigned at birth

Table 10.3 (Continued)

Gender Recognition Certificate (GRC)	A document which changes an individual's legal gender, allowing their birth certificate to be reissued. This conveys the same legal rights and responsibilities conveyed on their new birth certificate. Not all trans people will apply for a GRC, and it is not required to change gender markers at work or to legally change gender on other documents such as a passport
Heterosexual/straight	Someone who is sexually and/or romantically attracted to people of the opposite gender to their own
Homosexual	Someone who is sexually and/or romantically attracted to people of their own gender. The terms 'gay' and 'lesbian' are now more generally used
Homophobia	The dislike of or prejudice against homosexual people. Often used as an umbrella term to capture prejudice against all minority sexual orientations
Intersex	Someone whose reproductive and sexual anatomy and/or physiology do not fit typical definitions of male or female sex due to a range of genetic and hormonal factors. Intersex people may or may not identify with the gender assigned to them at birth
Intersectionality	The concept is that people may have multiple overlapping identities which intersect different aspects of discrimination or privilege, and that civil rights movements and equality organisations must consider other marginalised identities. Of note is the higher burden of discrimination and prejudice experienced by multiply marginalised individuals
Lesbian	A woman who is sexually and/or romantically attracted to other women. Some homosexual women will identify as lesbian, others as gay and others as /both. Some non-binary people may also identify with this term
LGBTQ+	The umbrella acronym for lesbian, gay, bi, trans, queer, intersex and asexual/aromantic. Other acronyms may be used to similar effect, including 'LGBT', 'LGBT+' and 'LGBTQIA'. 'LGB' as an acronym is sometimes used in research specific to minority sexual orientations
Misgendering	To refer to someone using words or pronouns which do not match with their gender identity. This may be accidental, or malicious and purposeful, however misgendering is offensive and psychologically harmful. See also 'Deadnaming'
MSM/WSW	MSM (Men who have sex with men) and WSW (women who have sex with women) are terms to refer to sexual behaviour only and carry no assumptions about the way in which people identify. These terms are usually utilised in research, public health and policy. Not all MSM or WSW would identify as gay/lesbian/bisexual
Non-binary/NB/Gender non-conforming	Someone whose gender identity does not comfortably conform to the binary identities of 'man' or 'woman'. Non-binary identities are varied and can include people who identify with some aspects of binary identities, whilst others reject them entirely. 'Genderqueer' may also be used in this sense
Outed	When an LGBTQ+ person's sexual orientation or gender identity is disclosed to someone else without their consent. This may be accidental or malicious and purposeful
Pansexual/Pan	Someone who is sexually and romantically attracted to people of all genders. This term is similar to bisexual but does not imply only two genders
Pronouns	Words used in place of a name to refer to someone in conversation - for example, 'he' or 'she'. Some people may prefer others to refer to them in gender-neutral language and use pronouns such as they/their
Queer	An umbrella term for anyone who is not heterosexual and cisgender. Queer is also a term used by those wanting to reject specific labels of romantic orientation, sexual orientation and/or gender identity. Whilst it can and is often used as an affirmative and inclusive label, this term has historically been used in a derogatory manner, so caution is advised in its use

(Continued)

Table 10.3 (Continued)

Queerphobia	An umbrella term used to describe the prejudice faced by people of minority sexual orientations and gender identities, a collaboration of the distinct experiences of homophobia, biphobia and transphobia
Questioning	The process of exploring one's own sexual orientation and/or gender identity.
Sex/sex assigned at birth	Biologically defined and genetically/ hormonally driven characteristics related to physiology and reproductive capabilities of males and females. Typically assigned to a person at birth based on primary sex characteristics, notably external genitalia. See also 'Intersex'
Sexuality/sexual orientation	The desire and sexual attraction to other people, or lack thereof. Often linked with 'Romantic orientation' to describe someone's sexual and/or romantic attraction to others. Examples include (but are not limited to) homosexual, bisexual, heterosexual
Spectrum	A term used to cover a variety of identities that have a root commonality or shared experience
SOGI	Acronym for Sexual Orientation and Gender Identity. Often used in the context of people of minority SOGI
Transgender/Trans	Someone whose gender identity differs from their sex that they were assigned at birth. Typically, transgender refers to someone whose gender identity is the binary opposite of their sex assigned at birth
Transgender man/ Trans man	Someone who was assigned female at birth but identifies and lives as a man. The term FtM (female to male) may be seen but is a historical term and should be avoided
Transgender woman/ Trans woman	Someone who was assigned male at birth but identifies and lives as a woman. The term MtF (male to female) may be seen but is a historical term and should be avoided
Transitioning	The process by which some transgender people change their gender expression to align more closely with how they view their gender identity. This may involve social transition (use of different pronouns, dressing and behaving differently), or medical transition (use of hormone therapy +/- surgical interventions). Each trans person's transition is an individual process, and assumptions should not be made about what constitutes 'full' or 'complete' transition
Transphobia	The dislike of or prejudice specifically against transgender people. This may manifest in intentional misgendering or exclusion
Transsexual	This is a historical term for what we now call transgender/trans and should be avoided; however, it is worth noting that some trans people may still preferentially use this term

Source: List of LGBTQ+ terms / <https://www.stonewall.org.uk/help-advice/information-and-resources/faqs-and-glossary/list-lgbtq-terms>, last accessed 20 May, 2024; MindOut's LGBTQ(+) glossary, 2021/<https://mindout.org.uk/mindouts-lgbtq-glossary/>, last accessed 20 May 2024; Gender and health/https://www.who.int/health-topics/gender#tab=tab_1, last accessed 20 May 2024; ABC of Equality, Diversity and Inclusion in Healthcare, 2023.

10.7.1 Transition and Affirmation

Transition is the process where a transgender or non-binary person changes their gender expression to match their gender identity more closely. Different individuals may choose different levels of gender expression and each person's choice is personal to them. These may be summarised as: [18]

- Social (e.g. changing name and pronouns, dress, chest binders)
- Legal (e.g. changing gender on documents)
- Medical (e.g. gender-affirming hormones)
- Surgical (e.g. vaginoplasty, facial feminisation surgery, breast augmentation, masculine chest reconstruction)

10.7.2 Key Points in the History

- Timeline – when did their experience begin and how has it evolved? Feelings about their body and sexual characteristics
- Effects – relationships, family, social life and occupation
- Health and wellbeing – symptoms of anxiety and depression
- Support network
- Steps to transitioning and affirmation – preferred name and pronouns
- Sex and partners
- Experience of stigma – support needs

10.8 Vaginal Discharge

A subjective increase in the amount of discharge from the vagina over the level normally experienced. A change in physiological discharge or signifying pathology [1].

10.8.1 Anatomical Site

The normal discharge is formed from a transudate across the walls of the vagina. It is discharged via the vulva. The amount may be sufficient to stain the underwear.

10.8.2 Pathophysiology

A healthy vaginal environment is fostered by oestrogen which increases the glycogen of the vaginal epithelial cells. Normal vaginal discharge contains lactobacilli and maintains the vaginal pH at less than 4.5. Lactobacilli inhibits the growth of other bacteria. Nonetheless, the vagina contains a range of organisms including faecal and skin organisms as well as potential pathogens. The discharge helps to cleanse the vagina of dead cells. Physiological discharge is clearer with a stretchable consistency around ovulation. It becomes more yellow during the luteal phase. Thickness increases during the menstrual cycle and breastfeeding. It increases in higher oestrogen states such as ovulation, luteal phase, puberty and pregnancy and with oestrogen-based therapies such as hormonal contraception and HRT. The amount of discharge is increased by sexual arousal. Lactobacilli are less numerous pre-puberty and postmenopause with the result other organisms may predominate. Normal discharge is found in 10% of those presenting with vaginal discharge but is not associated with other symptoms [21]. Pregnancy may cause an increase in normal physiological discharge and vaginal flora.

10.8.3 The Patient Experience

The symptom can be distressing and may be associated with itching, irritation, a feeling of burning and an odour. Patient embarrassment may affect history-taking. It may be a taboo topic in some cultures and exploration should be sensitive to this [21]. By the time of presentation, the patient may have tried over-the-counter preparations to manage symptoms with varying success.

“I’ve got a discharge and I feel itchy. I feel self-conscious and embarrassed as I’m sure it smells. I thought it was thrush again, but it’s changed colour and is slightly green not white. I’m going out tonight and meeting someone but now I think I ought to cancel”

10.8.4 Evidence Base

The presentation presumes an increase over the patient's normal amount of discharge together with associated symptoms [80]. Changes in the normal discharge are colour, consistency and amount and odour. Associated symptoms include itching, soreness, redness, dysuria, pelvic pain and intermenstrual or postcoital bleeding [21]. Amount of discharge may also be affected by semen, vaginal douches and intravaginal medication. There may also be colour change or excoriation of the perineum or introitus.

Around 15% of women report vaginal discharge [22]. Whilst abnormal vaginal discharge is mostly caused by infection, it does not necessarily denote an STI [22]. Seventy to ninety percent are caused by bacterial vaginosis (BV), vulvovaginal candidiasis (VVC) or trichomoniasis (Table 10.4) [23]. BV accounts for up to half of all infective cases [24].

Cervicitis is associated with *Chlamydia trachomatis* and *Neisseria gonorrhoea* most commonly. It should be suspected in sexually active women with purulent endocervical discharge and easily induced cervical bleeding.

Risk factors for a discharge being due to STI are younger age (<25 years), a new sexual partner in the last 3 months and history of contact with an STI [25]. Candidiasis is more likely with a 'cheesy' discharge (LR = 2.5) which causes itching and vulval erythema [26]. Absence of an odour increases likelihood of candidiasis (LR = 2.1) whilst presence of an odour is strongly associated with BV. Self-diagnosis following previous candidiasis infection is also likely to be candidiasis (LR = 3.3). Neither abnormal bleeding nor pain during intercourse (dyspareunia) is significantly associated with intravaginal infection. Other causes of vaginal discharge to consider are cervical erosion, granulation tissue, vaginal fistulae and foreign body.

Compared to a DNA reference test, clinical diagnosis of vaginal discharge is 81–85% sensitive and 70–99% specific for BV, candida vaginitis and trichomoniasis [27] suggesting an initial symptomatic approach to assessment may be appropriate, particularly for conditions such as candidiasis [28]. Vaginal discharge associated with

Table 10.4 Clinical findings associated with the three commonest causes of vaginal discharge.

Feature	Bacterial vaginosis	Trichomoniasis	Vulvovaginal candidiasis
Symptoms	Thin discharge, bubbly	Scanty to profuse or frothy yellow-green discharge	Thick white discharge
	Fishy odour	Offensive odour	Non-offensive odour
	No discomfort or itch	Vulval itch, dyspareunia, dysuria, discomfort	Vulval itch, dyspareunia, discomfort
Signs	No vulval inflammation	Vulvitis and vaginitis; 'strawberry cervix'	Vulval erythema, oedema, fissuring, satellite lesions
Vaginal pH	>4.5	>4.5	<4.5
Microscopy findings	Clue cells	Motile trichomonads	Yeast and pseudohyphae
Need for testing for other STIs	Consider if risk of STI	Yes, Trichomoniasis is associated with 2–3 times increased risk of HIV. HIV and other STI testing should be performed	No
Need for retesting	No	Yes, Retesting can be performed as 28 days post-treatment to within 3 months	No
Need to treat sexual partner	No	Yes	No

Source: Sim et al. [21]/Singapore Medical Association.

trauma to the hymen and/or perineum in a prepubertal girl should raise a suspicion of sexual abuse. However, the physical examination is not sufficiently sensitive or specific to confirm the diagnosis in this situation [29].

Commonest causes of increased discharge include BV (30–35%), VVC (20–25%), trichomoniasis (15–20%), atrophic vaginitis, vulval conditions (e.g. vulvodynia, lichen sclerosis, lichen simplex) and change in physiological discharge.

Non-infectious causes includes trophic vaginitis, contact dermatitis (allergic or irritant), foreign body (tampon or condom), cervical polyps, fistulas and genital tumours (vulva, vagina, cervix, fallopian tube, endometrium).

10.8.5 Key Points for the History

- Is the discharge you are experiencing significantly different from your usual type of discharge?
- Characterise the discharge – location (vulval, introital, vaginal), duration, variation with menstrual cycle, association with sexual activity, response to previous treatment, itching, burning, dyspareunia (painful sex), (mal)odour
- Sexual history – sexually active, how long? Any hormonal changes, recent change of partner, postcoital bleeding, problems with sex, type of sex – vaginal, oral, anal
- Last menstrual period
- Medical and drug history – recent antibiotic and contraceptive use
- Possibility of foreign body
- Recent surgery or instrumentation
- Fever, lower abdominal pain, abdominal pain/cervical excitation suggest upper genital pathology

10.9 Normal Menstruation

Menstruation occurs in higher primates and humans [30]. The median cycle length is 28 days in 16.32% of women whilst women over 40 years are more likely to have a median cycle of 27 days and less likely to have a median cycle of 29 days [31]. Women over 40 years have a higher number of cycles with a longer luteal phase [31]. The endometrium is regulated by the ovarian hormones, mainly oestrogen and progesterone (Figure 10.1).

Most women have bleeding for 4–5 days. This involves shedding of the superficial stratum functionalis of the endometrium [32]. Following menstruation, under the influence of oestrogen the stratum functionalis is regenerated from the remaining stratum basalis [33]. This results in increasing thickness of the endometrial functionalis layer. Following ovulation, increasing levels of progesterone prepare the endometrium for implantation. During this secretory phase, the spiral arterioles of the superficial endometrium grow.

10.10 Dysmenorrhoea

Dysmenorrhoea is painful menstrual cramps of uterine origin [1, 34]. It is either primary (with no underlying organic disease) or secondary to another problem. Primary dysmenorrhoea commences soon after periods begin (menarche). Secondary causes include endometriosis, fibroids, endometrial polyps, pelvic inflammatory disease and use of an intrauterine contraceptive device.

10.10.1 Anatomical Site

The uterine wall, cavity and cervical canal.

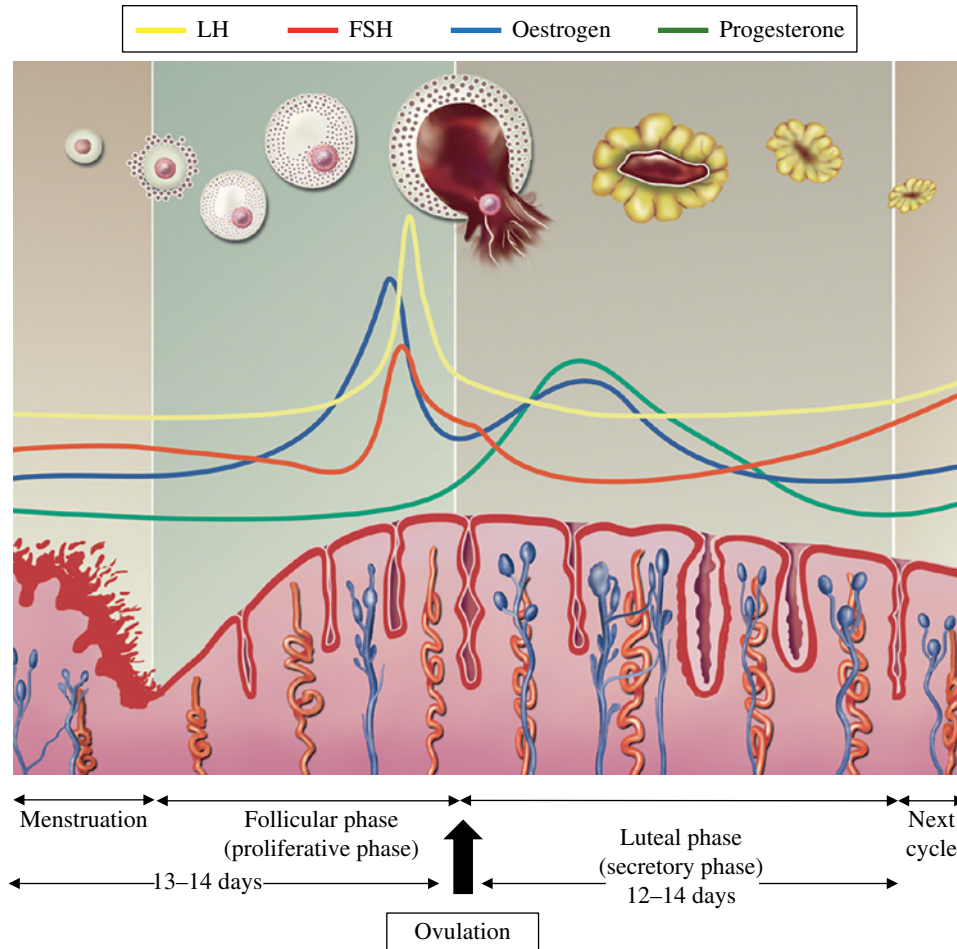


Figure 10.1 The normal menstrual cycle. *Source:* Dr Joanna Butler © www.medical-artist.com (2024). Permission granted under licence.

10.10.2 Pathophysiology

Breakdown of the endometrial lining before the onset of menstruation is accompanied by elevated prostaglandin and leukotriene levels. Prostaglandins cause contraction of the uterus. Uterine contraction causes constriction of blood vessels to the endometrium with the result that oxygen delivery to the tissue is reduced. This causes endometrial breakdown and death of this tissue layer. The uterine contractions then squeeze the dead tissue and a small amount of blood through the cervical neck and into the vagina.

Cramp-like pain is caused by the uterine contractions. The degree to which each woman experiences pain depends on each individual's level of prostaglandin. Increased levels of prostaglandins F2 alpha and E2 may be causative. Cramps may be worse in the first couple of days and then ease as the bleeding lightens. Patients with heavy periods may complain also of heavy bleeding at the same time.

10.10.3 The Patient Experience

Primary dysmenorrhoea is often underdiagnosed and inadequately treated [35]. It impacts the quality of life of young women and causes absence from school or work. In addition to the pelvic pain patients also experience physical and psychological symptoms: [36].

Physical – headache, lethargy, sleep disturbance, breast tenderness, generalised pain, altered appetite, nausea/vomiting, constipation/diarrhoea and increased urination.

Psychological symptoms – mood disturbance, anxiety, depression and irritability.

Rates of school absenteeism vary from 14 to 51% [37] whilst a study of the attendance of Palestinian female university students reported half missing classes due to painful periods [38]. Studies in Hong Kong and Turkey show similarly reduced perceptions of quality of life due to pain [37, 39].

“I’m 28 now and my periods have never been painful before. My periods have always been regular ever since I was 15. I just never had pain like this before even when all my friends and my sister did. Since I had my daughter a year ago, they’ve been all over the place and seem to last twice as long. It’s not helping me stick to my diet and lose weight like I was hoping. I feel so low”

10.10.4 Evidence Base

Dysmenorrhoea is the commonest gynaecological condition with a prevalence varying between 45 and 95% [40]. Severe pain may be experienced by 2–29% of women [41]. Reported prevalence rates are affected by study methodology, population studies, age and ethnicity of participants and communities’ differences in pain interpretation. Reported prevalences are greater in young women (less than 24 years) [42]. Up to 5% of women may be absent from work with it [40].

10.10.4.1 Primary Dysmenorrhoea

Primary dysmenorrhoea usually occurs 6–12 months after the onset of menstruation (menarche) and with the beginning of ovulatory cycles. An early onset of primary dysmenorrhoea increases the risk of subsequent endometriosis [43]. Pain is usually worse on the first day and lasts up to 72 hours [44]. It may radiate to the back and thigh. The patient may feel systemically unwell with headache, nausea, vomiting and diarrhoea [34]. An improvement or deterioration in symptoms over time is equally likely [40]. There may be a protective effect with subsequent childbirth. Primary dysmenorrhoea may improve with increasing age.

10.10.4.2 Secondary Dysmenorrhoea

Secondary causes arise usually in the 30s and 40s (Figure 10.2). The history should include a review of other gynaecological symptoms such as abnormal menstrual bleeding patterns and pain during intercourse (dyspareunia). Risk factors for dysmenorrhoea, in general, are duration of menstrual flow, younger age at menarche, smoking, obesity, alcohol consumption, high-stress levels, depression, anxiety and disruption of social networks [34].

Secondary causes are suggested by occurrence of dysmenorrhoea after age 25 years, late onset of dysmenorrhoea after no previous history, pelvic abnormality on examination, infertility, heavy menstrual flow, irregular cycles, dyspareunia and non-response to oral contraceptive or NSAIDs.

The pain of secondary dysmenorrhoea does not necessarily occur during menstruation [36]. Pain is more diffuse and constant. Endometriosis is one of the commonest causes of secondary dysmenorrhoea [46].

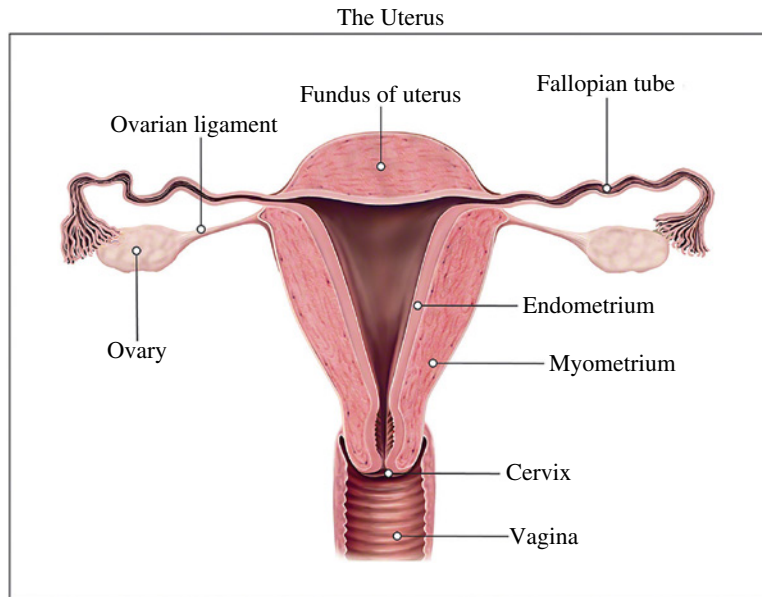


Figure 10.2 Differential diagnosis of dysmenorrhoea. Primary dysmenorrhoea: Increased levels of prostaglandins PGF2-alpha and PGE2 during endometrial sloughing. Secondary dysmenorrhoea: Endometriosis, Pelvic inflammatory disease, Adenomyosis, Leiomyomata, Ectopic pregnancy, Interstitial cystitis, Chronic pelvic pain. *Source:* Itani et al. [36]; Osayande and Mehulic [45].

10.10.5 Key Points in the History

Age at menarche and onset of symptoms – Establish the patient's usual pattern of bleeding – What is the patient's expectation of a normal period? – History of vaginal discharge – Location and character of pain – Presence of associated symptoms – Sexual history – Are the periods causing absence from school or work or affecting social activities? Are painkillers necessary? Which ones and how often? Is there abnormal uterine bleeding e.g. clots? Does the patient experience dyspareunia? [45].

Red flags – postcoital or intermenstrual bleeding – worsening of symptoms despite treatment – dyspareunia – family history of endometriosis – abnormal cervix on examination – pelvic mass.

10.11 Heavy Menstrual Bleeding (HMB)

Heavy (>80 ml) or prolonged (>7 days) menstrual bleeding is sufficient to prevent normal activities [47]. It may be accompanied by uterine cramps sufficient to cause pain (dysmenorrhoea). Volume of blood loss is difficult to measure and a more practical definition is any regular menstrual bleeding which a woman finds heavy.

Typically, in the developed world, a woman has 400 periods in her lifetime. In 20–30% of women, this is experienced as heavy menstrual bleeding.

10.11.1 Anatomical Site

Uterine cavity, blood flows through the cervix and into the vagina.

10.11.2 Pathophysiology

Normal menstrual flow approximates 25–80 ml of blood for up to 7 days. Although many women report excessive menstrual bleeding, in only about 10% does the blood loss meet the above definition or cause anaemia [47]. Blood shed with the endometrial lining during menstruation clots within the uterine cavity. The clot is then lysed before the resultant liquid is expelled through the cervix. In patients with heavy menstrual bleeding, uterine blood flow may precipitate blood loss via the endometrium. Excessive flow is experienced as heavier vaginal blood flow. This can be so fast that normal clot lysis does not occur, and the heavier flow is accompanied by passage of clots of varying sizes. Uterine contractions due to elevated prostaglandin levels may cause accompanying pain.

It occurs in the context of either ovulatory or anovulatory cycles. Ovulatory HMB is regular, heavy bleeding occurring between 21 and 32 days whilst in anovulatory cycles heavy, prolonged bleeding occurs every 35 days or more [30]. Onset soon after the menarche is termed primary HMB whilst onset in later reproductive life is secondary HMB [43].

Heavy menstrual bleeding can be classified by hormonal or anatomical causes and include fibroids, adenomyosis, endometrial polyps, coagulation disorders (e.g. von Willebrand's disease), pelvic inflammatory disease, thyroid disease, drugs (warfarin), intrauterine devices (IUDs) and endometrial or cervical carcinoma.

10.11.2.1 PALM-COEIN Classification

The PALM group can be visualised using imaging or histopathology whilst the COEIN group cannot be diagnosed with these techniques [48]. Many women have experienced disturbance and change in menstrual bleeding because of Covid-19 and its aftermath [49] (Figure 10.3).

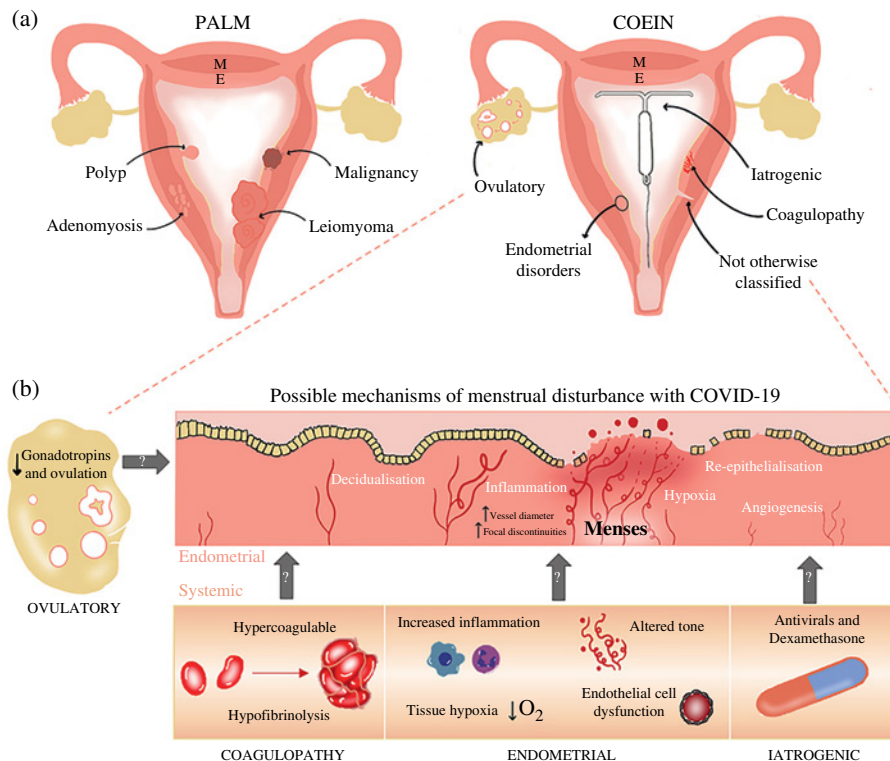


Figure 10.3 PALM-COEIN classification of causes of heavy menstrual bleeding and possible mechanisms of COVID-19 effects on menstrual function. Source: [49]/Portland Press CC BY 4.0.

10.11.3 Patient Experience

One-third of Swedish women aged 40–45 years experience HMB [50].

“My periods are ruling my life. I hope it all stops soon; I thought it would have done by now. I’m losing days of my life with the bleeding. I can’t plan to do things. I take 2-3 sets of clothing to work. It’s painful, heavy. I pass clots like big pieces of liver. I can’t wear anything light-coloured anymore. Everyone knows why. Sometimes I must leave work early or spend time in the toilet cleaning myself up. They’re looking to lay people off at work. I’m going to be top of the list.”

10.11.4 Evidence Base

Actual blood loss correlates poorly with the patient’s actual experience; 26% of women with a loss below 60ml thought it heavy whilst 40% of those with a loss of more than 80ml thought it light or moderate [22]. The most predictive combination of symptoms is the presence of clots and a changing rate of flow during the period together with a low ferritin [47]. Passage of clots is an important feature denoting increased menstrual flow. Large clots (larger than UK 50 pence piece) increase the likelihood of true heavy menstrual bleeding [47] (LR = 4.8). Frequent changes of sanitary towel (more than once hourly) increase the likelihood of true HMB (LR = 3.1) [22]. The quantity of loss overall does not predict underlying cause although a loss of greater than 80ml is associated with anaemia.

Abnormal patterns of bleeding associated with HMB should alert to possible serious underlying pathology. These include intermenstrual bleeding, irregular bleeding, sudden change in the volume of blood lost, postcoital bleeding, dyspareunia, pelvic pain and premenstrual pain.

10.11.5 Key Points in the History

Disruption of life – symptoms of anaemia – did HMB start at menarche? – less likely to be pathological – regularity of menstrual cycle – heavy anovulatory bleeds in early puberty, PCOS or perimenopause.

10.12 Pelvic Pain

Pain arising from the female reproductive organs of the pelvis.

10.12.1 Anatomical Site

True pelvic pain arises from the organs within the pelvis including the uterus, cervix, vagina, fallopian tubes, ovaries, uterosacral and broad ligaments.

10.12.2 Pathophysiology

Pelvic pain is a complex symptom mediated by nociceptive (‘normal’ protective pain), inflammatory (due to tissue damage or injury) and neuropathic mechanisms (secondary to nerve dysfunction or damage). Inflammation is a significant cause of visceral pain. One should remember pelvic pain can be caused by conditions outside the pelvis, for example, irritable bowel syndrome or adhesions due to previous abdominal surgery. Chronic pain is not related to menstruation and is non-cyclical (Figure 10.4).

Must not miss

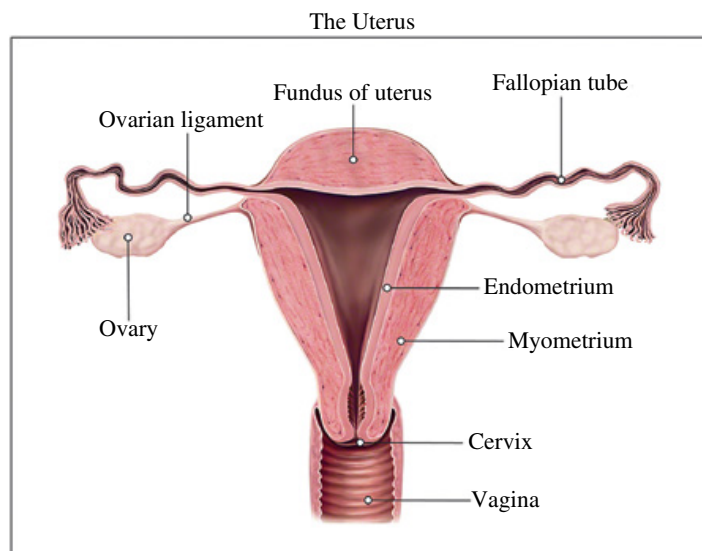
Torsion of adnexa or cyst
Tumours of bladder, colon,
ovary, tubes or uterus
Ectopic pregnancy
Tubo-ovarian abscess

Gynaecological

Adenomyosis
Adnexal masses or cysts
Cervical stenosis
Endometrial or cervical polyps
Intrauterine contraceptive device
Leiomyomata
Ovulatory pain
Peritoneal cysts
Salpingitis
Tuberculosis salpingitis

Musculoskeletal

Abdominal wall pain
Back or coccygeal pain
Compression fracture
Fibromyalgia
Neuropathic pain
Pelvic floor myalgia
Piriformis syndrome
Postural pain



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(Image may be resized as necessary)

Commonest

Endometriosis
Interstitial cystitis
Irritable bowel syndrome
Pelvic congestion syndrome
Recurrent PID and pelvic adhesions

Gastrointestinal

Appendicitis
Constipation
Diverticular disease
Hernia
Inflammatory bowel disease
Meckel's diverticulum

Urinary

Chronic UTI
Detrusor dyssynergia
Nephrolithiasis
Radiation cystitis
Urethral dysfunction

Familial or psychosocial

Bipolar disorder
Depression
Familial Mediterranean fever
Porphyria
Sexual abuse or assault
Sleep disturbance
Substance misuse

Figure 10.4 Common causes of female pelvic pain. *Source:* Olson and Schnatz [51].

10.12.3 The Patient Experience

“I have dreadful pain low down in my tummy and my pelvis. It feels like my whole insides are being twisted round tight. I can feel bloated before it comes on. It is often worse in the week before my period is due. It feels heavy inside. It is affecting my enjoyment of sex with my partner, and I can feel myself getting stressed about sex. The pain is deep inside when I have sex. It is worse in some positions than others. It leaves me feeling sore and aching the next day. I keep trying to avoid it and this is affecting our relationship. I know they are worried about me, about us, but I can’t help it.”

10.12.4 Evidence Base

The main conditions of concern are endometriosis and pelvic inflammatory disease. The main presenting symptoms of endometriosis are dysmenorrhoea, dyspareunia and chronic pelvic pain. Dyspareunia may be superficial (around the external genitalia and the distal vagina) or deep (cervical, uterine or pelvic). A sexual history may reveal this more clearly including positions which may aggravate pain. Of women undergoing laparoscopy to evaluate chronic pelvic pain, 33% may have endometriosis [52]. Infertility may be associated with chronic pelvic pain. Involvement of the rectovaginal or uterosacral ligaments may cause referral of pain to the rectum, lower pain, or legs. Pain during intercourse is also associated with involvement of these sites [52]. There is no correlation of sites with symptoms such as dysmenorrhoea and chronic pelvic pain. It is important to establish if the pain is cyclical and non-cyclical [53]. Cyclical pain is more likely to be gynaecological in origin reflecting the fluctuations in the female sex hormones. Dysmenorrhoea and increased uterine cramps may increase retrograde menstruation along the fallopian tubes. This may increase risk of eventual endometriosis.

Risk factors for pelvic inflammatory disease include age under 25 years, age at first sexual intercourse under 15 years, lower socioeconomic status, being single, adverse pregnancy outcome, self-reported history of sexually transmitted infection, exposure to Chlamydia and use of vaginal douches [54]:

Pelvic pathology may present with alimentary symptoms. The possibility of ovarian malignancy should be considered in women presenting with abdominal pain, particularly if unilateral or flank, and bloating [55].

10.12.5 Key Points

Diagnosis of endometriosis is often delayed, sometimes by many years. It is important to consider this at the outset as the condition causes much suffering.

10.13 Menopause

The absence of periods for 12 months which is not caused by extraneous hormones (e.g. contraceptive pill or implant). The time around menopause is sometimes referred to as perimenopause or ‘climateric’ and is characterised by symptoms such as hot flushes, night sweats, irregular vaginal bleeding, vaginal itching and dryness, urinary symptoms, mood changes and decreased calcification of bones.

10.13.1 Anatomical Site

Cessation of cyclical ovarian function. It coincides with depletion of oocytes. Considered irreversible, research is ongoing on whether the timing of menopause can be reversed or postponed. As well as the monthly fluctuations in ovarian hormones, they change also across the life cycle. The neuroendocrine changes leading to menopause begin many years before the cessation of periods.

10.13.2 Pathophysiology

At menopause, the ovaries cease to function. Production of oestrogen falls to virtually zero. The fall in oestrogen levels removes the negative feedback on follicle-stimulating hormone (FSH) production with the result the level of FSH increases greatly. Oestrogen withdrawal produces physiological changes leading to the symptoms listed below.

10.13.3 The Patient Experience

There is great variation in how women experience the menopause. Recognised symptoms include hot flushes, sweats, amenorrhoea, insomnia, anxiety, irritability, memory loss, tiredness, poor concentration and musculo-skeletal aches and pains.

They may also present with any of the symptoms listed above either alone or in combination.

10.13.4 Evidence Base

No one symptom or test is sufficiently reliable to establish a diagnosis of menopause. Women tend to present during the perimenopausal period and wish to establish whether they are 'going through the change'. Of most use are the patient's age and a careful menstrual history. The median age at perimenopause is 47.5 years and 87% of women are perimenopausal or menopausal by the age of 51 years [56]. The average age of menopause (51 years) has remained unchanged since ancient Greek and Roman times. Ninety-five per cent of women reach menopause between 45 and 55 years. Other associations (and likelihood ratios) include self-diagnosis (LR = 1.53–2.13), hot flushes (LR = 2.15–4.06), night sweats (LR = 1.90), vaginal dryness (LR = 1.48–3.79) and raised FSH (LR = 3.06) [57].

Diagnosis is made most often from the typical history of hot flushes, night sweats and/or amenorrhoea. FSH level, whilst helpful in suspected early or premature menopause, is unhelpful above 45 years and if the patient has typical menopause symptoms [58].

Forty-five per cent of women report a decrease in sexual desire following menopause, whilst 37% report no change and 10% an increase [59]. Genital perfusion, engorgement and lubrication decrease as do touch perception and vibratory sensation. Capacity to achieve orgasm is maintained although the intensity of experience may be reduced. Sudden reduction in oestrogen levels may be more adverse than a gradual decline. This may explain the higher incidence of sexual problems in patients having a surgical menopause.

10.13.5 Premature Ovarian Insufficiency

Menopause before the age of 40 years. It is diagnosed following either primary or secondary amenorrhoea. Affected women may experience spontaneous ovarian activity with resultant irregular vaginal bleeding and a small risk of pregnancy.

10.14 Sexual Dysfunction

There are three models of the human sexual response. Masters and Johnson described a four-stage model characterised by genital and non-genital physiological response [60]:

- 1) Excitement
- 2) Plateau
- 3) Orgasm
- 4) Resolution

Critics of the model state it takes no account of desire and libido and assumes individuals are always responsive to initiation and stimulation [61]. Kaplan introduced the concept of desire, desire leading to arousal, plateau, orgasm and resolution [62]. Basson built on this further through recognition of desire, closeness, intimacy, commitment and caring particularly for women [63]. Since dysfunction can occur at all stages of the proposed models, they can all facilitate an understanding of sexual dysfunction.

10.15 Erectile Dysfunction

‘The recurrent inability of a man to obtain and/or maintain a penile erection that is satisfactory for sexual performance [64]. The patient may complain also of dysfunction of other components of the sexual experience including premature loss of erection, absence of ejaculate with orgasm, premature ejaculation and loss of desire.

10.15.1 Anatomical Site

The penis consists of three cylinders; two on the dorsum, the corpora cavernosa. These comprise erectile tissue. On the ventral surface is the third cylinder, the corpus spongiosum which contains the urethra and distally forms the glans penis. Testicular size may also be relevant as evidence of hypogonadism.

10.15.2 Pathophysiology

Erection occurs via two pathways – central psychogenic and reflexogenic [65]. Psychogenic erections are in response to auditory, visual, olfactory, or imaginary stimuli. Reflex erections result from stimulation of sensory receptors on the penis which via spinal pathways cause somatic and parasympathetic efferent actions [65]. Nerve supply to the male internal and external genitalia is via branches of the pelvic plexus.

There are three types of erection in humans – genital stimulated (tactile stimulation), central-stimulated (memory, fantasy, visual or auditory stimuli) and central-stimulated (nocturnal associated with REM sleep). Normal penile blood flow is restricted by the resting vasomotor tone of the penile arterioles.

Neurotransmitter stimuli due to one of the three above causes relaxation of the smooth muscle allowing arteriolar vasodilatation and increased penile blood flow (Figure 10.5). The result is lengthening and widening of the penis until the surrounding tunica albuginea is completely distended and the penis achieves full erection. Normal erection requires integration of stimuli, neurostimuli, nerve supply and vascular function as well as anatomical normality of the penis itself. Dysfunction of any one of these components will cause failure of erection. The number of individual components in the pathway raises the possibility of a range of causes for the ED.

10.15.3 The Patient Experience

As well as being associated with physical disease, ED is a cause of anxiety and depression. Screening and discussion for ED can be incorporated into chronic disease reviews. It is helpful to explain some conditions associated with sexual dysfunction (e.g. diabetes, post-myocardial infarction) and then follow up with a question. This helps to normalise the symptoms in the patient’s mind. Similarly, screening for sexual problems in the context of other conditions (e.g. chronic physical or mental health problems) can facilitate a more open discussion.

“I am having problems getting an erection. We used to have a very health sex life and it’s still important for both of us. My partner has really encouraged me to be here as they’re worried it means I don’t love them anymore. I can get one sometimes and we start having sex ok but then it just seems to go and nothing else happens. Sometimes I wake up with an erection in the mornings and we try and quickly take advantage but it’s always 50:50 whether it will work ok. My partner is fine; they’ve got no problems. I think it must be something wrong with me. It’s getting to be quite a pressure to be honest.”

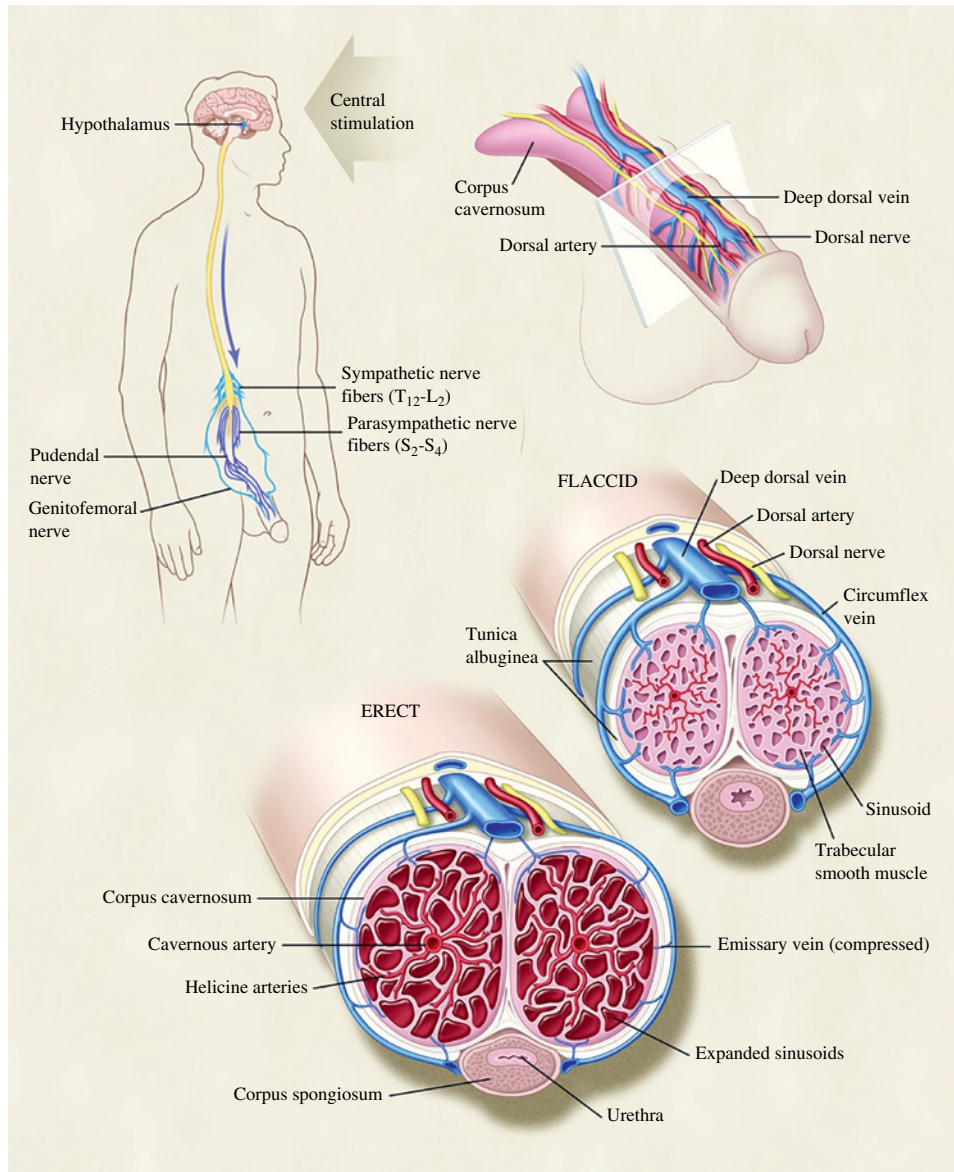


Figure 10.5 Anatomy and physiology of male erection. The erection pathway can be triggered by direct genital stimulation and by auditory and visual stimulation, which act together to increase penile blood flow. The penis has an anatomical structure which allows a massive increase in blood flow to be trapped within the inelastic layers surrounding the penis (the tunica albuginea), which causes rigidity and expansion of the cavernosal smooth muscle. *Source:* Fazio and Brock [66]/ Canadian Medical Association.

10.15.4 Evidence Base

Estimates of prevalence vary and are dependent on both the population studied, the type of study and definition used. This gives figures ranging from 19% through 52% to 76% [67, 68]. Organic causes occur more often in patients with other health problems. They are likely to have a more gradual onset without necessarily loss of libido. Organic causes can be subdivided into vascular, neurogenic and hormonal causes. The commonest causes of ED are those

Table 10.5 Peyronie's disease.

Peyronie's disease, in which fibrous plaques form in the tunica albuginea, causes curvature of the erect penis of 15° to almost 180°. Initial inflammation followed by fibrosis leads to deformity of the penis and painful erection. It may be due to microvascular damage during sex in predisposed men. It may occur in 3–5% of men over 50 living in the community. It is associated with diabetes, hypertension, hyperlipidaemia, Dupuytren's contracture and plantar fasciitis.

Source: Adapted from Smith et al. [71].

causing impairment of arterial blood supply or neuropathy. Diabetics have high rates of ED due to both vascular disease and autonomic dysfunction [69]. Regardless of cause, a psychogenic aspect is also likely to be present. The condition increases with age without being a function of age. A cause should therefore always be sought. Major predictors of ED are hypertension, hyperlipidaemia, diabetes mellitus and heart disease. Risk increases in smokers and may be dose-dependent. Psychological correlates include decreased self-esteem, depression, anger, anxiety and relationship dissatisfaction. Associated symptoms include premature ejaculation and diminished desire. The history is particularly good at identifying ED of psychogenic origin [70]. History and examination had a 95% sensitivity but only a 50% specificity in diagnosing organic ED. Helpful discriminators are: Was the onset sudden or gradual? Is it constant or intermittent? Are there any other sexual problems? Is masturbation affected as well? Do nocturnal erections occur? [22].

Nocturnal erections are a useful discriminator, their presence being 86% sensitive and 100% specific for a psychogenic cause (LR = infinitely high). Review of systems should include the cardiovascular, endocrine (especially diabetes) and neurological systems. A history of prostate cancer may be relevant. Local spread and radiotherapy may damage parasympathetic nerves [22]. It is appropriate to ask about the shape of the penis on erection as Peyronie's disease is common (Table 10.5).

Patients may also be taking medication for chronic conditions. Causative agents for ED include antihypertensives, antidepressants, psychotropic medication, digoxin and metoclopramide. Substance misuse including alcohol is associated with ED.

10.15.5 Key Points in the History

Time and duration of onset – Is it progressive? – Is there any loss of libido? – Does any erection occur? If so, is it sufficient for penetrative sex? Any change in shape of the penis? Is erection painful? Morning/nocturnal erections. PMH – diabetes, hypertension, neurological, previous pelvic surgery, or radiotherapy, smoking, alcohol, drugs. Psychosocial aspects – relationships = difficulties, anxiety, depression.

10.16 Female Sexual Dysfunction

Persistent or recurrent inability to attain sexual arousal or to maintain arousal until the completion of sexual activity.

10.16.1 Anatomical Site

Sexual arousal is mediated via the stimulation of the external genitalia (clitoris, vulva and vagina) and via breast stimulation.

10.16.2 Pathophysiology

Clitoral engorgement and vaginal lubrication are mediated via the same pathways as in the male – genital stimulated (tactile stimulation), central-stimulated (memory, fantasy, visual or auditory stimuli), central-stimulated (nocturnal associated with REM sleep). Disorders of any of these pathways will lead to altered sexual function with the result that associated risk factors and causes are remarkably similar to men [72].

10.16.3 The Patient Experience

“I’m just not that interested anymore. Since the children left home we seem to be leading separate lives. I’m fed up with work. I find myself getting tearful about the slightest things. I don’t think I love my partner anymore, at least not in the same way. We are more like friends now. I get anxious when they try to be romantic and make excuses about being tired. We used to have a lot of fun and it was a big part of our lives. I have a lot of back pain and that seems to make it difficult plus the side effects of the painkillers”

10.16.4 Evidence Base

It affects 43% of women in the United States [73]. The incidence increases with age, particularly after the menopause. Sex remains important to many people and changes in desire around menopause cause distress to patients. Risk factors include cardiovascular disease, diabetes, neurological causes, hypertension and smoking. Poor educational achievement and low socioeconomic class are also important [73]. Classification of female dysfunction is: [72]

- Decreased sexual desire – lack of sexual thoughts, decreased receptivity to ideas of sex
- Sexual arousal disorder – poor vaginal lubrication, decreased genital sensation, poor vaginal smooth muscle relaxation
- Orgasmic disorder – loss of orgasm following adequate arousal and stimulation
- Sexual pain disorder – genital pain associated with non-coital sexual stimulation – includes dyspareunia and vaginismus.

The history needs to focus on the specifics of the sexual problem. A review of medication including prescription, over-the-counter, alcohol, smoking and illicit drug use should be undertaken. For example, 30–60% of patients have one or more sexual symptoms related to use of selective serotonin reuptake inhibitors (e.g. fluoxetine) [56]. Ill health in a partner can lead to sexual dysfunction for the couple whilst separation, divorce or death may deprive people of a regular sexual partner.

10.16.5 Key Points in the History

Table 10.6

10.17 Fertility Problems

The inability of a couple to conceive naturally after one year of regular unprotected sexual intercourse [74].

10.17.1 Anatomical Site

This is dependent on cause but may involve both female and male genital tracts and related neuroendocrine and vascular pathways, combined male and female factors including anatomical and psychological sites and unexplained causes (e.g. male infertility secondary to a history of mumps orchitis).

Table 10.6 Key points for the history of female sexual dysfunction.

-
- Explore expected and actual levels of sexual activity
 - Presence of pain – how, when, where position etc.
 - Level of desire and libido
 - Problems with orgasm
 - Past medical history
 - Gynae
 - Menstrual and contraceptive history
 - Obstetric
 - Cardiovascular health
 - Drugs and medication
 - Sexual health history
 - Endocrine/neurological
 - General fitness
 - Exercise and diet
 - Psychological and relationship history
 - Relationship difficulties
 - Gender identity and sexuality
 - Partner expectations
 - Sexual abuse or assault
 - Mental health history
 - Anxiety
 - Depression
 - PTSD
 - Eating disorder
 - Social
 - Bereavement
 - Lack of privacy
 - Cultural or religious expectations
 - Babies and small children at home
-

10.17.2 Pathophysiology

Again, dependent on male, female, combined male-female factors, or unexplained cause. Familiarity with the normal sexual and reproductive functions of both sexes will help identify possible causes or lines of investigation.

10.17.3 The Patient Experience

“We’ve been trying for a baby for just over a year. My partner has a child from another relationship. I’ve never been pregnant. My periods are a bit irregular but from talking to friends they sound pretty normal. Sometimes I only have a light bleed and we get excited thinking it means there might be a pregnancy. But when we do a test it’s always clear. We’re having sex regularly though it’s hard to manage it every day. We both do shift work so we’re either not at home at the same time or too tired. Do you think that’s the problem?”

10.17.4 Evidence Base

Approximately 1 in 6 couples in the United Kingdom are affected [74]. Infertile couples may experience a sense of failure, guilt and shame from their predicament. The probability of conception per menstrual cycle is 20–25%; 60% within the first six months, 84% within the first year and 92% within two years assuming appropriate sexual

intercourse [74]. Risk factors include a history of pelvic inflammatory disease [75], smoking and excess alcohol [74]. Factors to consider in the history are:

- Female – present history, menstrual history, obstetric history, contraceptive history, sexual history, past medical history and family history.
- Male – present history, sexual history, past medical history and family history.

Major causes are ovulation problems (52%), male problems (38%) with the remainder due to fallopian tube disorder, endometriosis, polycystic ovary syndrome or unknown cause [76]. Patients presenting to secondary care may have a higher incidence of pelvic pathology [22]. Fertility declines with age, more markedly in women than in men [77]. A BMI below 20 and above 30 are both related to subfertility [78].

10.18 Breast Lump

Though most breast lumps are benign, this is always a worrying symptom. Fibroadenoma ('breast mouse') is the commonest benign cause. About 10% of people presenting with breast symptoms have breast cancer. The process of assessment, investigation and treatment when necessary, causes understandable anxiety.

10.18.1 Anatomical Site

The breast though patients may also present with a lump in the axilla. Widespread disease may involve the spine, liver and lungs as well as axillary lymph nodes.

10.18.2 Risk Factors for Breast Cancer

Table 10.7

10.18.3 Patient Experience

Figure 10.6

"I noticed a lump in my left breast when I was showering. It feels a bit uncomfortable, but I have been prodding at it a lot. The skin looks a bit bruised but that might be for the same reason. I know if it's cancer it can spread but I can't feel any lumps under my arm. My aunt had breast cancer, so I've always been careful about checking myself regularly. There haven't been any changes to my nipples nor any discharge."

10.18.4 Key Points of the History

- Family history of breast cancer and other malignancies - breast, ovarian, prostate, colon, pancreatic may suggest genetic factors
- Personal history of breast disease
- Age of menarche and menopause
- Use of hormonal contraception, HRT and fertility treatment
- Parity – breastfeeding – smoking – alcohol – obesity
- Characteristics of the lump – timeline and progression – location – size – variation with menstrual cycle, pain, skin changes and nipple changes or discharge

Table 10.7 Risk factors for breast cancer.

<i>Well-established Risk Factors</i>	<i>Probable Risk Factors</i>
Age over 50 years	Alcohol consumption
Benign breast disease especially cystic disease, proliferative types of hyperplasia and atypical hyperplasia	Did not breastfeed
Exposure to ionising radiation	High endogenous oestrogen levels
First childbirth after age 20	High BMI
Higher socioeconomic status	Hormonal contraception
History of breast cancer	Increased mammographic density of breast tissue
History of breast cancer in a first-degree relative	Menarche before age 12
Hormone therapy	Menopause after age 45
Nulliparity	Mutations in BRCA 1 and BRCA 2 genes
Obesity (BMI > 30/m ²)	
	<i>Possible risk factors</i>
	Chemical exposure
	Diet high in fat
	Diet low in beta carotene, folate and vitamins A and C
	Diet low in vegetables and fruit

Source: Adapted from Klein [79].

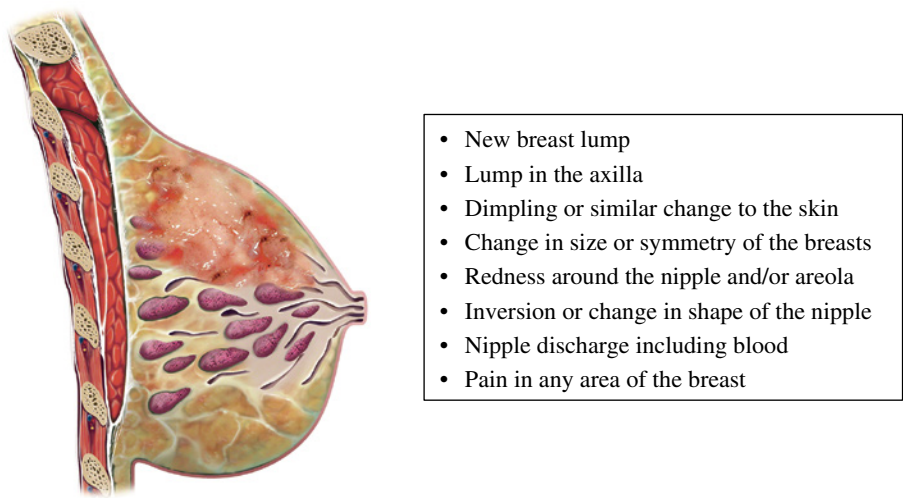


Figure 10.6 Symptoms of breast cancer. NB: Breast cancer does not always present with a lump. Source: Dr Joanna Butler © www.medical-artist.com (2024).

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11

Mental Health

KEY POINTS

- Mental health disorders have increased worldwide in the period 1990–2019
- This has been exacerbated by the effects of the COVID-19 pandemic
- These symptoms and conditions contribute to disability and premature death
- People from minoritised groups are affected disproportionately by mental health conditions
- Patients with mental health conditions often feel stigmatised by healthcare professionals
- Exploring symptoms in these conditions includes assessing the risk of self-harm and suicide

KEY SYMPTOMS

Anxiety – a feeling of unease, such as worry or fear, that can be mild or severe

Mood – marked disruptions in emotions (severe lows called depression or highs are hypomania or mania)

Thought disorder – a disorganised way of thinking leading to abnormal ways of expressing language when speaking and writing

Personality change – changes in the way of experiencing certain situations, in the way of reacting in certain situations or in the way a person used to act spontaneously.

Behavioural change – this is a change in the person's baseline level of conduct and may be a sign of acute mental difficulties. It may result in a decline in social conduct and lead the person to place themselves or others at risk of harm.

Cognitive decline – change in the performance of tasks that require quick processing of information, use of working memory and executive cognitive function and memory

Confusion – the inability to think as clearly or quickly as normal. A person may feel disoriented and have difficulty concentrating and decision-making.

Sleep disturbance – disorders of initiating and maintaining sleep (DIMS, insomnias), disorders of excessive somnolence (DOES), disorders of sleep–wake schedule and dysfunctions associated with sleep, sleep stages or partial arousals (parasomnias).

Addiction – a chronic dysfunction of the brain system that involves reward, motivation and memory. It causes a compulsive or obsessive pursuit of 'reward' and lack of concern over consequences.

Withdrawal – a constellation of aversive symptoms – ranging from anxiety, tremors ('the shakes') and nausea to hallucinations and frank seizures – brought on by the sudden stoppage or dosage drop of long-term drug or alcohol use.

Self-harm – Self-harm is when a person hurts their own body on purpose. It is more common amongst women than men.

Suicide – the act of killing yourself, usually due to a mental illness such as depression.

11.1 Impact of Mental Health Disorders

The World Health Organisation (WHO) defines mental health as [1]:

‘a state of well-being in which every individual realises their own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to their community’.

Over a billion people worldwide live with a mental or addictive disorder [2]. Mental disorders are a leading cause of disability and a risk factor for premature death [2, 3]. People with severe mental disorders die as much as two decades early. A systematic analysis of 12 main mental disorders in 204 countries between 1990 and 2019 found an increase in disability-adjusted life years (DALYs) from 80.8 to 125.3 million for the period, with years lived with disability (YLDs) contributing most of the impact from mental disorders (Table 11.1) [4]. DALYs for mental disorders are evident across all age groups, and for idiopathic intellectual disability and autistic spectrum disorders (ASDs), they become evident before five years of age [4]. Depression and anxiety are the leading mental disorders worldwide [4]. Together with schizophrenia, bipolar disorder and eating disorders they not only impair health themselves but increase the risk of other adverse health outcomes including suicide [5] (Figure 11.1).

- Depression, anxiety disorder and eating disorders are commoner in women than men
- Rates for ASD and Attention Deficit Hyperactivity Disorder (ADHD) are greater in males than females
- 80.6% of the burden of mental disorders occurs in people of working age (16–65 years)
- 9.2% of burden occurs in young people aged 16 or less

Table 11.1 Global prevalence of mental disorders 1990–2019.

	1990 Prevalence, in millions	2019 Prevalence, in millions (95% UI)
<i>Mental disorders</i>		
Total	654.8	970.1
Male	317.8	462.2
Female	337.0	507.9
<i>Anxiety disorders</i>		
Total	194.9	301.4
Male	73.4	113.9
Female	121.5	187.5
<i>Depressive disorders</i>		
Total	170.8	279.6
Male	65.6	109.2
Female	105.2	170.4
<i>Other mental disorders</i>		
Total	67.7	117.2
Male	39.9	68.3
Female	27.8	48.9

Table 11.1 (Continued)

	1990 Prevalence, in millions	2019 Prevalence, in millions (95% UI)
<i>Idiopathic development intellectual disability</i>		
Total	92.8	107.6
Male	47.7	54.9
Female	45.2	52.7
<i>Attention-deficit hyperactivity disorder</i>		
Total	72.4	84.7
Male	52.6	61.5
Female	19.8	23.2
<i>Conduct disorder</i>		
Total	32.7	40.1
Male	21.6	26.3
Female	11.1	13.8
<i>Bipolar disorder</i>		
Total	24.8	39.5
Male	11.6	18.8
Female	13.2	20.7
<i>Autism spectrum disorders</i>		
Total	20.3	28.3
Male	15.6	21.6
Female	4.7	6.7
<i>Schizophrenia</i>		
Total	14.2	23.6
Male	7.5	12.4
Female	6.7	11.2
<i>Eating disorders</i>		
Total	8.5	13.6
Male	2.8	4.7
Female	5.7	9.0

Source: Adapted from GDB 2019 Mental Disorders Collaborators [4]. This is an open access article distributed under the terms of the Creative Commons CC-BY license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. You are not required to obtain permission to reuse this article.

- DALYs for mental disorders are high in many high-income countries and lowest in sub-Saharan Africa and Asia. However, this may be affected by the availability of epidemiological data in the latter countries
- DALYs for depression and anxiety are higher in countries with high rates of child sexual abuse, intimate partner violence and conflict and war [6, 7].

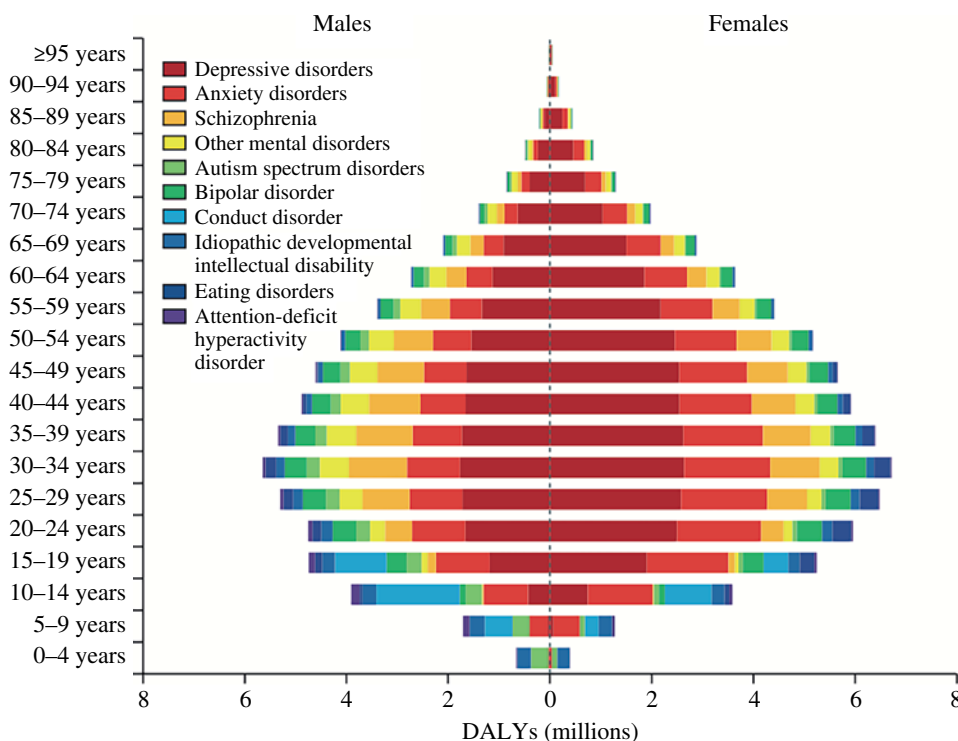


Figure 11.1 Global DALYs by mental disorder, sex, and age, 2019. *Source:* GDB 2019 Mental Disorders Collaborators [4]/Elsevier/CC BY 4.0.

Mental illness has a physical impact. For example, depression increases the risk of myocardial infarction, diabetes and multiple sclerosis – conditions that themselves increase the risk of depression.

In the UK, mental illness is common. Figures vary, but as an example [8]:

- 1 in 6 people have a common mental disorder such as depression, anxiety or phobia
- 19% of women have a chronic mental health condition; in men the figure is 12%
- For severe mental health symptoms, the figures are 10% of women and 6% of men
- 5.9% have generalised anxiety disorder
- 3.3% have depression
- 2% are living with bipolar disorder
- 5.7% have a personality disorder
- 0.7% have a psychotic illness

11.1.1 Impact of COVID-19 [9]

Figures from the WHO report a 25% increase in the prevalence of anxiety and depression during the first year of the COVID-19 pandemic. Factors in this include the loneliness and isolation of lockdown, fear of suffering and death, bereavement and financial worries. Frontline health workers experienced an increase in suicidal ideation. Young people were particularly at risk of self-harm and suicidal behaviours. Women and those with pre-existing health conditions were more likely to develop mental health symptoms.

11.2 Stigma and Discrimination [10]

People with mental health conditions are at increased risk of stigma, discrimination, and severe human rights violations. These arise from the ignorance, attitudes and behaviour of people who often have no experience nor any knowledge of the reality of mental health problems.

The effects include [11, 12]:

- Loss of income
- Prolonged unemployment
- Reduced access to healthcare and housing
- Increased rates of morbidity and mortality beyond that expected for their mental health condition
- Internalised stigma
 - Feelings of shame
 - Loss of emotional well-being
 - Poor self-efficacy
 - Negative recovery outcomes
 - Hopelessness and depression
 - Social withdrawal
 - Reduced participation in treatment

Barriers including stigmatisation and discrimination are even experienced when accessing health services and again is a global phenomenon [13]. Healthcare professionals may have negative beliefs including stereotypes about mental health patients [14]. Patients' family members may also be subject to discrimination [15].

11.3 Community Prevalence of Mental Health Symptoms

A self-reporting survey in Bangladesh of 7270 adults over 18 years stated a prevalence of 18.7% of mental disorders (women 20.5% versus 15.7% of men) [16]. Commonest conditions were depression (6.7%), anxiety disorders (4.7%), somatic symptoms and related conditions (2.3%), those affecting sleep (1%) and schizophrenia spectrum disorders (1%) [16]. These are similar magnitudes to those in the United Kingdom [8]. It is estimated one in five men and one in three women worldwide will experience major depression during their lifetime. Accurate prevalences are difficult to establish due to the stigma associated with mental illness and individuals' reluctance to share this information [17].

11.4 Social Determinants of Mental Health

The social determinants of mental health represent the most modifiable risk factors for interventions to prevent the onset of mental health disorders [18]. The risk of developing any mental health condition is linked to our life circumstances [19]. Social determinants of mental health include [18]:

- Individual level
 - Socio-economic disadvantage
 - Early life adversity
 - Childhood adversity
 - Migration
 - Ethnic and racial discrimination

- Inequalities experienced by the lesbian, gay, bisexual, transgender, queer or questioning (LGBTQ+) community
- Sex-based inequalities
- Loneliness and social isolation
- Wider environment
 - Neighbourhood socio-economic disadvantage and inequality
 - Social capital, fragmentation and ethnic density
 - Physical environment
 - The built environment
 - Pollution
 - Access to green and blue space
 - Climate change

11.5 Ethnicity and Mental Health

The disparities across the world in the diagnosis and treatment of mental illness among ethnic minorities are long established. However, despite the stressors of racism and discrimination use of mental health services is consistently lower than in non-Hispanic White populations. There are financial, geographic, cultural and linguistic barriers to accessing mental health services for people of colour in the United States. This results in more severe illness going untreated for longer [20]. A review in the United States of data from the 2019 National Household Interview survey and the 2020–2021 Household Pulse survey showed worsening mental health among Black, Hispanic and Asian respondents during the pandemic [21]. Increases were particularly marked for rates of depression and anxiety compared to White respondents. Black adults were impacted highly by the murder of George Floyd by police [21]. Asian adults were similarly affected by the murder of six Asian women in Atlanta in the same period [21].

11.6 LGBTQ+ and Mental Health

LGBTQ+ individuals have been historically marginalised, discriminated against and neglected both by society and by healthcare services around the world. This has led to a reluctance to access healthcare, poorer service user experience and worse healthcare outcomes across a range of specialities. Research into the LGBTQ+ experience in mental health and healthcare needs, though improving, is still developing. A literature review identified several themes as mental health challenges for LGBTQ+ individuals: [22]

- Emotional distress
 - Adverse childhood experiences
 - Depression
 - Anxiety
 - Suicidal ideation and attempts
- Stigmatisation, discrimination, victimisation and social exclusion
 - Reduced access to healthcare
 - Harassment
 - Bullying
 - Elevated levels of violence

- Barriers to mental healthcare services
 - Lower levels of social support
 - Systemic exclusion from services
 - Low practitioner knowledge of LGBT issues
 - Stereotyping of LGBT individuals
 - Subtle discrimination
 - Linking mental health to LGBT rather than discrimination

11.7 The Patient Experience

Patients are likely to feel a combination of relief and fear upon receiving their diagnosis [23]. Relief at vindication of their symptoms and concerns and fear from not knowing what the diagnosis means, what the treatment will mean and how people will react to them now [23]. Those who complain about their psychiatric care may do so due to poor explanations from clinicians about the origin of their illness, patronising attitudes, failure to listen to patients' concerns, failure to discuss treatment options or the risks of no treatment and the possibility of side effects of treatment [23]. People with major depression or schizophrenia have a 40–60% greater chance of dying prematurely than the general population due to physical conditions being inadequately treated or the side effects of psychotropic drugs on physical health conditions [1].

11.8 Approaching the Mental Health Interview

In approaching the mental health interview, you should:

- 1) Encourage the patient or family members to write down their questions beforehand to bring to the consultation
- 2) Allow the patient to make an 'opening statement' (the 'golden minute') with the intent of:
 - a) Identifying a problem list
 - b) Establishing and agreeing on an agenda for the consultation
- 3) Having done this, you should explore each problem in turn using open questions. For this purpose, mental health symptoms are in many respects like other symptoms you have explored, and the following questions may all be useful, in your own and appropriate form of words, at some point:
 - What is it you are experiencing?
 - What is it like?
 - How bad is it? [1–10]
 - When did it start, how long does it last and how often does it come?
 - Environmental factors, personal activities and emotional reactions
 - Does anything make it better or worse?
 - Have you noticed anything else that accompanies it?
 - How is it affecting your everyday life and work?
 - What are you really worried about?
 - What would you like us to do for you today?
- 4) You will need to check for other lines of inquiry using 'closed questions'; exploring further where the answer is 'yes' and closing the inquiry when negative. Like other interviews, you should be moving between open and closed questions in a conversational manner (the 'open-to-closed cone') (Figure 11.2).
- 5) As in any medical interview, you should use active listening skills to encourage the patient to open up and share information with you.

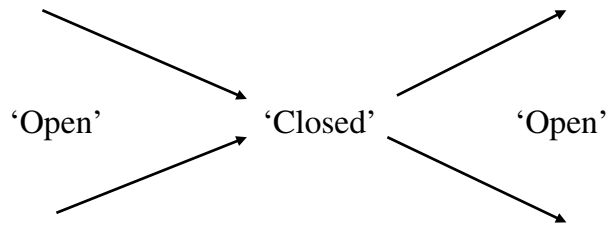


Figure 11.2 The 'open-to-closed' cone. Explore the symptom or line of inquiry with open questions; closed questions can be used to fill in outstanding points of detail and/or to open new lines of inquiry. Good communication leading to a data-rich history involves multiple open-to-closed cones. *Source:* Adapted from Silverman et al. [24].

11.8.1 Sensitive Topics

Patients may need to discuss more often in the context of their mental health topics, which are personal and sensitive. These include:

- 1) Sexual history – sexual dysfunction, gender identity
- 2) Psychological trauma – rape, childhood sexual abuse and violence
- 3) Illicit drug use
- 4) Crime
- 5) Thoughts of self-harm, suicide or harm to others

11.8.2 Assessing Mood

Mood is the patient's pervasive emotional state. Many conditions (e.g. depression, mania and anxiety) are characterised by mood disturbance.

Elements of mood can be observed. For example:

- Appearance – state of dress, unkempt, odour and well presented
- Facial expression – eye contact, appropriateness of expressed emotion
- Signs of physical disease
- Rapport – co-operation with the interview, aggression and withdrawal
- Overactivity – agitation
- Underactivity – withdrawn, stupor and motor inactivity
- Speech – tone, speed and pressure of speech (increased speed)

11.8.3 Starting Off

It can be helpful to ask the patient about their recent mood:

- 1) *How has your mood been recently?*
- 2) *Have you noticed any change in your mood or emotions recently?*
- 3) *Has your family or friends noticed any recent changes in your mood?*
- 4) *Do you still enjoy the things which used to give you pleasure?*

11.8.4 Closing the Interview

Explanations and information provided to the patient should be repeated to the patient to aid memory and allow for cognitive difficulty. Additional information can be provided in leaflets, booklets and via links to websites and support groups. Many patients find visual aids explaining the course of an illness and the effects of medication helpful. Self-report charts and diaries can help patients better understand their illness (e.g. mood charts for affective disorder).

Discussion should be made of early warning signs of relapse, including how to manage suicidal ideation.

11.9 Anxiety

Anxiety is an emotion that is primarily adaptive rather than pathological. It is [25]:

‘a future orientated mood state associated with the anticipation of future threat and possibly its avoidance. Fear is the organism’s response to present/imminent real or perceived threat and is associated with autonomic arousal and escape.’

Everyone has feelings of anxiety at some point in their life. Clinical anxiety is characterised by the persistence of these feelings with consequent distress and functional impairment including:

- Feeling restless, wound-up or on edge.
- Being easily fatigued.
- Having difficulty concentrating.
- Being irritable.
- Having headaches, muscle aches, stomach aches or unexplained pains.
- Difficulty controlling feelings of worry.

11.9.1 Pathophysiology [26]

Although research has concentrated on the gamma-aminobutyric (GABA) and 5-hydroxytryptamine (5-HT) neurotransmitters, there is no definitive explanation for the mechanisms underlying pathological anxiety. The Diagnostic and Statistical Manual (DSM)-5 has reclassified the previous ‘anxiety disorders’ into the categories ‘anxiety disorders’, ‘obsessive compulsive disorders’ and ‘Trauma and stress-related disorders’ though again it is not established these are distinct entities. Anxiety disorders are due to the interaction of many hundreds of genes with environmental factors.

Individual anxiety disorders share such common features as fear, physical symptoms and avoidance behaviours but have differing triggers in each person:

- Separation anxiety
- Panic disorder
- Agoraphobia
- Social anxiety
- Generalised anxiety disorder
- Phobias
 - Injection
 - Animals
 - Situational

11.9.2 The Patient Experience

‘We moved about a lot when I was a child. I would get settled in one school, make a few friends and it would be time to move on somewhere. It was my parents’ work. . .I know they did it for us. . .but I don’t think it was the best. It’s made me feel very anxious about changes and more difficult to just relax and enjoy things when it’s going well. I guess I get worried about letting go as it won’t last in my experience. I know I’ve lost opportunities because of it, including relationships. I keep things and people at a distance and then they move on. . .so it becomes a self-fulfilling prophecy. . .’

11.9.3 Evidence Base

Globally, anxiety is the commonest mental health disorder in most countries with a prevalence of 30% during a lifetime and 14% in the previous 12 months [27]. The most frequent disorders are specific phobias and social anxiety disorders with 12-month prevalences of 10 and 8% [28, 29]. The least prevalent adult disorders in adults are generalised anxiety disorder, panic disorder and agoraphobia [27].

Childhood, adolescence and young adulthood represent high-risk ages for the development of anxiety disorder [30]. The earliest onset disorders are separation anxiety and specific phobias, with half presenting by the age of 8 years and almost all apparent by 12 years. Onset may be related to life events:

- Loss of a parent
 - Death
 - Separation
 - Divorce
 - Physical or sexual abuse
 - Neglect in childhood

Agoraphobia, panic disorder and generalised anxiety develop into adolescence and young adulthood. Children developing anxiety disorders are at increased risk of subsequent development of depression. Female gender is the most consistent risk factor for an anxiety disorder [31].

Anxiety disorders are typically not chronic. Instead, symptoms fluctuate above and below the diagnostic threshold. Spontaneous complete remissions are rare [32]. However, anxiety disorders may predispose to the development of other mental health disorders and adverse outcomes [33]:

- Depression
- Substance misuse
- Suicidal ideation
- Educational underachievement
- Early parenthood
- Financial

Severity increased functional impairment and concurrent panic attacks may increase the risk of depression. Use of alcohol or drugs may represent self-medication to relieve anxiety symptoms [34]. A structured questionnaire may help in the diagnosis of anxiety (Table 11.2)

11.10 Mood Disorders

Mood is ‘a pervasive and sustained feeling that is sustained internally and that impacts nearly all aspects of a person’s behaviour in the external world’ [36]. The main mood disorders are depressive and bipolar disorders [37]. Depression is suffered by over 300 million people worldwide [38]. Mood disorders increase a person’s lifetime risk of suicide [39]. Prevalences of mood-related symptoms may be as high as 51% [40].

11.10.1 Pathophysiology

Neurotransmitters help regulate mood, particularly serotonin and noradrenaline. Serotonin is depleted in depression. Dopamine may be decreased in depression and increased in mania. Chronic stress is aetiological in major depression. Chronic stress results in overactivation of the hypothalamic–pituitary–adrenal (HPA) axis leading to increased cortisol production [41]. Mild to moderate impairment of neuronal plasticity causes depression, while severe impairment causes mania [36].

Table 11.2 Generalised anxiety disorder 7 (GAD-7) questionnaire.

Over the past two weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious or on edge?	0	1	2	3
Not being able to stop or control worrying?	0	1	2	3
Worrying too much about different things?	0	1	2	3
Trouble relaxing?	0	1	2	3
Being so restless that it is hard to sit still?	0	1	2	3
Becoming easily annoyed or irritable?	0	1	2	3
Being afraid as if something awful might happen?	0	1	2	3

Scoring: 0–4 = no anxiety, 5–9 = mild anxiety, 10–14 = moderate anxiety, 15–21 = severe anxiety.

Source: Spitzer et al. [35] Form is copyrighted but can be freely used. More information can be found at the provided link(s)

- <https://www.phqscreeners.com/select-screener>
- <https://loinc.org/55758-7>

11.10.2 Patient Experience

‘I started university very optimistically; I was looking forward to getting to know people on the course especially socially. There were a few good things in the first few weeks – I joined the canoeing club – the minibus broke down on the way to our first event, so I never went again. I went out a few times with some people but never the same ones. Then one Friday afternoon, I heard people in my tutor group arranging to meet that evening, but they hadn’t invited me. I don’t think it was personal; they all lived in the same hall of residence, but it did make me think that by the end of the first term I’d really gotten nowhere. The course was a given, but everyone wants to have a good time at uni, away from home for the first time, and I realised I was very isolated. My mood quickly dropped, and I became very low. I just stopped mixing with people. Every day became an ordeal to be endured. I set myself small targets, ‘Well, I feel better than this time last week. . .that’s good, at least.’

11.10.3 Evidence Base

There may be temperamental profiles that predispose individuals to subsequent development of depression (Table 11.3) [42]. There is a close relationship between prodromal profiles and residual symptoms of a depressive episode [43].

Risk factors include [44]:

- Female
- Young and middle-aged adults
- Non-White persons
- Lower educational attainment
- Previously married
- Unemployed
- Other chronic illnesses
- Family history of mental illness

11.10.3.1 Symptoms of Depression

These include low mood, poor concentration, guilt, loss of interest in previous activities, ideas of self-harm and suicide [36]. Women with depression are more likely to have physical symptoms including headache, muscle

Table 11.3 Temperamental profiles which may predispose to mood disorders.

Temperament	Profile
Dysthymic	Low mood more days than not; poor appetite or overeating, poor sleep or oversleeping, low energy, low self-esteem, difficulty making decisions and pessimism
Hyperthymic	Need less rest and less sleep, less hunger without negative impact, overconscientious, driven, ambitious and insensitive, impulsive
Cyclothymic	Periods of low mood followed by periods of elation and excitement when less sleep required, greater energy and sociability and impulsiveness
Irritable	Anger, frustration, quick annoyance and may be unprovoked, react angrily to setbacks and short tempered

aches and gastrointestinal disturbances. They are more likely to exhibit stress and crying easily [45]. Men are more likely to display aggression, anger, reckless behaviour and substance misuse [46]. The rate of depression is higher in patients with chronic conditions and is found in patients across all medical specialities [47]. In the case of diabetes and coronary heart disease, the relationship is bidirectional [48].

11.10.3.2 Screening for Depression

Depression has a high community prevalence and is associated with many chronic conditions. Screening for depression may facilitate earlier treatment, though the appropriate screening interval is unclear [38]. Several instruments have been developed. The most widely used of these are the patient health questionnaire (PHQ)-2 and PHQ-9 (Tables 11.4 and 11.5) [49].

PHQ-2 is an initial screening tool, often in the context of chronic disease reviews. When positive, PHQ-9 or usual history-taking should be used. Sensitivity and specificity of PHQ-2 is 78–92% respectively and PHQ-9 91–94% [38, 50].

11.10.3.3 Post-partum Depression

Depression is commoner in pregnancy and post-partum. It affects not only the woman but also the child [44]. Risk factors for post-partum depression are: [44]

- Poor self-esteem
- Child-care stress
- Prenatal anxiety
- Life stress
- Decreased social support
- Single or unpartnered
- History of depression including post-partum
- Difficulty with infant temperament

Table 11.4 PHQ-2 questionnaire.

Over the last two weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
Little interest or please in doing things?	0	1	2	3
Feeling down, depressed or hopeless?	0	1	2	3

Scoring ranges from 0 to 6. A score of 3 or more is the cut-off when screening for depression.

Patients with scores of 3 or more should be further assessed using the PHQ-9 questionnaire to assess if they meet the criteria for depression.

Table 11.5 PHQ screening questionnaire for depression.

Over the past two weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things?	0	1	2	3
Feeling down, depressed or hopeless?	0	1	2	3
Trouble falling or staying asleep, or sleeping too much?	0	1	2	3
Feeling tired or having little energy?	0	1	2	3
Poor appetite or overeating?	0	1	2	3
Feeling bad about yourself – or that you are a failure or have let yourself or your family down?	0	1	2	3
Trouble concentrating on things, such as reading the newspaper or watching television?	0	1	2	3
Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual?	0	1	2	3
Thoughts that you would be better off dead, or of hurting yourself in some way?	0	1	2	3

Scoring 1–4 points = minimal depression, 5–9 points = mild depression, 10–14 points = moderate depression, 15–19 points = moderately severe depression, 20–27 points = severe depression.

- Lower socio-economic status
- Unplanned pregnancy

Prevalence of post-partum depression is around 10% [51]. Up to 50% of cases begin before delivery [38]. In post-partum cases, 90% occur in the first 4 months [38]. Post-partum depression is associated with abnormal development, cognitive impairment and psychopathology in children [52]. It may also affect the mother's relationship with her partner and family. Prenatal screening may improve diagnosis and remission of symptoms [38]. The most popular screening tool is the Edinburgh Postnatal Depression Scale [53]. A systematic review, using a cut-off score of 12, reported sensitivity and specificity of 80–90% [54].

11.10.3.4 Bipolar Disorders

Bipolar disorders are categorised as: [36]

- 1) Bipolar I – elevated mood with three or more of increased goal-directed activity, grandiosity, diminished need for sleep, distractibility, racing thoughts, pressured speech and reckless behaviours
- 2) Bipolar II – current or past major depression with current or past hypomanic periods lasting at least four days
- 3) Cyclothymia – at least two years of both hypomanic and depressive periods without ever meeting the criteria for mania, hypomania or major depression
- 4) Hypomania – non-psychotic, milder or subthreshold manic state of short duration lasting for at least four consecutive days and without marked social and occupational impairment

Key features of bipolar depression are early age of onset, acute onset, recurrent episodes of depression (more than 5), family history of bipolar disorder, depression with psychotic symptoms prior to age 25, post-partum depression and mixed depressive state [55].

11.10.4 Red Flags

Assessment for ideas and active planning for self-harm and suicide is essential.

11.11 Thought Disorder

Slowing of thought can be a feature of depression, while pressure of thought ('flight of ideas') characterises mania. In psychotic illnesses such as schizophrenia, the association of ideas can seem haphazard with seeming loosening and randomness of words and ideas. The logical sequence of thought can be altered. Descriptions of this include 'knight's move' thinking, thought blocking, derailment or 'word salad'.

11.11.1 Pathophysiology

Thinking is the mental activity and processes to imagine, appraise, evaluate, forecast, plan, create and will. These manifest through neural firings within the brain and are expressed in language [56]. Formal thought disorder (FTD) refers to disturbances in the structure of thinking, the boundaries of concept formation, semantic disturbances (e.g. neologisms) and transitions between thought segments and concepts [57]. Studies have identified the superior temporal gyrus and *N*-methyl-D-aspartate as sites of origin in the brain [58].

Psychosis may be caused by psychological trauma, stress, substance misuse (drug and alcohol), side effects of prescribed medication, traumatic brain injury and organic disease such as brain tumour.

FTD in psychotic illness including schizophrenia is associated with the most serious forms of illness, persists after the resolution of positive symptoms and leads to poorer outcomes [58, 59]. In the prodromal phase of illness, thought disorder is evident in high-risk patients [59, 60].

11.11.2 Patient Experience

'I've realised since I had the baby I am very good at this. I need to tell people who are struggling what I've found out. I must contact the media and explain we need to protect all the mums who are struggling. I've found you can go without the sleep. I keep my distance from the baby so they can grow on their own. I don't hold with this idea of bonding. They'll never become resilient if you cuddle them all the time. Besides, a boy needs to learn to stand up for themselves. Obviously, I am sitting by the cot all night in case they need feeding. I've sent my own mother home as I'm coping well on my own. My partner doesn't need to be here. They are too busy and important to be wasting time at home. I was quite irritated by the midwife; she wouldn't listen to anything I was telling her about how to look after new babies. She should listen to experts. The health visitor was concerned baby was still losing weight, but I think my new feeding plan is working well and I'm sure it will soon be widely adopted by the NHS'.

11.11.3 Evidence Base

The main symptoms of psychosis are hallucinations, delusions and disordered thinking and speaking. The main causes of psychosis are schizophrenia, bipolar disorder and severe depression [58].

Thought disorder is characteristic of schizophrenia. It is not well defined but includes concepts of thought disturbance, language processing and social cognition [61]. Symptoms of schizophrenia are categorised as positive and negative. Positive symptoms are changes in behaviour and thoughts including hallucinations and delusions. Negative symptoms affect ability to function. The person loses interest in usual activities becoming withdrawn, or lacking pleasure in things. They may also lack emotion, failing to make eye contact, poverty of facial expression and flattening of tone of voice. Patients with thought disorders have more difficulties with social and occupational functioning [57]. There is increased re-hospitalisation, unemployment risk, reduced quality of life and self-support [60].

11.11.4 Key Points in the History

Use of open questions will allow thought disorder to emerge more clearly as the patient will be able to describe their own ideas and what is happening to them [57]. FTD, is an objective sign of mental state examination unlike delusions and hallucinations. Up to 18 different abnormalities in rate and organisation of speech are described in FTD rating scales [58].

Assessment of content can begin with:

- What have your main worries been lately?
- What has been on your mind recently?
- Do you have any thoughts you keep coming back to?

Exploration of the content of the patient's thinking can continue using the following questions or concepts: (Table 11.6) and (Table 11.7).

Table 11.6 Thought disorder questionnaire.

Speed	Social desirability
+ I find it difficult to do things that require me to think quickly.	– I find understanding easy.
– I enjoy doing things that require me to think quickly.	+ My thinking is as clear as it can be.
Fantasy	Amount
– I am able to do a task without daydreaming.	– My thoughts are numerous.
+ My imagination runs away on me.	+ My thoughts appear to be few.
Response	Concept formation
– I think before I speak.	+ Many ideas are confusing to me.
+ My ideas seem good at first, but turn out to be wrong.	– I find science easy to understand.
Content	Orientation
– I feel that others do not deliberately try to make trouble for me or harm me.	+ I have lost track of what the date is.
+ I think someone or some group is deliberately trying to make trouble for me or harm me.	Perception
Symptoms	+ People seem unusually small to me.
+ My thoughts are frightening.	– People's faces seem normal to me.
Control	Insight
+ I am under the control of some outside force or power.	+ I am sure that my thinking is abnormal.
– It is impossible for outside forces to remove thoughts from my mind.	– I am sure my thinking is normal.
Efficiency	Concentration
+ It is hard for me to organise my thoughts when I am facing something now.	– When I am alone, my concentration is good.
– I worry that others pay special attention to what I do.	+ I have trouble concentrating on new tasks.
	Infrequency
	+ I concentrate until I pass out.
	– I used my mind when I was in school.

+ = positively worded items; – = negatively worded items

Source: Waring et al. [62]/Canadian Psychiatric Association.

Table 11.7 Assessing thought disorder.

Abnormal beliefs

- Have there been times when you thought something strange was going on?
- Do you ever think you are being followed or watched?
- Do you ever feel other people can interfere with your thoughts or actions?

Perceptions

- Do you ever hear voices when nobody is talking?
- What do they say?
- Where do they come from?
- Have you had any visions?
- Have you ever felt that you were not real or that the world around you weren't real?

Insight

- Do you think anything is wrong with you?
- What do you think is the matter with you?
- If you are ill, what do you think needs to happen to make you better?

*Screening questions***Anxiety**

- What physical symptoms have you been experiencing?
- How relaxed have you been feeling recently?
- Have there been any worries or concerns on your mind recently?

Depression

- How has your mood been recently?
- Are you still enjoying things the way you used to?
- How do you view the future just now?

Schizophrenia

- Have you any beliefs you think other people might find odd?
 - Have you had any unusual experiences recently?
 - Have you had any difficulty controlling your thinking?
 - Have you heard people's voices when there's no one around?
-

Source: Frain [83]/University of Nottingham.

11.12 Sleep Disorders

Sleep consists of two phases: non-rapid eye movement (NREM) and rapid eye movement (REM). Sleep is an involuntary activity in which the brain is still but responds to internal stimuli during NREM and is 20% active during REM [63]. Functions of sleep include neuronal plasticity, memory consolidation, immune function, growth and mental health [63]. Each person has distinctive patterns of sleep including eye movements, muscle tone and brain wave patterns [63].

11.12.1 Pathophysiology [63]

Sleep disturbance may be due to any or all of sympathetic overtone, increased activity of the HPA axis, metabolic disorders and inflammatory response. Consequences include emotional disturbance, increased stress response, mood disorder, cognitive and performance deficits, somatic pain and reduced quality of life.

It can have long-term effects on physical health including dyslipidaemia, diabetes, cardiovascular disease, hypertension and colorectal cancer.

11.12.2 Patient Experience

‘I can’t sleep. I haven’t really slept since they died. I keep myself occupied during the day, little jobs, seeing people. Everyone’s been so kind, so supportive. It makes such a difference. . .but the night times are bad. Going to bed, I feel as if I’m climbing into my own coffin, and something will happen during the night. I distract myself with YouTube or a DVD and eventually I’ll drift off. It doesn’t last long, and I am waking the rest of the night every 90 minutes or so. Sometimes I’ll drift back off and others, that’ll be it and I’m awake for the rest of the night. By 4 am, I won’t sleep so I get up and clean and dust like I did yesterday or perhaps just browse online.’

11.12.3 Evidence Base

Working people experience variability between workdays and free days, with longer sleep duration and later sleep–wake times on free days [64]. Once established, insomnia can be very persistent. It is a risk factor for mental health problems particularly depression and reduces quality of life [65]. Sleep assessment scales exist though they are used more in research [65]. There is a high incidence (32–71.5%) in ASD and 20–50% of people with ADHD, of sleep disorders in neurodivergent populations [63]. This rises to 86% in people with intellectual disabilities [63].

Sleep becomes fragmented with age. Between 20% and 43% of elderly people are affected [66]. Those reporting sleep disturbance may perceive their length of sleep to be different from the amount expected as they age [66]. Elderly people expect to sleep 6–8 hours each night [66].

11.12.4 Key Points in the History [67]

- Previous pattern of sleep
- What are patient’s expectations?
- Where is the problem?
 - Difficulty initiating sleep
 - Difficulty maintaining sleep
 - Early morning waking
- Duration and frequency of symptoms
- Sleep schedule
 - Bedtime
 - Time to get to sleep
 - Awakening time
 - Sleep environment
 - Sleep hygiene measures

- Triggers
 - Stress
 - Shift work
 - Jet lag
- Behaviours during sleep
 - Snoring
 - Sleep apnoea
 - Restless legs
- Past medical history
 - Previous sleep problems and treatment
 - Co-morbidities affect sleep
- Impact
 - Quality of life
 - Driving
 - Employment
 - Mood
- Medication and substance use
 - Alcohol and caffeine

11.13 Memory Change

The forgetting of information or ‘things’. It can be divided into information recently acquired (short-term) or more distantly (long-term). Use of the term usually implies if it is affecting the patient’s daily life.

Examples of cognitive symptoms include:

- Problems remembering.
- Difficulty speaking.
- Difficulty understanding.
- Problems concentrating.

11.13.1 Anatomical Site

Storage of memory occurs in the temporal lobe. The hippocampus processes new memory into long-term. The hippocampus is affected in Alzheimer’s disease. Recall of memory takes place in the frontal lobes, which access information and previous experiences.

11.13.2 Pathophysiology

Memory function is divided into:

- Working – registering new information, naming objects and giving a sequence of numbers
- Short-term – tested by recollection of an address given five minutes previously
- Long-term – indicated by the patient being able to recall details of the past life and experiences

11.13.3 Patient Experience

'I know my memory is going. It used to be photographic, now I can go upstairs or into another room and I can't remember why I came there or what I wanted to watch on TV. I have to make lists of what I need to do or, if I'm going to see the doctor, of the questions I want them to answer. We are supposed to be going on holiday next week and I've completely forgotten to get insurance or to get money.'

- Asking the same questions repeatedly.
- Forgetting common words when speaking.
- Mixing words up – saying 'bed' instead of 'table', for example.
- Taking longer to complete familiar tasks, such as following a recipe.
- Misplacing items in inappropriate places, such as putting a wallet in a kitchen drawer.

11.13.4 Evidence Base

There is a normal decline in recall and processing of memory with ageing. However, significant memory loss with loss of clear orientation in time, person and place suggests underlying pathology (Figure 11.3). Memory (and concentration during testing) can be affected by anxiety and depression, and this should be accounted for during the interview with the patient. The history given by family and friends can be very useful in this regard. 10% of adults over 65 and 50% over 90 years have dementia [68].

Early symptoms of dementia include [69]:

- Difficulty in learning and retaining new information
- Handling complex tasks
- Simple problem-solving
- Problems with spatial awareness in familiar places
- Getting lost in conversations
- Change in behaviour (e.g. passive, suspicious, more irritable or aggressive)

11.13.5 Assessment Tools in Dementia

The memory can be usefully assessed using a validated tool such as the Mini-Mental State Examination (MMSE). This covers the following areas of memory and cognitive function:

- Orientation (year, place, month etc.)
- Registration (name three unrelated objects)
- Attention and calculation (serial 7s test)
- Recall (recall the three objects previously given)
- Naming (name some objects)
- Repetition (repeat the phrase 'No ifs, ands or buts')
- Three stage command ('Take this piece of paper in your left hand, fold it in half and place it on the floor')
- Reading (read this phrase)
- Copying (copy a design or diagram)

The test is scored out of 30. A score of less than 23 is interpreted as evidence of mild cognitive impairment, with less than 17 suggesting moderate impairment and less than 10 indicating severe. The score is adjusted to allow for the patient's educational attainment before final interpretation. A systematic review of screening tests found a

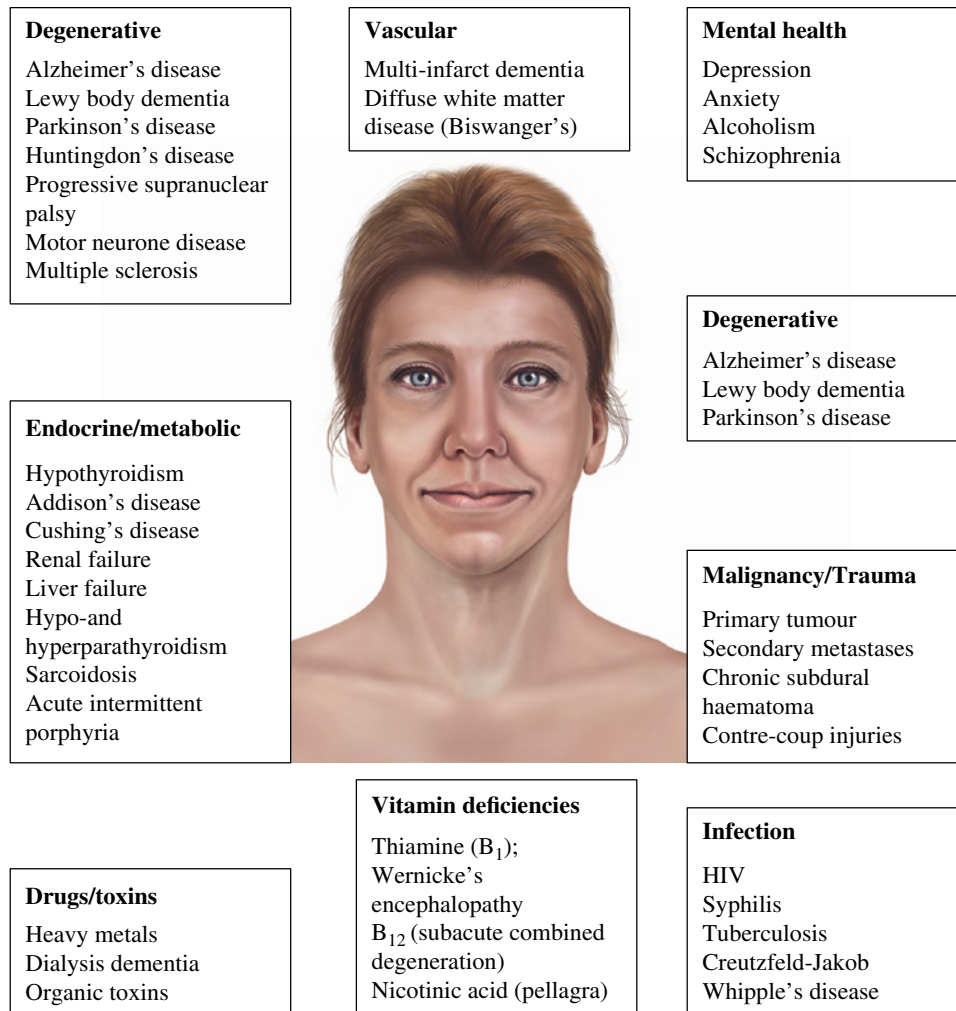


Figure 11.3 Differential diagnosis of memory loss and cognitive decline. *Source:* © Joanna Butler, Medical Artist Limited. Permission granted under licence (Image may be resized as necessary).

combined sensitivity and specificity of 0.81 and 0.89 respectively for the MMSE [70]. Ten other tests were reviewed, of which the Mini-Cog (sensitivity = 0.91; specificity = 0.86) and Addenbrooke's Cognitive Examination-Revised (ACE-R) performed the best, and were comparable to the MMSE [70].

11.13.6 Key Points in the History [71]

- It is helpful to have a witness present
 - Observations about patient's memory, speech and thinking
- Timeline
 - Slow onset – degenerative
 - Stepwise or abrupt change – vascular

- Acute – infection, metabolic, brain lesion and medication
- Rapid – acute confusional state, delirium
- Impact on activities of daily living (ADLs)
 - Eating
 - Bathing
 - Dressing
 - Continence
 - Personal finances
 - Taking medication
- Triggers for cognitive or behavioural change
 - Change of accommodation
 - Hospital admission
- Co-morbidities
- Medication
- Family history
- Alcohol or drug use

11.14 Personality Disorders

DSM-5 defines 10 personality disorders, which are clustered into three groups. [72] These are:

Cluster A:

- Paranoid, schizoid and schizotypal

Cluster B:

- Antisocial, borderline, histrionic and narcissistic

Cluster C:

- Avoidant, dependent and obsessive compulsive

Persons with personality disorders display distorted perceptions of reality and abnormal affective behaviour. This results in maladaptive coping mechanisms and distress [73]. Patterns of thinking are rigid. There is difficulty interpreting and relating to people and situations.

11.14.1 Pathophysiology

Genetic factors affect regulation of neurotransmitters including serotonin, dopamine and noradrenaline [73]. Cultural factors are also relevant. There are low levels of antisocial personality disorder in China and Japan, but higher incidence of cluster C presentations [72]. There is abnormal neurobiology in schizotypal (decreased volume of the frontal lobe), borderline personality disorder (BPD) (decreased responsiveness of midline regions of the prefrontal cortex), antisocial and paranoid disorders (altered amygdala function) [74]. These findings lead to altered regulation of the affective and emotional response.

11.14.2 Patient Experience

Patients will present with the consequence of psychiatric symptoms including depression, reduced educational attainment and employment history. They experience limitations in personal relationships and social activities. There may be problems with impulse control and cognition [75].

'I haven't had much of a life. . .the family was always moving. My mum was always in and out of relationships. Some of her partners abused me, physically and mentally. I never have good relationships. I get too possessive, always checking and wanting to know where people are. . .it drives them away. The kids don't like us. I hate myself. I just feel empty all the time. I lash out at people. I can't help it. It's a way of letting off steam but it gets me into trouble.'

11.14.3 Evidence Base

The WHO estimates a prevalence of 6.1% [73]. The prevalence of the respective clusters, A, B and C, are 3.6%, 1.5% and 2.7%. Personality disorders usually begin in adolescence or young adulthood. Women are affected more than men. There are many types of personality disorders. Symptoms tend to improve over time, though patients may not attain good psychosocial functioning [75].

There are increased rates of [74]:

- Domestic abuse
- Relationship breakdown
- Substance misuse
- Homelessness
- Emergency department attendance
- Accidental injury
- Self-harm and suicide

In BPD, patients are triggered by external events and are sensitive to perceived rejection, failure and abandonment [75]. Negative emotions persist longer than positive ones [75]. Between 60 and 78% display suicidal behaviours and 90% engage in self-harm [75]. Impulsive behaviours include gambling, spending, overeating and sexual promiscuity [75]. Interpersonal difficulties lead to fewer long-term relationships and a family life. The presence of symptoms is related to stressful events. By comparison with bipolar and schizophrenic disorders, paranoid thoughts, auditory hallucinations, depersonalisation and derealisation are of shorter duration [75].

11.14.4 Addiction

Addiction is an impulsive behaviour characterised by a lack of control and craving of activities or substances that may be harmful to the person. It is most often seen with alcohol, prescription and illicit drugs, solvents (e.g. glue, aerosols) and gambling. However, it could also be applied to work where it affects physical health and relationships. Modern addictions also include computer and mobile phone use. Allied to this is online or other shopping and the spending on things not really needed. The high of any episode of addictive behaviour is often followed by guilt, shame and despair.

11.14.5 Evaluation of Addiction [76]

Addictive behaviour is related to:

- Socio-demographic factors
 - Age, gender, socio-economic status and cultural affiliation
- Psychiatric co-morbidities
- Psychological vulnerability
 - Temperament
 - Parenting

- Personality traits
- Motivation
- Psychosocial function of the person and their family
- Cognitive
 - Craving
 - Expectancy from the addiction
- Motivational level
- Impact of addiction
 - Quality of life
 - Disability experienced

11.15 Self-harm

Self-harm is intentional damage or injury to the body. People self-harm to express psychological and emotional pain. It is often related to a life event or loss such as bereavement, relationship breakdown or an argument with family or friends.

11.15.1 Evidence Base

Self-harm is a common mental health presentation. The WHO estimates an annual rate of suicide attempts of 4 per 1000 adults [77]. In the United Kingdom, 5.6% of adults report a lifetime history of attempted suicide and 4.9% a history of self-harm without suicidal intent [78]. The two groups overlap by 50% [78].

11.15.1.1 Risk Factors [79]

- Socio-demographic
 - Age
 - Gender
 - Ethnicity
 - Sexual orientation
 - Deprivation
- Neurobiological
 - Genetic
 - Neurotransmitters
- Past history
 - Mental health disorder
 - Physical comorbidity
 - Substance misuse
- Psychological factors
 - Impulsiveness
 - Poor problem-solving skills
 - Hopelessness
- Environmental
 - Adversity in early life
 - Later life events
 - Social media

11.16 Suicide

Rates of suicide worldwide in 2019 were 9.0/100 000 in both sexes (12.6 in males and 5.4 in females) [80]. Rates are highest in Africa (age standardised rate [ASR] = 11.2) and lowest in the Eastern Mediterranean (ASR = 6.2). While rates declined during 2000–2019, they increased in the Americas [80]. Over 90% of people completing suicide present to primary care services in weeks and months prior to their death (Table 11.8) [81].

11.16.1 Risk Factors

These include:

- Personal health
 - Any mental health disorders
 - Personality disorders
 - Chronic physical health conditions including pain
 - Traumatic brain injury
- Psychosocial
 - Access to the means for suicide
 - Prolonged life stress – bullying, harassment, relationship and occupational
 - Adverse life events – relationship breakdown, financial and personal loss
- Past history
 - Previous attempts at self-harm and suicide
 - Family history of suicide
 - Adversity in early life – childhood abuse, neglect or trauma

11.16.2 Red Flags

The following may be signs of increasing risk of suicide [82]:

- The person talks about:
 - Killing themselves
 - Feeling hopeless
 - No reason to live
 - Being a burden to others
 - Feeling trapped
 - Pain
- Change in behaviour
 - Increase consumption of alcohol and drugs
 - Searching and planning methods to kill themselves
 - Withdrawal
 - Isolating themselves
 - Sleeping too much or too little
 - Visiting or calling people to say goodbye
 - Aggression
 - Fatigue

11.17 Assessing Risk of Self-harm and Suicide

Table 11.8 Assessment of risk of self-harm and suicide.

Risk assessment is mandatory in all mental health interviews. Usually, if there is risk, it is the patient themselves from either:

- Self-harm, suicide or violence to others
- Refusal or non-compliance with treatment for physical or mental illness
- Social or welfare – through neglect or inability to maintain basic needs such as food, shelter, warmth, safety and hygiene.

Risks may also arise to others based on:

- Family, friends
- Specific individuals (e.g. neighbours, celebrities)
- Groups based on age, ethnicity etc.

Risk assessment needs to be particularly thorough in the following situations:

- Where the patient's presentations include threats to self-harm or hallucinations advising self-harm.
- A history of self-harm or violence to others.
- Recent significant social loss.
- Where the possible diagnosis includes risk of harm – depression, paranoia.

In general, it is better to be direct and to-the-point in asking about risk. Patients report wanting and preferring to be asked:

- 1) How do you feel about the future?
- 2) Have you thought about ending your life?
- 3) Have you made plans to end your life?
 - a) Have you written a note?
- 4) Have you attempted to end your life?
- 5) Are there people you know who would be better off dead?
- 6) Have you thought about harming anyone else?
- 7) Have you been told to harm anyone else?

Source: Frain [83]/University of Nottingham.

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12

Babies and Children

KEY POINTS

- Children are not little adults
- Rapport with parents and carers is essential in gaining a child's trust
- There are discrete phases in childhood so the history should be tailored to the age of the child
- With increasing age, the child should be involved in the consultation and their opinion sought
- It is important to take a history and to establish a differential diagnosis appropriate to the child's age

We will not be discussing all presentations of symptoms in childhood and adolescence in this chapter. They are extensive specialities in themselves. We will discuss in general terms children's symptoms across systems.

12.1 Burden of Disease in Childhood

Global childhood deaths under 5 have declined in the period 1990–2021 from 12.8 million annually to 5 million, a fall of 59% [1]. Neonatal deaths have declined over the same period from 5.2 million to 2.3 [1]. Infectious diseases, including acute respiratory, diarrhoea and malaria together with preterm birth complications, birth asphyxia, trauma and congenital anomalies are the leading causes of death [1]. Mortality rates vary by region with sub-Saharan Africa and southern Asia accounting for more than 80% of the deaths under 5 years [1, 2].

Over a similar period (1990–2017), the global quality-of-care scores have improved for respiratory infection, enteric infection, leukaemia, foreign body aspiration, asthma, epilepsy, diabetes mellitus, dermatitis, road injury and neonatal disorders [2]. There is a disparity favouring females for mental health indicators but otherwise no gender difference is apparent across these disorders [2]. Although communicable disease has fallen in the under-5s, it has risen in the older child and adolescent group [3].

12.2 Social Determinants of Health

Child poverty in the United Kingdom has increased annually since 2011–2012 [4]. In 2019, one in three children was estimated to be living in poverty, an increase of 500,000 over the preceding 5 years [4]. Children born into poor households are likely to have lower birthweight and more likely to die in the first year of life. Infant mortality

Table 12.1 Factors influencing early childhood development.

Educational attainment of parents
Maternal mental health
Malnutrition
Infectious diseases
Environment toxins
Limitation of uterine growth
Ethnicity
Characteristics of family environment
Quality of childcare
Parent-child interactions
Socio-cultural context
Biological factors and genetic inheritance
Child's educational opportunities
Exposure to violence

Source: Adapted from Atashbahar et al. [6]/Springer Nature/CC BY 4.0.

in the UK rose in 2015 and 2016 after 100 years of continuous decline. Children living in poverty are more likely to be obese by age 4–5, to have a chronic illness, to die from an accident and to have poor mental health [4]. Ethnic minorities are disproportionately affected. Early life experiences have a significant impact on subsequent development and life [5]. Early childhood development is affected by a range of factors (Table 12.1) [6].

12.3 Ethnicity

In the United Kingdom in 2017, children from Asian and Black ethnic groups consulted GPs more often than White ethnic groups [7]. Black children had lower outpatient attendance rates. There are high levels of unmet needs in areas of socioeconomic deprivation [7]. Childhood obesity and infant mortality (IMR) are higher in African Caribbean groups [7]. Eighty-three percent of Black babies and 73% of Asian babies are born in the most deprived areas of England [8]. IMR rates are also higher in Bangladeshi, Indian, Pakistani and Black African children [9]. A scoping review reported heterogeneity in classification of ethnicities making accuracy of research difficult [10]. In the United States, ethnic minorities are 1.5–2.0 times more likely to have major chronic diseases [11]. Globally, a review of 415 ethnic groups in 36 low-income and middle-income countries reported significant ethnic differences in health, 25 countries had significant differences in under-5 mortality rates [12].

12.4 Phases of Childhood

- Extremely preterm <28 weeks
- Very preterm 28 to <32 weeks
- Moderate to late preterm 32 to <37 weeks
- Neonate <28days
- Infant 1–12 months
- Toddler 1–3 years

- Preschool 4–5 years
- School age 5–12 years
- Adolescence >13 years

12.5 Exploring Symptoms of Babies and Children

There is a wide range in paediatrics so interviewing and use of clinical communication should be adapted for the age and stage of the child whom you are seeing [13].

Presenting symptom/problem	Talk to the parent/carer if the child is young or to the child themselves if older and engaged (do not discuss the child as if they were not there)
Onset	What is the timeline of the symptom(s)?
Progress	How has the symptom changed? Is it the same, worsening or improving? What has worsened, improved, or stayed the same until now?
Exacerbating factors	What makes the symptom or child's condition worse?
Relieving factors	What makes it better? Has anything been tried (e.g. medication)? Did it help? How?
Associated symptoms/problems	Ask about other symptoms or problems in any system. These may be relevant to developing your differential diagnosis.
Timing of symptoms	How long has the child had the symptom? How long do the symptoms last each time? How often do the symptoms occur?
Previous episodes	Has this happened before or anything similar? Are there any ongoing effects of previous episodes?
Severity	How severe is the problem? Would a symptom-scoring questionnaire help e.g. pain?
Functional aspects	How does the symptom affect them? Mobility, sleep; feeding/eating, social and interaction with others, play, mood, time off school.

12.5.1 Past Medical History

Birth history [13]	Were there any complications before, during and after delivery?
Neonatal	Neonatal illnesses, prematurity, retinopathy of prematurity, respiratory distress syndrome, jaundice, birth injury
Development history	Developmental delays affecting cognitive and psychological development. Performance at nursery and school.
Social history	Parental issues (psychiatric problems, drug/ alcohol abuse, poverty, poor housing, relationship problems, domestic violence). Occupation, economic status, relationship status, parental stress.
Pregnancy details	Review maternal health before and during pregnancy, maternal wellbeing during labour, recovery, breastfeeding.
Maternal health	Depression, pregnancy-induced hypertension and infections, intercurrent medical conditions. Exposure to teratogenic substances such as medications, recreational drugs, alcohol and smoking.
Labour and delivery	Location, duration and mode of delivery. Risk factors relevant to child's health – birth trauma, congenital malformation, neonatal resuscitation; gestational age, birth weight.
Immunisations	Are they up to date? Any missed? Why?

12.5.2 Review of Systems

These are like adults though there may be some differences plus symptoms specific to children and their age at presentation.

<i>General</i>	<i>Respiratory</i>	<i>Genitourinary</i>
Fatigue/malaise	Pain	Frequency
Fevers/rigours/night sweats	Breathlessness	Dysuria
Weight/appetite	Wheeze	Incontinence
Sleep disturbance	Cough	Change in volume
Rashes, bruising	Sputum/haemoptysis	Polyuria
		Menstrual symptoms
<i>Cardiovascular</i>	<i>Nervous system</i>	<i>Gastrointestinal</i>
Pain	Headaches	Difficulty swallowing
Breathlessness	Loss of consciousness/seizures	Nausea/vomiting/haematemesis
Palpitations	Dizziness	Indigestion/heartburn
Swelling	Visual disturbance	Pain/distension
Syncope	Hearing weakness	Change in bowel habit
	Numbness/tingling	Bleeding
<i>Musculoskeletal</i>	<i>Mental health</i>	
Pain	Anxiety	
Stiffness	Low mood/depression	
Swelling	Withdrawal	
Loss of function	Behaviour change	
Activities of daily living	Lack of play	
	Lack of social interaction	
	Self-harm/suicide	

12.5.2.1 Medication History

Past, current and drug and non-drug allergies.

12.5.3 Family History

You should ask about the family history of illness and social issues in general [13]. Specifically, you should enquire about family history of febrile fits, pyloric stenosis, congenital dislocation of the hips, child and neonatal deaths and consanguinity. It may help to draw out a family tree.

12.5.4 Parental Ideas and Expectation

What are the thoughts of the parents or carers on what is causing the symptoms? [13] Are there particular conditions the parents/carers considered and excluded? What are they hoping to achieve from this consultation?

12.5.5 Differential Diagnosis

- Summarise your history
- Explain your thoughts to the parents/carers and to the child as appropriate
- In the patient's record, define the child's problem list
- Give your differential diagnosis
 - Leading hypothesis
 - Alternative diagnoses to your leading hypotheses
 - Include any 'must not miss' diagnoses
- Define your management plan in detail
- Consider if information needs to be shared with other family members, professionals or agencies in the best interests of the child

12.6 Signs of Serious Illness in Babies

12.6.1 Neonates

The first month of life is the most critical for newborn babies. In 2017, nearly 2.5 million neonates died globally. Seventy-nine percent of these deaths occurred in Sub-Saharan Africa and South Asia [14, 15]. The WHO and UNICEF recognise the following as dangerous symptoms – feeding problems, convulsions, fast breathing, severe chest indrawing, fever, feeling cold, movement only when stimulated or not even when stimulated, yellow soles, reddened or pus draining umbilicus, reddened or pus draining eyes [16].

Following the immediate neonatal period, the highest incidence of serious illness and death occurs in the first six months of life. For babies born at term, between 37 and 42 weeks of pregnancy (Table 12.2).

There is great variation in knowledge of these danger signs with less knowledge in developing countries [18]. Parental knowledge about danger signs is related to higher educational attainment, living close to health facilities, previous experience of neonatal danger signs, antenatal and postnatal clinic attendance, and access to television for sources of information [18].

12.6.2 Parenting

Parent inconsistency and lack of love can lead to long-term mental health problems as well as reduction in potential and happiness [19]. NICE in the UK highlights the importance of bonding and emotional attachment between parents and baby including face-to-face interaction, skin-to-skin contact and responding appropriately to baby's cues [17]. Parenting issues are any difficulties or concerns that parents face in raising their children. These include decisions about childcare, schooling, discipline, household chores, daily routines, finances and work-family balance.

12.7 Feeding and Growth

Feeding problems occur in up to 25% of normally developing children and 35% of children with neurodevelopmental delay [20]. Problems with feeding may lead to nutritional, developmental and psychological effects. There is no universal definition, and the presentation may include a variety of issues including food dislikes (e.g. pickiness), partial or total food refusal, difficulty sucking, swallowing, or chewing, vomiting, colic, inability to move on to textured foods or solids, delay in self-feeding, mealtime tantrums, and pica [20].

Table 12.2 Symptoms and signs of illness in babies.

General principles

- Fever may not be present in young babies with a serious infection
- Changes in the baby's behaviour such as refusing feeds or change in level of responsiveness may be signs of serious illness
- The presence or absence of individual signs or symptoms may be of limited value in identifying or ruling out serious illness in a young baby

Red flags for serious illness in young babies

- Appearing ill to a health professional
- Appearing pale, ashen, mottled or blue (cyanosis)
- Unresponsive or unrousable
- Having a weak, abnormally high-pitched or continuous cry
- Abnormal breathing patterns, such as:
 - Grunting respirations
 - Increased respiratory rate (over 60 breaths/minute)
 - Chest indrawing
- Temperature of 38 °C or under 36 °C
- Non-blanching rash
- Bulging fontanelle
- Neck stiffness
- Seizures
- Focal neurological signs
- Diarrhoea associated with dehydration
- Frequent forceful vomiting (green or yellow-green vomit)

Source: Adapted from National Institute of Health and Social Care Excellence [17].

Causes include neurological problems, anatomical problems with the upper airway and GI tract, medication side effects, chronic illness, food allergies, genetic and metabolic disorders, development delay, traumatic feeding experiences, feeder-infant relationship (e.g. home environment, parenting skills, and psychosocial factors [20].

12.7.1 Faltering Growth and Weight

Faltering growth is an interruption at the rate of the expected rate of growth of a child compared to children of similar age and sex.

12.7.2 Pathophysiology

Loss of up to 10% of birthweight in the first days of life is common, more so if the baby is breast fed. It is usually regained within the first three weeks [21]. Weight faltering may occur during the first couple of years but is less common thereafter. In the United States, faltering growth may occur around 10% of children in the community and 5% in hospitalised children.

Feeding is a physiological process requiring integration of the nervous system, oropharyngeal apparatus, cardiorespiratory, gastrointestinal systems and the musculoskeletal systems.

12.7.3 Evidence Base

The WHO has developed growth charts which have been adapted for the United Kingdom. These allow monitoring of weight and growth along expected centile lines for the child's age and sex. Both parameters are said to be faltering if the child's weight, length/height are falling across centile lines.

12.7.4 Key Points

Use of open questions will encourage a parent to share information in detail: How often do you find your child difficult to feed? [22] How do you find your child is doing with feeding? Food diaries may reveal feeding practices. A review of height and weight will identify children with growth failure.

- Pregnancy factors – smoking, alcohol, maternal medications, maternal illness during pregnancy
- In bottle-feeding how much is being taken at each feed?
- Is the child content post-feed or craving more, or uninterested?
- Frequency of wet and dirty nappies
- The stool – chronic diarrhoea will result in failure to gain weight
- Child illness
- Parental-child interaction
- Symptoms or signs of development delay

12.8 Development

Development assessment is divided into four domains – gross and fine motor skills; speech and language; social and personal and activities of daily living; performance and cognition [23].

12.8.1 Pathophysiology

Fetal brain development begins around the fourth week of gestation and continues until at least the second decade [23]. It is a programmed process occurring in all children [23]. Although the pattern of development is constant, the rate of achievement varies from child to child [23]. Attainment of goals follows a logical sequence. For example, motor development progresses from head to toe and from proximal to distal along limbs. Head control is attained before use of the legs for walking; head control also allows us to develop vision and 'explore' our immediate environment. We must develop shoulder and arm control before eventually developing a fine, precision grip with the hand. There is progression from generalised reflexive responses into more complex motor patterns under voluntary control [24].

Milestones refer to the attainment of a key performance skill (Table 12.3) [23]. Median age is the age at which half a population of children attain a milestone. Limit age is the age at which a milestone should have been achieved. It sits at two standard deviations from the population mean.

12.8.2 Patient Experience

12.8.2.1 Developmental Variation

Children do not always follow the expected pattern of development (Table 12.4) [25]. An example is 'bottom shufflers' who do not crawl but shuffle around. These children may walk late and may have hypotonia in the

Table 12.3 Normal developmental milestones.

Age	Gross Motor	Fine Motor and Vision	Hearing, Speech, and Language	Social and Behavioural
6 weeks	Head held horizontally in plane of body in ventral suspension	Fixes and follows face	Stills or startles to sound	Smiles
3 months	Lifts head up to 90° above horizontal in ventral suspension	Holds object in hand	Turns to sound	Hand regard
6 months	No head lag on pulling to sit; able to sit with support; supports self with forearms when prone; rolls from tummy to back	Palmar grasp Transfers objects between hands	Vocalises	Finger feeding
9 months	Sits unsupported; crawling	Pincer grip using thumb and index finger	2-Syllable words	Waves bye bye Stranger anxiety
12 months	Pulls self to stand; able to walk by cruising		1–2 words	Indicates wants Understands object permanence
18 months	Walking; starting to run	Builds tower of 2–4 blocks	6–12 words	Uses spoon for feeding
2 years	Climbs step – two feet for each step Throws a ball	Tower of 6–7 blocks	Joining 2–3 words in short sentences	Partial undressing
2.5 years	Kicks a ball	Draws a horizontal line	3–4 words joined together	
3 years	Uses one foot per step	Tower of 9 blocks	Short sentences	Uses fork and spoon Dressing Sharing with friends Able to play alone Bowel control

Source: Adapted from Developmental Assessment Station in One Page/<https://mrcpch.paediatrics.co.uk/wp-content/uploads/2014/06/Development-Assessment-MRCPCH-Website.pdf>, last accessed 20 May 2024.

Table 12.4 Variations in the normal attainment of developmental milestones.

- Late walking may run in families
- Motor skills of Black and Asian infants may develop more quickly than White children
- Understanding of language occurs before expression and speech
- Speaking at least 3 words occurs between 15 and 18 months
- Speaking a simple sentence occurs at 24–30 months
- Standing without support is achieved between 9 and 12 months
- Walking without support is achieved between 12 and 18 months

lower limbs. Children may ‘commando crawl’ or not even go through a crawling stage at all. Children also show variation in development of language, social skills, play or behaviour.

12.8.3 Evidence Base

Delay in two or more of the main developmental domains is defined as “Global developmental delay” [23, 26]. Significant delay has occurred when the child’s age for the milestone is two or more standard deviations from the mean age. In the United Kingdom and United States, the terms are applied under the age of 5 years [23]. Global development delay affects 1–3% of children [26]. About 1% of children have autistic spectrum disorder, 1–2% a mild learning disability, 0.3–0.5% a severe learning disability and 5–10% a specific learning disability in a single domain [27–29]. Assessment with early identification and intervention improves outcomes. A study in 1987 reported without routine screening, only 29% of children with developmental delay were identified before pre-school [30] while a randomised trial found screening detected high levels of delay (23–26% versus 13% children not routinely screened; $p < 0.00$) [31].

Developmental delay is further categorised as mild (functional age <33% below chronological age); Moderate (functional age 34–66% of chronological age) or Severe (functional age <66% of chronological age) [26].

Causes can be classified as exogenous (teratogenic including drugs and alcohol), genetic (metabolic and non-metabolic), prenatal, perinatal (prematurity, infections) and social [26] (Table 12.5). One-third of causes of developmental or cognitive delay can be identified by history and examination alone with a further third identified investigations based on clinical assessment, and one-third by investigation alone [33].

Risk factors for developmental delay include male gender, lower socioeconomic status, perinatal risk factors and lower level of maternal education [34].

Parental questions may include: Why has it happened? (aetiology), What does it mean for our child? (prognosis), What treatments might be available? Can it be prevented in the future? (prenatal testing) [35].

12.8.4 Key History Points

Developmental screening will occur as part of a structured programme (Child Health Surveillance (CHS) in the United Kingdom) but should also be done opportunistically.

- Parental concerns – behaving, learning, development; use of limbs; speech and hearing; play; any loss of skills; interactions with others; developing independent skills and activities
- Features in the history [35] – regression or possible regression including significant change in behaviour; possible or definite seizures; movement disorder: continuous or paroxysmal; muscle pain/fatigue; new onset sensory impairment, for example, significant decline in visual acuity; cognitive decline/behavioural change in child with epilepsy or ASD.

12.8.5 Red Flags

Table 12.6.

12.9 Cardiovascular Disease

The incidence of congenital heart disease varies between four and 50 per 1000 births [36]. In children, symptoms of cardiovascular origin may be vague (e.g. poor feeding, failure to thrive, colic, sweating) or they may mirror those found in adults (e.g. pain, palpitations) (Figure 12.1). Unlike adults, coronary arteries are rarely involved

Table 12.5 Causes of developmental delay.*Antenatal*

Genetic conditions – Down syndrome, Trisomy 18, Fragile X syndrome

Early maternal infection (e.g. rubella, cytomegalovirus)

Late maternal infections (e.g. varicella, HIV)

Primigravid mother

Teenage pregnancy

Vascular complications of pregnancy – haemorrhage or occlusion

Medications – anticonvulsants, cytotoxic chemotherapy

Toxins – smoking, alcohol, opioids

Socioeconomic factors

Perinatal

Intrauterine growth restriction (IUGR)

Prematurity

Perinatal asphyxia

Hypoglycaemia

Neurotoxicity secondary to perinatal jaundice

Socioeconomic

Postnatal

Metabolic – hypoglycaemia, hyponatraemia

Inborn errors of metabolism – phenylketonuria

Trauma

Infections – meningitis, encephalitis

Maternal mental health

Childhood adversity – abuse, intimate partner and domestic violence

Socioeconomic

Hypothyroidism

Malnutrition – iron, folate, Vitamin D calcium

Source: Adapted from Khan and Leventhal [32].

in pathology. Less than one year of age, children present with ductal-dependent heart disease. Above this age, symptoms relate to treated congenital heart disease and acquired conditions myocarditis, cardiomyopathy, aortic dissection in Marfan's syndrome and arrhythmias in teenagers.

Feeding difficulties are present in one-third of infants and children with CHD [37]. The common symptoms in children presenting with acute heart failure to the emergency department were dyspnoea (74%), nausea and vomiting (60%), fatigue (56%) and cough (40%) [38]. Similarly to adults, cardiac symptoms may limit ability to exercise or exert oneself. Key points in the history are ability to play, duration and ease of feeding and participation in vigorous activity and sports.

Chest pain is much less common in children though its presentation and also one of syncope should always lead to consideration of structural heart disease particularly where there is a family history of hypertrophic

Table 12.6 Red flags for developmental abnormalities.

Age	Developmental milestone
1–3 months	No response to loud noise
	Not fixing and following
	No attempt to grasp objects in 3 months
	Not smiling
	No development of head support
4–7 months	Eye movements not co-ordinated
	Muscle tone may stiff or reduced
	Still exhibiting head lag
	Reduced interaction with people
	Not locating sounds by 4 months
	No rolling over (stomach to back) for 6 months
	Not making sounds
8–12 months	Not reaching for objects
	Not weight bearing
	Not crawling
	Unable to stand when supported
	No simple words
12–24 months	Do not make gestures such as waving
	Unable to sit unsupported by 10 months
	Not walking by 18 months
	Walking not developing to heel-toe or walking on toes patterns
24–36 months	Not speaking 15 words by 18 months
	Unable to follow simple instructions by 24 months
	Difficulty with stairs
	Frequent falls
	Unable to build a tower of more than 4 blocks
	Unable to communicate in short phrases
	No pretend play
3–4 years	Severe separation anxiety
	Not interacting with other children
	Unable to jump
	Difficulty scribbling
	Cries or clings on leaving parents/carers
	Unable to use the toilet
	No use of imagination when playing
	No sentences of more than 3 words
	Lashes out when angry or upset

Source: Adapted from <https://www.tclny.org/developmental-red-flags> (Accessed 4th May 2024).

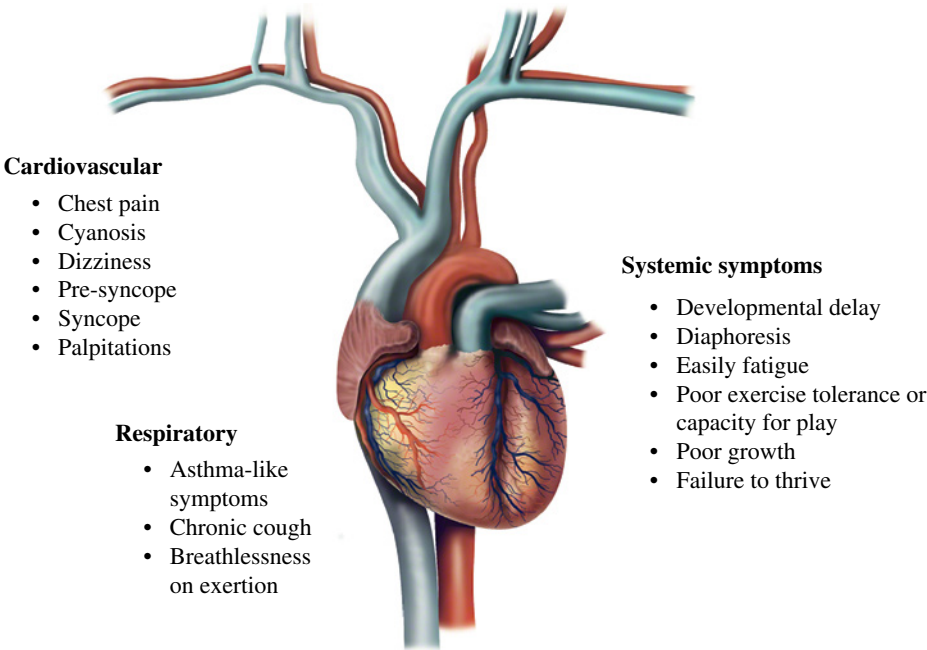


Figure 12.1 Symptoms suggesting cardiovascular disease in children. *Source:* Dr Joanna Butler © www.medical-artist.com (2024).

cardiomyopathy [37]. An outpatient study of children found chest pain or syncope accounted for 10% of consultations. Eleven per cent of children with chest pain and 5% of those with syncope had heart disease [39]. Parental hypercholesterolaemia is a predictor of hyperlipidaemia and familial disorders in children [40].

COVID-19 has seen an increase in children presenting with chest pain, chest tightness and palpitations. However, there has not been an increase in cardiac diagnoses. This may reflect the effects of the pandemic on child and adolescent mental health [41].

In patients presenting with sudden cardiac arrest (SCA), patients were an average of 16 years and 69% male. Seventy-two percent were reported by parents to have had at least one cardiovascular symptom before SCA with fatigue (44%) and near-syncope or lightheadedness (30%) the most common (Table 12.7) [42].

Table 12.7 Warning symptoms and family history in children and young adults with sudden cardiac arrest (SCA).

- Average age of 16 years (Range, 5–29 years)
- 72% of victims were reported to have had at least one cardiovascular symptom before SCA
- Commonest symptoms were fatigue (44%) and near-syncope/lightheadedness (30%)
- 24% of victims had one or more (average 2.6; range 1–10) syncopal or unexplained seizure remaining undiagnosed as cardiac disorder prior to SCA
- First symptoms occurred on average 30 months (range 19–71 months) before SCA
- Symptoms were brought to the attention of a doctor in 41% of cases
- 27% of families had a history of a relative with sudden cardiac death before the age of 50 years

Source: Adapted from Drezner et al. [42].

12.10 Respiratory

12.10.1 Cough in Children

Cough in children is more frequent than in adults. Prevalences are lower in adolescents and during summer. About 30–40% of children with a cough are brought to the doctor [43]. Cough is one of the most common reasons for presentation in paediatrics [44]. A majority of children experience one week of cough between 5 and 8 times per year [45]. The lowest prevalence of cough occurs in studies of older children (15–19 years) [46]. In primary care, acute cough resolves in about half of children within one week while in 10–20% of children not until three weeks [47].

The most frequent cause of acute cough is upper respiratory tract infection and ‘bronchitis’ (inflammation of the bronchial mucosa which may result in either a dry cough or one productive of white, yellow, or green sputum; the child may also feel breathless). For subacute and chronic cough, the most frequent causes are recurrent respiratory tract infection, asthma and pertussis [48]. In school-age children coughing for more than two weeks, there is a high prevalence of pertussis [49]. Total duration of cough ranges from 24 to 192 days (median 112 days) and 62.3% of children may still be coughing after two months [48].

12.10.2 Patient Experience

Parents often have serious concerns about a coughing child including effects on daily activities, disturbance of sleep and children’s and caregivers’ quality of life [44, 50, 51].

12.10.3 Otitis Media

Otitis media may present as either an acute infection or a chronic condition with effusion (OME) (‘glue ear’) (Figure 12.2) [52]. The latter is the most common cause of hearing loss in children and 50% of cases follow an acute otitis media. Hearing loss may last weeks to months. If persistent, it is a risk factor for developmental problems including speech language and communication issues. Most cases occur between age 6 months and 4 years.

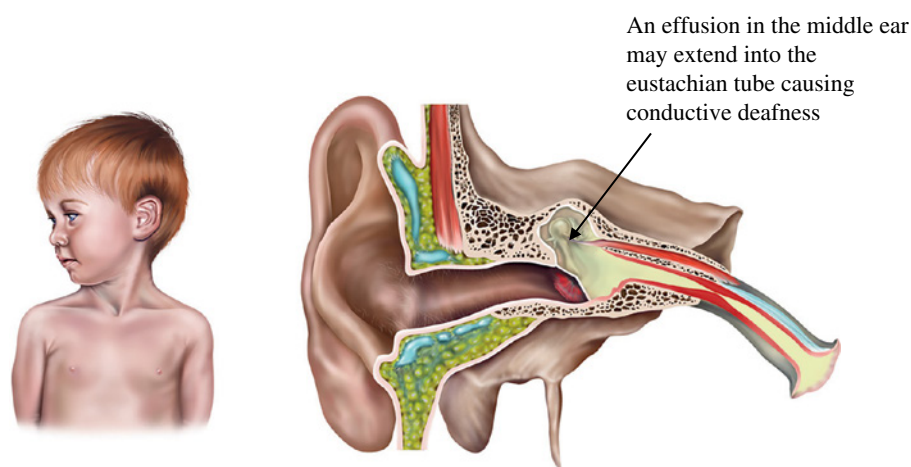


Figure 12.2 Otitis media. Otitis media may occur as either an acute, self-limiting infection of short duration or a chronic condition characterised by a middle ear effusion ‘glue ear’. It is a risk factor for hearing, speech, and communication problems. *Source:* Dr Joanna Butler © www.medical-artist.com (2024).

It is more common in children with cleft palate, Down's Syndrome, cystic fibrosis, primary ciliary dyskinesia and allergic rhinitis.

The history should cover previous hearing difficulties including newborn screening, intermittent ear pain or 'popping', aural discharge, recurrent ear or upper respiratory tract infections, sneezing or nasal itching, snoring and the impact of hearing loss (fluctuation in hearing, lack of concentration, social withdrawal, behavioural change, progress at nursery or school, speech and language development, balance problems and clumsiness [52].

12.10.4 Wheeze

Approximately 50% of children under one year experience wheezing [53]. Recurrent wheezing affects a third of children of preschool age [54]. Wheezing can be classified according to pattern and duration [54]:

- Episodic – often associated with a cold; wheezing may occur between episodes
- Multitrigger – presents with and without acute viral infection
- Wheeze according to duration
- Never or infrequent
- Transient early wheeze – starts early in the first year of life and continues before beginning to subside in the third year of life
- Intermediate wheeze – rare in the first 18 months, it presents initially between 18 and 42 months persisting into later childhood. It is strongly associated with atopy, allergic sensitisation, hyperresponsiveness and lower pulmonary function test scores
- Late-onset – infrequent wheezing may occur between 6 and 42 months of age and persists to around age 6. Nasal allergy is an aetiological factor
- Persistent wheeze – onset at 6 months or later. Patients present with symptoms like asthma. Two main subgroups:
 - Non-atopic – triggered mainly by viral infection
 - Atopic – IgE associated and accounts to 60% of persistent wheeze. Risk factors include male sex, house dust mites, family history of asthma, atopic dermatitis, eosinophilia in the first year of life and early sensitisation to food and aeroallergens

12.10.4.1 Pathophysiology of Wheeze

Wheeze occurs due to airway obstruction. Its onset is affected by anatomical, genetic, environmental and immunological factors interacting with one another [54]. In infancy, the chest wall is highly compliant. The airways are smaller and narrower. Inward pressure on the chest wall produces collapse of the intrathoracic airways and this effect is greater in some children than others. The effect produces wheeze. As a child grows and airways enlarge, most children 'grow out of it'. Bronchiolitis, a common condition in children under three years (most often under 2 years), is a condition characterised by wheeze (Figure 12.3). It is caused most by respiratory syncytial virus (RSV). Infection can be severe and it is a common cause of hospital admission particularly during winter months.

12.11 Neurological

Warning signs of neurological disorders include abnormal muscle tone at birth, seizures, floppy baby, subtle staring/unresponsive episodes, slow language and/or motor skills, decrease in developmental milestones.

Neurological symptoms mirror those in adults. A neurological symptom in a child should always be considered alongside the possibility of developmental delay and the possible causes of this. As always, encouraging an opening statement by the parent, carer or child and exploring symptoms with open questions will allow a more complete dataset to emerge.

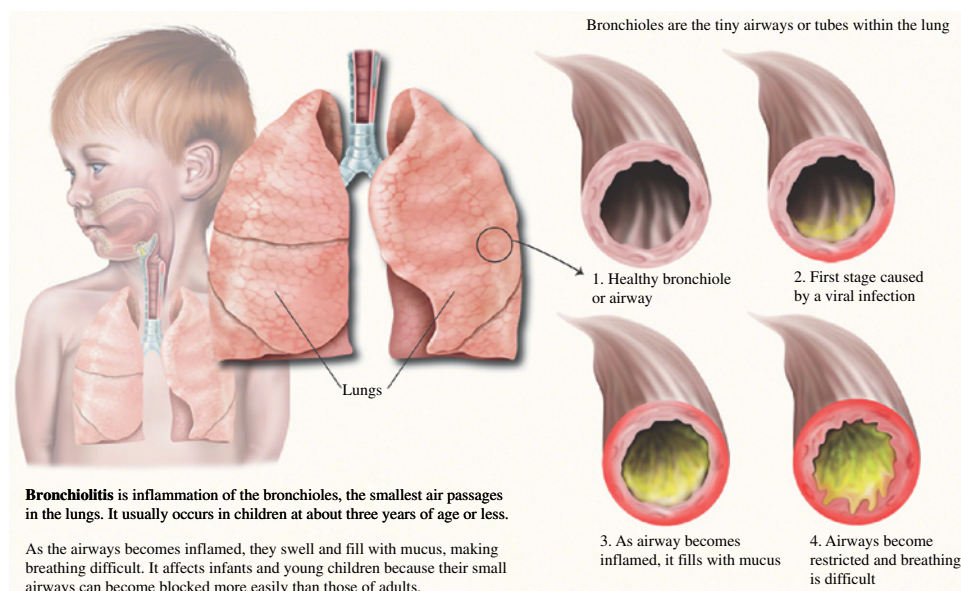


Figure 12.3 Pathophysiology of bronchiolitis. *Source:* Dr Joanna Butler © www.medical-artist.com (2024).

Some neurological problems may appear as symptoms in other systems. For example, vomiting due to raised intracranial pressure; constipation and urinary incontinence (spinal cord tumour) or as part of systemic illnesses such as lupus erythematosus (seizures, psychosis, demyelination) or mitochondrial disorders (developmental delay, hypotonia).

12.11.1 Key Points in the History

- Explore the neurological symptoms (see Chapter 8)
- Birth history – pregnancy and maternal health, history of maternal miscarriage, consanguinity, hypertension, pre-eclampsia, gestational diabetes, bleeding in pregnancy, infections, falls and reduced or absent fetal movements
- Chromosomal, CNS or neuromuscular disorders
- Labour – gestational age, mode of delivery and indication, fetal distress, breathing at birth
- Perinatal – birth weight, head circumference, jaundice, screening results, sucking and feeding
- Developmental history – static abnormality from birth suggests congenital, intrauterine, or perinatal cause; regression of skills may suggest a degenerative CNS condition or inborn error of metabolism
- Psychosocial history – family relationships, birth of a sibling, bereavements, social and academic performance

12.12 Gastrointestinal

Symptoms in children mirror those in adults (see Chapter 6) [55]. Sucking develops during the third trimester at around 34 weeks. It takes several months following birth before the oropharynx develops sufficient co-ordination to swallow solids and in the first six months of life, nutrition is confined to milk via breast or bottle. Air swallow-ing during feeding is common in the first year of life leading to burping and colic.

Regurgitation is common during the first 12 months. Usually, this is a release of air with a small amount of fluid from the mouth (possetting). Larger vomits may be as much as 15–30 ml but may be larger. Episodes may occur

several times of day. Eight percent resolve by 6 months and 90% by one year. Children are not necessarily distressed following an episode and remain hungry and willing to feed. Persistent regurgitation needs to be differentiated from vomiting and consideration given to possible intestinal obstruction (e.g. projectile vomiting in pyloric stenosis).

Stool frequency has a high variability in normal children with a range of 0–7 times daily. Breastfed babies have initial small, loose stools which transition to infrequent soft stools over 2–3 weeks. Vegetable matter may be present in the stools of older infants and toddlers. This is often due to poor chewing rather than malabsorption. Toddler's diarrhoea is common in otherwise healthy children between 1 and 3 years.

12.12.1 Constipation

Constipation in childhood is a common presentation [55]. As in adults, there is a range of normal. A soft stool every second or third day is not unusual. A hard stool passed with difficulty every third day is constipation. The rectum stores faeces until it is passed. Constipation arises either from defects of filling or emptying the rectum. Filling problems arise from ineffective peristalsis (e.g. Hirschsprung's disease) or from defective emptying due to lessening of the defaecation reflex with result of large, hard stool. Impaction may occur with overflow diarrhoea.

12.12.2 Abdominal Pain

Pain in children may be either functional or organic. Both may be equally painful.

12.12.3 Bleeding and Jaundice

While blood is always a red flag in children requiring full evaluation, jaundice associated with breastfeeding may be benign. A careful history with examination and biochemistry is essential. Associated symptoms include 'stomach' pain, nausea, vomiting, diarrhoea, constipation, jaundice, bloating, bleeding and change of appetite.

12.13 Musculoskeletal Symptoms

Musculoskeletal pain occurs in around 16% of children. While the cause of acute pain is usually obvious, chronic pain is more challenging to characterise. It requires thorough evaluation particularly if presented with systemic symptoms.

Mechanical joint pain is more likely to be acute, involve point tenderness and be worse at the end of the day with overuse. Inflammatory joint pain is worse on waking, may be described as stiff and improves on activity [56]. As in adults, the distribution of pain and the joints involved will facilitate a diagnostic hypothesis. An inflammatory cause may also be suggested by prolonged stiffness, joint swelling and extra-articular symptoms such as fever, weight loss and fatigue.

Rapid onset of pain suggests trauma, sepsis, haemarthrosis and malignancy. Onset of pain over several days suggests infectious or reactive arthritis.

Extra-articular symptoms include rashes (SLE, juvenile dermatomyositis), arthritis and rash of Henoch–Schoenlein purpura that develops following an upper respiratory infection. Reactive arthritis typically follows a genitourinary or gastrointestinal infection. A painful red eye may accompany the spondyloarthropathies.

12.14 Cancer in Children

Approximately, one in 500–600 children in Europe develop cancer before the age of 15 years [57]. Early symptoms may mimic self-limiting or transient conditions. The positive predictive values (PPVs) of presenting symptoms in childhood cancer are very low [58]. Most symptoms are general and non-specific [57]. Only 20% of

children with an eventual diagnosis present with initial alarm symptoms [57]. Children may have attended up to 3–4 times by the time of diagnosis [58]. Cancer should be considered in children where pain and other symptoms, are out of proportion to the clinical findings. Pain is the most common presenting symptom of musculoskeletal cancer. Pain may present initially with signs of swelling and reactive arthritis occurring weeks to months later. Musculoskeletal tumours account for 5–10% of all cancers in childhood. The most common lesions are osteosarcoma, Ewing's sarcoma and rhabdomyosarcoma. The type of cancer varies with age group. Leukaemia is more common in those 1–4 years while lymphomas are commoner in the 15–19 year group [59]. Symptoms suggestive of leukaemia include pallor, fatigue, irritability, unexplained fever, persistent or recurrent upper respiratory tract infections, generalised lymphadenopathy, persistent and/or unexplained bone pain and unexplained bruising.

12.14.1 Key Points in the History

Always take seriously the parent's or carer's concerns. Unexplained symptoms, particularly when several occur simultaneously, always require assessment. It is important to put in place safety netting and follow up until an explanation or resolution is found.

12.15 Emotional Disorders

Twenty per cent of children under 7 years of age experience emotional difficulties including aggression, defiance, overactivity and anxiety [60]. Early social-emotional problems are associated with later mental health conditions, development delays and educational difficulties [61]. Rates are increased for substance misuse, teenage pregnancy, lower educational attainment, unemployment and involvement in crime or violence. There is some variation in the research on age of onset of symptoms leading to future mental health problems [62]. Elevated symptoms rather than childhood diagnosis are more strongly associated with adult disorders [62]. Fifty per cent of mental disorders begin before age 14 years, with 75% having onset by age 24 years [63]. Prevalence rates are higher in children with intellectual disabilities. There are recognisable and modifiable risk factors for emotional difficulties and subsequent mental health problems (Figure 12.4).

12.15.1 Signs and Symptoms

Persistent and intense mood changes including low mood, irritability, anger, or elevation of mood – Difficult family relationships – Behaviour problems – Lack of motivation and enjoyment of usual activities – Difficulty concentrating – Changes in progress at school or college – Increased aggression – Unexplained weight loss – Substance abuse.

Mood and behaviour changes may be related to an experience of abuse, mental, physical, or sexual. This may be taking place in several settings including family, social network, school, or clubs or online including grooming. Risk factors for child maltreatment include: (Table 12.8) [64].

12.16 Autistic Spectrum Disorders (ASD)

ASD is a heterogeneous group of neurodevelopmental disorders sharing core features affecting social communication and stereotypical behaviours. ASD includes the following conditions Autism, Asperger's syndrome, Pervasive developmental disorder (not otherwise specified), Childhood Disintegrative Disorder and Genetic disorders (e.g. Rett syndrome).

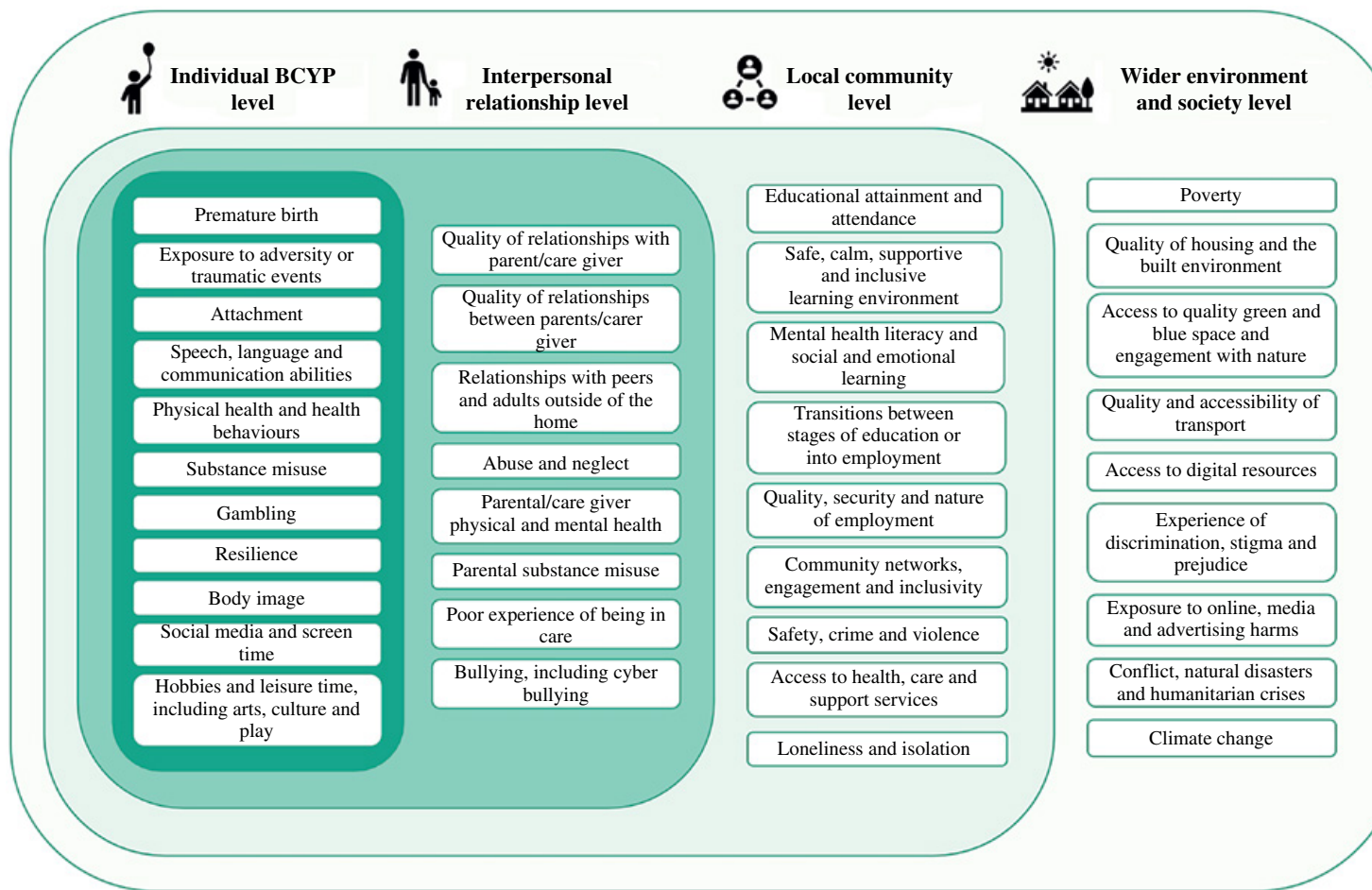


Figure 12.4 Babies, children and young people's mental health: a framework of modifiable factors to guide promotion and prevention. *Source:* Improving the mental health of babies, children and young people: a framework of modifiable factors, 2024 / <https://www.gov.uk/government/publications/improving-the-mental-health-of-babies-children-and-young-people/improving-the-mental-health-of-babies-children-and-young-people-a-framework-of-modifiable-factors>, last accessed 20 May 2024/Crown Copyright/CC BY 3.0.

Table 12.8 Risk factors for child maltreatment.*Child factors*

Age under 4 years, or in adolescence
 Physical and/or mental impairment
 Living in the care system
 Being a twin or multiple
 Being unwanted or not meeting expectations of parents/carers
 Identifying (or being identified as) lesbian, gay, bisexual or transgender

Parental/carer factors

Substance misuse
 History of domestic abuse, sexual violence, or exploitation and/or maltreatment as a child
 Emotional volatility or having problems managing anger
 History of violence or other criminal activity
 Mental or neurological disorders
 Known maltreatment of animals
 Poor education
 Lack of parenting knowledge and skills
 Lack of parental responsibilities and limited support (e.g. in learning difficulties)
 Low self-esteem

Family and environment

Poverty and financial pressures
 Poor housing
 Maltreatment of other children within the family or violence between family members
 Family/relationship breakdown

Community and society

Gender and social inequality
 Lack of housing or services to support families
 High levels of unemployment or poverty
 Inadequate policies and programmes to prevent child maltreatment
 Social and cultural norms promoting or glorifying violence or diminishing the status of the child in parent/carer-child relationships
 Social, economic, health and education policies leading to poor living standards socioeconomic inequality or instability

Risk factors for recurring for persistent child abuse and neglect

Refusal by the parent or carer to engage with services
 Parent or carer is experiencing a mental health or substance misuse problem which significantly impacts parent responsibilities
 Chronic parental stress
 Parent or carer experienced abuse or neglect as a child

Source: National Institute of Health and Social Care Excellence [64].

12.16.1 The Patient Experience

ASD is diagnosed usually by age 3. Early indicators are a lack of response to given name and discomfort with eye contact [65]. Most symptoms persist into adulthood. Social communication can improve into adulthood. Clinical diagnosis is based on presence of features including delay in speech development, learning impairment, difficulties with social communication, difficulty with organisational skills, stereotypical behaviours (e.g. hand flapping, rocking of the body, repetitive words and phrases) and specific or restricted behaviours (e.g. intense interest in a topic [66]).

Secondary symptoms include aggression, hyperactivity, impulsivity, anxiety and depression. Thirty per cent of individuals with ASD also have symptoms of ADHD. Physical symptoms of ASD include epilepsy, sleep and gastrointestinal disorders. Epilepsy, which has a high rate of co-occurrence with ASD, is more likely where there is ASD with intellectual disability [67].

12.17 Attention Deficit Hyperactivity Disorder (ADHD)

ADHD is a condition affecting children's ability to function. Symptoms include inappropriate levels of inattentiveness, hyperactivity, or impulsivity. The onset is usually before age 12 years. The symptoms are present at home, school and work and cause impairment of social, academic and occupational function. DSM 5 defines three types [1] Predominantly inattentive (18.3%) [2] Predominantly impulsive or hyperactive (8.3%) and [3] a combination of 1 and 2 (70%) [68].

12.17.1 Pathophysiology

It is one of the most heritable psychiatric disorders. There is greater concordance in monozygotic than dizygotic twins. The risk to siblings is twice the general population. Research has shown reduced dopamine receptors in the frontal lobe in sufferers [69]. Noradrenergic receptors may also be involved. The anterior cingulate gyrus and dorsolateral prefrontal cortex are smaller in individuals with ADHD. Activity in the frontostriatal region is also reduced on MRI scans.

12.17.2 The Patient Experience

Diagnosis is solely based on history and children should have trouble in at least 6 of the 9 symptoms given in DSM 5. The symptoms should be present in multiple settings. Inattentive symptoms include not paying close attention to tasks, missing small details, rushing through tasks, not seeming to listen when spoken to, difficulty organising things, not finishing work, disliking or avoiding tasks which take sustained mental effort, losing things and being forgetful.

Hyperactive symptoms include fidgeting, feeling like an 'internal motor' is always going, leaving their seat, climbing on things, being loud, blurting out answers, talking excessively or out of turn, having trouble waiting their turn, interrupting or intruding on others.

12.17.3 Evidence Base

ADHD occurs in 3–6% of adults and is one of the most prevalent disorders of childhood [70]. Core symptoms are present in around 5–7% of children and adolescents, regardless of cultural background [71, 72]. It is commoner in males (Ratio 2 : 1) [73]. The inattentive subtype is commoner in females. Other conditions may overlap with ADHD and should be considered as they may lead to misdiagnosis. Examples include depression, anxiety, substance misuse, hearing problems, learning disability and developmental disorders [74]. In adolescence,

hyperactivity and impulsivity diminish. However, the symptoms and impairments of ADHD persist into adolescence and children are more likely to experience low self-esteem, poor peer relationships, conflict with parents, social conflicts, smoking and substance abuse. Around two-thirds of children with ADHD have ADHD symptoms as adults. Even if treated or resolved, it may lead to lower educational, occupational, social and clinical outcomes in adulthood [75]. They may have increased risk of obesity and asthma [76]. An emerging problem is significantly increased screen time utilisation (STU) which may add to the burden of ADHD [77].

12.18 Adolescence

12.18.1 HEADSS for Adolescents

The Home Education, Activities, Drug use, Sexual behaviour, Suicidality and Depression (HEADSS) assessment is a structured interview tool for exploring issues affecting adolescents (Table 12.9) [78]. The original tool has been superseded by an electronic form, the e-HEADSS, making it more flexible for use across a range of settings. Precise format of the tool may vary between sources.

12.18.2 Red Flag Responses for HEADSS

- I have been forced to do something sexual against my will before [79]
- I have tried to or thought about harming myself
- Ending my life has been on my mind lately
- I [do not] feel safe at home
- I would like to talk more about feeling safe

12.18.2.1 Suicide/Depression

- Sleep disorders (usually induction problems, also early/frequent waking or greatly increased sleep and complaints of increasing fatigue)
- Appetite/eating behaviour changes
- Feelings of ‘boredom’
- Emotional outbursts and highly impulsive behaviour
- History of withdrawal/isolation
- Hopeless/helpless feelings
- History of past suicide attempts, depression, psychological counselling
- History of suicide attempts in family or peers
- History of recurrent serious ‘accidents’
- Psychosomatic symptomatology
- Suicidal ideation (including significant current and past losses)
- Depressed effect on interview, avoidance of eye contact – depression posturing
- Preoccupation with death (clothing, media, music, art)

12.19 Gender Identity and Sexual Orientation

It is a normal phase in adolescence and young adulthood to reflect on one’s gender identity and sexual orientation (see Chapter 10). While many embrace their identity and orientation, for others it is a source of anxiety and distress. Historically, individuals identifying as what we currently term LGBTQ+ have been discriminated against,

Table 12.9 Domains to be covered in the Adolescent HEADSS assessment.

Home

- With parents or other family member
- With friend or independently
- Public shelter/streets
- Other

Education

- College or community college
- Trade or vocational school
- High school
- Junior school
- Drop-out
- Other

Activities

- Sports interests
- Job (employed)
- Hangs out with friends
- Hobbies
- Other

Drugs

- IV drugs
- Hallucinogens
- Stimulants
- Inhalants
- Narcotics
- Marijuana
- Alcohol
- Drugs a problem
- No drug or alcohol

Sexual behaviour

- First sex (age in years)
 - Never
 - 0–9
 - 10–14
 - 15–18
 - 19+
- Heterosexual
- Gender identity
- Sexual orientation
- Non-conforming
- Sexual abuse
- Sexual problem identified by respondent

Suicidal and depression

- Depressed
 - Suicide attempts ever
 - Suicidal ideation, within last month
 - Major mental health problems
 - Physical abuse
-

Source: Cohen et al. [78]/with permission of Elsevier.

victimised, socially excluded and subject to violence. Today, LGBTQ+ individuals may still experience prejudice, lack of support and bullying from families, peers and wider society including healthcare professionals and organisations. They may also experience discrimination due to other identities (e.g. ethnicity) which interact with concerns about gender identity and sexual orientation. There are increasing numbers of children and adolescents being referred to specialist gender clinics. There are currently 23 published guidelines worldwide describing similar care pathways [80]. Our collective understanding of appropriate clinical management is still evolving [80]. What is clear is individuals in this situation are a potentially vulnerable group who should not be stigmatised but treated with respect and provided with appropriate support and engagement.

12.19.1 Gender Identity and Expression

Gender identity develops early in life and for some is fixed by 2–3 years of age [81]. For others, it may continue evolving through childhood and adolescence only becoming clearer to the individual in early adulthood. Nonconformity in gender expression is a phase of exploration of how an individual wishes to express themselves in terms of appearance, personality and behaviour. It is commoner among girls (7%) than boys (5%). It is not the same as transgender. Gender nonconformity may continue into adulthood. Only a minority of gender-nonconforming children develop a transgender identity. Most will identify as gay, lesbian or heterosexual.

Symptoms of gender dysphoria include distress, anxiety, depression, negative self-image, strong dislike of your sexual anatomy and strong preference for the toys and activities associated with the other gender (in children)

12.20 Sexual Orientation Symptoms in Children

There are no symptoms specifically associated with one's sexual orientation. Some sexual orientations both historically and currently are subject to prejudice and discrimination. Consequently, individuals may have trouble coming to terms with their sexual orientation. In addition, they may experience negative attitudes from family, peers and services including health. This has impacts on mental health and self-esteem which leaves individuals vulnerable to other health issues (e.g. substance misuse, alcohol and self-harm). This may lessen their likelihood of their engaging with services from which they may benefit. Adolescence is a time of experimentation which can leave all at risk. It is important individual healthcare professionals and organisations acknowledge this vulnerability and act to provide support and protection when it is needed.

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13

Elderly Care

KEY POINTS

- Increasing life expectancy and declining fertility rates is changing population profiles globally.
- Age is a protected characteristic under the UK Equality Act 2010. Nonetheless, ageism exists in society and in health services.
- Effective health care for older people is affected by ageism, multimorbidity and access to health care.
- The needs of older lesbian, gay, bisexual, transgender, queer or questioning (LGBTQ+) individuals are poorly researched.
- Older people from ethnic minorities are more likely to report poor health and social isolation.
- There are stereotypes around sexuality in old age, but older people value the well-being which comes from intimate relationships.

Although the chapters in this book on exploring systems apply to adult people of all ages (except for Chapter 12), there are dimensions which apply to elderly people. These occur due to a combination of ageing, conditions and injuries accumulated across a lifetime and chronic medical conditions. This results in a range of physical and mental problems with functional impairment. Both multimorbidity and polypharmacy are common.

In this chapter, we will cover the following topics:

- Normal ageing
- Symptoms in the elderly
- Multimorbidity and comorbidity
- Frailty
- Falls
- Appetite/weight
- Hearing
- Vision
- Mobility
- Mental health
- Sexuality
- Elder abuse

13.1 Global Burden of Disease in Older People

Twenty-three per cent of the global burden of disease arises in older people [1]. This is one-half of the burden in high-income countries and a fifth in low- and middle-income countries [1]. The most age-dependent disorders are dementia, stroke, chronic obstructive pulmonary disease (COPD) and diabetes [1]. The direction and

intensity of effects of population ageing vary by region and by disease [2]. By 2050, 80% of older people will be living in low- and middle-income countries [3]. The burden of cardiovascular disease is gradually concentrating towards low-income countries [4]. Elderly Ghanaians who are overweight and obese have higher risks of hypertension, arthritis and deficiencies in the instrumental activities of daily living (IADLs) [5]. Underweight elderly Ghanaians are similarly likely to have difficulty with activities of daily living (ADLs) [5]. A study of 30 000 Americans found over 1.5 years of healthy life were lost over 16 years due to 10 conditions – hip fractures, congestive heart failure, myocardial infarction, COPD, stroke, cancer, diabetes, back pain, arthritis and hypertension [4].

Global disability in adults over 70 years is driven by functional decline, vision and hearing loss and pain [6]. Sociodemographic trends and access to health care are major determinants of life expectancy and healthy life expectancy in adults over 70 [6]. COVID-19 has impacted the elderly with increased sedentary lifestyles and decreased physical activity [7]. Requirements to isolate and barriers to normal living have impacted physical and mental health [8].

13.2 Ethnicity and Ageing

In the UK, the number of Black, Asian and Minority Ethnic people aged 50–70 years is growing faster than that of White [9]. People from these groups are under-represented in the wealthiest group (12% compared to 21% White people) but over-represented in the poorest (29% compared to 19%) [9]. Older Black individuals are more likely to still be in paid work than Asian and White groups (74% versus 60% and 59%, respectively) [9]. Ethnic minority groups are more likely to report financial problems, poor health, lower life satisfaction and feel more isolated [9]. In the US, African American respondents expected the least age-related functional decline while Chinese Americans expected the greatest [10]. Non-Hispanic Blacks and Hispanics in the US have accelerated ageing while non-Hispanic Whites have decelerated rates of ageing [11].

13.3 LGBTQ+ and Ageing

LGBTQ+ people are impacted by many stressors resulting from their minority status [12]. Older LGBTQ+ patients have grown up at a time when their gender identities and sexual orientation were considered mental illnesses or criminal activities. Consequently, they will have experienced invisibility, marginalisation, social exclusion and discrimination [13]. This will have affected their ability to access, and their experience of, engaging with health care. In addition, the needs and experiences of older LGBTQ+ people are not reflected in research [13]. Nonetheless, many LGBTQ+ individuals are now living comfortably with their identities and have a resilience to the experiences of their earlier lives [14].

Health professionals and support organisations often ignore the identities of older LGBTQ+ patients [12]. It is important that health care providers and staff reflect on the LGBTQ+ experience including: [12, 15]

- Confidence in accessing health care
- Caregiving – availability of social support and structured networks
- Cultural/affirmative competence
- Social isolation and loneliness
- Wellness, health behaviours and quality of life
- Impact of discrimination

- Lifetime trauma
- Human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS)
- Independence/loss of decision-making
- Cultural differences
- Intersectionality – including age and ethnicity

A study of 115 LGBTQ+ people aged 65 years and over in the Netherlands reported older LGBTQ+ people's experiences with ageing are related to how ageing environments accommodate LGBTQ+ lifestyles [16]. Neighbourhood-based activities may not be sufficiently responsive to older LGBTQ+ people [16].

13.4 Normal Ageing

Normal ageing is the result of a complex process that is progressive in nature, in the absence of disease. It is important to note that the speed of ageing varies by individual. In the same way, major morphological and functional differences can be observed between individuals of the same age.

Ageing is the gradual and progressive deterioration in physiological functions that results in age-related frailty, disability and disease, leading ultimately to death [17]

Normal ageing is a cumulative result of molecular and cellular damage resulting in the loss of physiological reserve [18]. Successful ageing is the ability to meet the challenges of this stage of life in a prosperous and satisfactory way, with good functional, physical and cognitive capacity and an active involvement in psychosocial life [19].

13.4.1 Patient Experience

I'm in my 70s now and about the age I think everyone expects you to have packed in or packed up ... I guess I'm lucky I don't, we don't have any major problems. A few aches and pains of course but nothing paracetamol can't handle. I'm quite happy with life. We see friends and our children every week....sometimes every day. That makes a big difference, knowing they are not far away, and we can call on them if anything happens and of course the grandchildren are an absolute joy. I've still got the balance to kick a ball around the garden and they'd have me out there for hours if they could....not that I'd mind. We both belong to a book club and go there every fortnight. It gives me the discipline of making sure I read it on time plus we can put the world to rights. My German is coming along with Duolingo – on a 153-day streak now.

13.5 Symptoms in the Elderly

As well as an increase in life expectancy, there is the impact of symptoms in the older person on quality of life. Organ function declines progressively from young adulthood (Figure 13.1) [20]. A longer life might be expected to result in more years lived with disability. The 'compression of morbidity' hypothesis proposes that the burden of lifetime illness can be compressed into a shorter period if the age of onset of the first chronic infirmity can be postponed. This has implications for the individual and for health services.

Population ageing means individuals may be living longer lives with chronic disease and disability for years or even decades. This is associated with higher use of services, residential and nursing care, and reduced quality

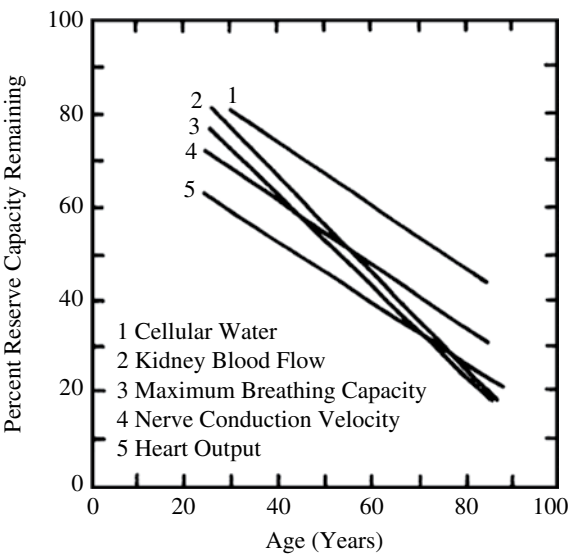


Figure 13.1 Decline in organ function with ageing.
Source: Fries [20]/National Library of Medicine/Public Domain.

Table 13.1 Projections of multimorbidity in the older population in England to 2035.

- In 2015, 54.0% of people aged over 65 had two or more conditions (multimorbidity). By 2035 this is predicted to have risen to 67.8%. By age group, the prevalence of multimorbidity was predicted at 52.8% for people aged 65–74, 75.9% for those aged 75–84, and 90.5% for those above the age of 85.
- By 2035, there will be double the number of people aged over 65 living with four or more conditions: 17% compared with 9.8% in 2015. People aged over 65 contribute most to this number.
- By disease, most people over 65 will be affected by arthritis (62.6%), followed by high blood pressure (55.9%), respiratory disease (24.4%), cancer (23.7%), and diabetes (21.6%). The greatest prevalence increase was for cancer which had doubled from 12.6% in 2015.
- The contribution of mental illness (depression, dementia, or cognitive impairment) to overall multimorbidity increases with the number of diseases or impairments. In 2015, 4.1% of people with two or more conditions had mental ill-health, to 34.1% of people with four or more conditions. This pattern is expected to change little by 2035.
- Life expectancy is predicted to increase by 3.6 years for men and 2.9 years for women by 2035. This extra life comprises a reduction in years lived with no or only one health condition and in increase in years lived with multimorbidity.

Source: Adapted from Kingston et al. [21].

of life (Table 13.1). A survey of 375 community-living people aged over 75 years in Sweden who had been hospitalised more than three times in the previous year and had three or more diagnoses, reported the frequency and impact of 31 symptoms amongst the group [22]. The mean number of symptoms per person was 8.6. Pain had the highest prevalence, frequency, severity and distress. Half the group experienced a lack of energy and a dry mouth [22]. Poor vision, likelihood of depression and gastrointestinal disorders were independently related to the total symptom score [22]. In the elderly, chronic disability is the strongest negative prognostic factor for functionality and survival [23].

13.5.1 Patient Experience

I would say when you get to my age, nothing ever works quite right. I feel very tired all the time and stiffness is a real problem. I can sit in a chair watching a film for a couple of hours after I’ve had my lunch. After it’s finished I get up and I really can’t move, one awkward step after another. I wouldn’t say it’s painful, it just a seizing up and

though my joints had become solid. Once I get walking, it's ok. Actually, walking improves it a lot. We were in Spain a few weeks ago and it was completely different. I have to plan sleep as well. If I don't get my position 100% right then I'm in for a really stiff neck and shoulders the following day.

13.6 Key Tips in Taking a History

- Give adequate time
- Obtain collateral history from family and friends, and check medical records
- It may not be possible to take a history in a single session
- Adapt language to the cultural characteristics of the patient

13.7 Multimorbidity and Comorbidity

This is defined as:

'Any combination of chronic disease with at least one other disease (acute or chronic) or biopsychosocial factor or somatic risk' [24]. Included within this definition are common conditions including constipation, falls, sleep disturbances and sensory symptoms. For example, an individual with well-controlled hypertension and osteoporosis is currently considered to be multi-morbid (i.e. by having two chronic conditions), as is someone with end-stage chronic kidney disease (CKD) and chronic obstructive lung disease requiring home oxygen. Comorbidity is a condition which coexists with an index disease [25]. An example in an elderly person would be hypertension with ischaemic heart disease. Diseases and conditions may interact with one another or exist alongside (e.g. Type 2 diabetes mellitus and osteoarthritis, Parkinson's disease and psoriasis).

Multimorbidity is common though evidence is heterogeneous. A systematic review of 21 papers reported a prevalence of between 3.5% and 98.5% [26]. Risk factors for multimorbidity include [27]:

- Increasing age
- Female gender
- Higher number of previous diseases
- Lower education
- Large social network is protective

The impact of multimorbidity is reflected in the functional status and quality of life of individuals. People with disability in daily function are more likely to live with a carer or in a care home. They will also have higher rates of cognitive and sensory impairment, number of chronic conditions and be living with the effects of polypharmacy [28]. In the Kungsholmen project, functional decline occurred in 3.8% of those with no chronic disease, and 5.8%, 7.3%, 14.8% and 16.5%, respectively in those with one, two, three or four coexisting chronic conditions at baseline [23]. In people without cognitive decline, multimorbidity increases the rate of cognitive decline [29]. There is a strong association between multimorbidity and quality of life (QoL) [30]. QoL is affected also by specific cluster conditions and socioeconomic factors [31]. Parkinson's disease, depression and obesity have the greatest impact on quality of life [31]. Rheumatism also has a large impact when concurrent with other conditions [31].

Patients with multimorbidity may attend multiple medical appointments with different clinicians applying a range of single disease-based guidelines which may conflict with one another. The result can be polypharmacy with an increased risk of adverse events and treatment outcomes less than intended. Overall multimorbidity and functional disability increase the risk of death between 4 and 8 times [23, 28]. Although measures of multimorbidity

and comorbidity exist, a simple count of diseases and medications performs almost as well as complex measures in predicting most outcomes.

13.7.1 Patient Experience

Once I had that first illness, they have been coming thick and fast. It was my knee then they found I had diabetes and hypertension, and it took a while to bring it under control. Then the other knee needed doing and that's when I had my heart attack. Honestly, my day is governed by the timing of all the tablets I have to take now. It's a nightmare. I've had to have a tablet box with the days and times I'm supposed to take each of them otherwise I get mixed up. I think between us we must give the chemist good business and the surgery. There doesn't seem to be a day when we don't have to go along for some sort of appointment or dressing.

13.8 Frailty

Frailty is related to the ageing process, that is, simply getting older. It describes how our bodies gradually lose their in-built reserves, leaving us vulnerable to dramatic, sudden changes in health triggered by seemingly small events such as a minor infection or a change in medication or environment. It affects 5–17% of the elderly [32, 33]. Frailty may be reversible if diagnosed and treated early. Screening tools may aid in early diagnosis of frailty [34]. Clinical guidelines for frailty management recommend using validated measures for diagnosis.

13.8.1 Pathophysiology

An individual's physiological reserve enables compensation for disease-related change and the maintenance of homeostasis in the ageing process [18]. Frailty reflects loss of reserve across multiple systems [35]. Within cells, altered processes in mitochondria and protein processing, increased free radical concentrations and increased effects of apoptosis lead to systemic change [36]. Key changes include decreased hormonal regulation (increased cortisol levels), sarcopenia (loss of skeletal and muscle mass) and increased immune system activation and proinflammatory cytokines [35].

13.8.2 Risk Factors

These include [18]:

- Older age
- Female sex
- Unhealthy lifestyle
- Lower socioeconomic status
- Social determinants
 - Marital status
 - Smoking history
 - Isolation
 - Lower educational attainment

Frailty increases with the number of health problems and multiple comorbidities [33]. Diabetes mellitus, respiratory disease, stroke, dementia, multiple sclerosis, connective tissue disease, osteoarthritis and chronic fatigue syndrome are all associated with higher rates of frailty [37].

13.8.3 The Patient Experience

There is no specific symptom of frailty. Patients will often report generalised weakness and exhaustion. Associated symptoms include slow gait, poor balance, decreased physical activity, decreased strength and cognitive decline. Weight loss is a late-stage symptom [38].

It's very sad seeing my dad like this. When I think of him when I was growing up, always in control, strong and looking after everyone. It's heart-breaking when he comes on the phone, and I hear that quiet, sad voice telling me in detail everything that's been happening. . .that's his world now. Just going up to get the paper is a big trip out. . .slowly walking along and he's so tired. It can't be a more than a mile round trip, but he's worn out by the time he's gets back. Just sits in his armchair and sleeps. He used to love his food, but he doesn't seem interested. It's as though he's given up.

In the UK, National Institute of Health abdominal Care Excellence (NICE) recommends several simple initial steps in assessment [39]:

- An informal assessment of gait speed – walking from the waiting room to the consulting room
- Formal assessment of gait speed – taking more than five seconds to walk 4 m indicates frailty
- Self-reported health status – ask the person to rate their health on a scale of 0–10. A score of 6 or less indicates frailty
- The Prisma-7 can also be using as a screening tool for more detailed assessment: [40]
 - Are you more than 85 years old?
 - Are you male?
 - In general, do you have any health problems that require you to limit your activities?
 - Do you need someone to help you on a regular basis?
 - In general, do you have any health problems that require you to stay at home?
 - If you need help, can you count on someone close to you?
 - Do you regularly use a stick, walker, or wheelchair to get about?
- Three or more positive answers to the questions again suggest further assessment is required.

13.8.4 Comprehensive Geriatric Assessment (CGA)

A comprehensive geriatric assessment (CGA) is a systematic, multidimensional assessment conducted by an interprofessional team including primary care physicians. It considers social, environmental and medical determinants of health rather than focusing on individual diseases. Clinicians assess:

- Patient's medical comorbidities
- Polypharmacy
- Functional abilities (ADLs)
- Falls risk
- Hearing
- Vision
- Mental health
- Cognition

Aspects of assessment can cover several visits or be part of an annual review (see Figure 13.2).

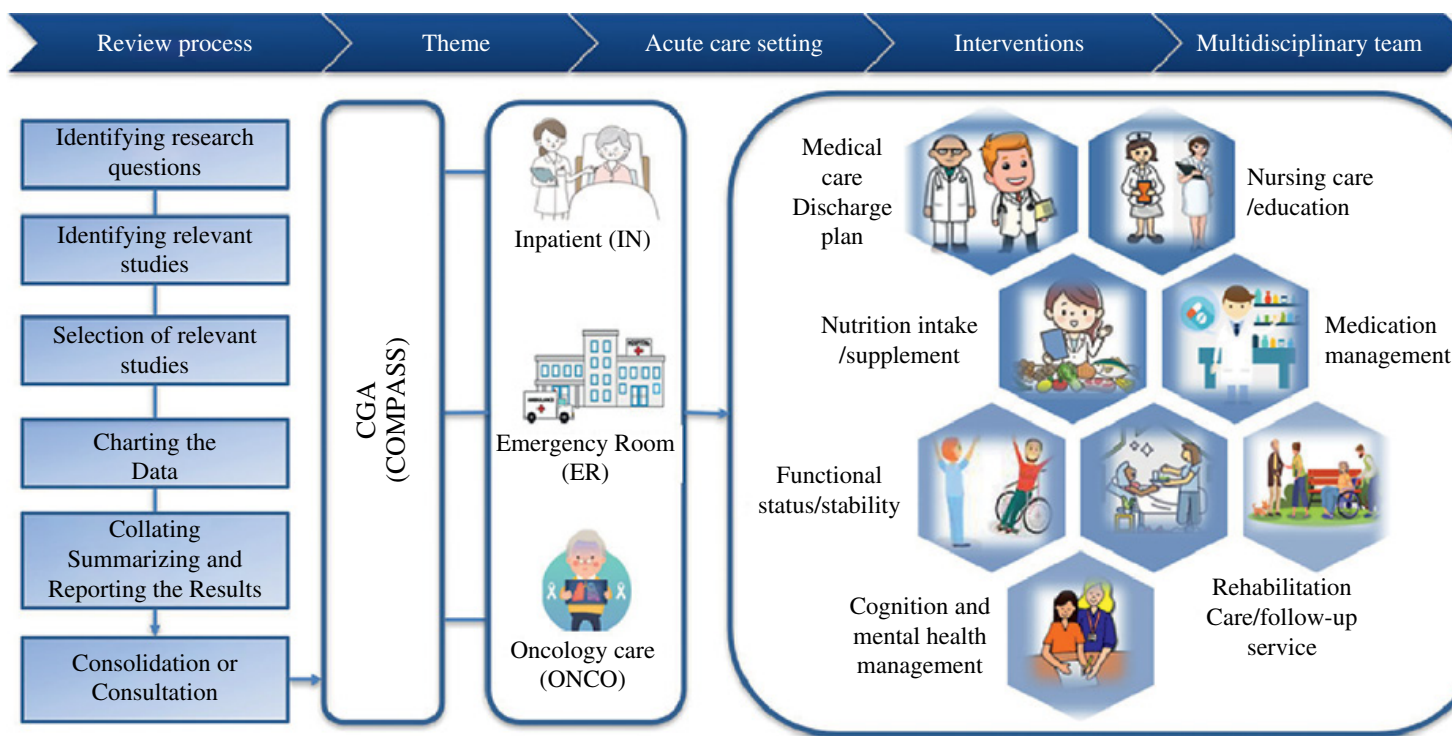


Figure 13.2 Comprehensive geriatric assessment (CGA). *Source:* Choi et al. [41]/with permission of Elsevier.

13.9 Falls

Around one in three adults over 65 years who live at home will have at least one fall each year [42]. The rate of falls increases with age and is higher in women than men. There are ethnic and socioeconomic factors present in those who fall. Studies in the US show whites fall more often than Hispanics, African Americans and Chinese. Diet and lifestyle behaviours may be factors. The extended families and communities of some ethnic communities may be protective. In the UK, those in the most deprived areas are most at risk. One in five falls results in serious consequences such as fractures or head injury. The cost of fragility fractures in the UK has been estimated at £4.4 billion (Public Health England, 2020) [43].

13.9.1 Pathophysiology

The aetiology of falls is multifactorial. Falls are classified as Intrinsic (patient-based) or Extrinsic (environment-based) [42]. Intrinsic causes include physical health conditions which impair mobility or balance while extrinsic causes are hazards in the environment or potentially hazardous situations [42].

A person's physical condition is affected by changes due to ageing itself, physical fitness, disorders present and drugs used [42]. The physical condition probably has a greater effect on the risk of falling than environmental hazards and hazardous situations. Not only does a poor or impaired physical condition increase the risk of falls, but it also affects how people respond to hazards and hazardous situations.

13.9.2 Patient Experience

It's a bit bad, but my house is a mess to be honest. . . stuff all over the floor. I was walking out of the kitchen with a tray of drinks and food, and I didn't think about that rug. The dog leapt across the room, and it shook me. I caught my foot on the rug and fell completely over the armchair. So stupid. Just missed the fireplace! Banged my knee and my elbow; grazed my forehead. I wasn't knocked out I know that, but it was bleeding, and my daughter was worried. She insisted I come down here so here I am!

13.9.3 Evidence Base

Intrinsic risk factors for falls include [42]:

- Sarcopenia and muscle weakness
- Loss of joint mobility and impaired gait
- Impaired balance
- Syncope (transient loss of consciousness and postural tone)
 - Orthostatic hypotension
 - A fall in systolic blood pressure of at least 20 mmHg (at least 30 mmHg in patients with hypertension), and/or a fall in diastolic blood pressure of at least 10 mmHg within three minutes of standing
 - Postprandial hypotension
 - A fall of at least 20 mmHg in systolic blood pressure after a meal
 - Carotid sinus hypersensitivity
 - An exaggerated response to carotid sinus baroreceptor stimulation (e.g. shaving, wearing a tight collar, turning the head)
- Visual impairment
- Cognitive problems
- Incontinence
- Polypharmacy

Use of drugs that affect attention (e.g. opioid analgesics, antianxiety drugs and some antidepressant drugs) or lower blood pressure (e.g. antihypertensive, diuretic and some heart drugs) can also increase the risk of falling [42]. The Health Survey England (2016) found nearly half of over 75-year-olds surveyed were taking five or more medications [44].

These risk factors are conveyed by a range of conditions more prevalent in the elderly including:

- Cardiovascular
 - Cardiac syncope
 - Bradyarrhythmia and tachyarrhythmia
 - Structural heart abnormalities (e.g. aortic stenosis)
- Inflammatory and degenerative arthritis
- Diabetes
 - Peripheral sensory neuropathy
 - Retinopathy
- Neurological
 - Stroke
 - Parkinson's disease
 - Eye – glaucoma, age-related macular degeneration
 - Muscle disease
 - Vestibular disease
 - Dementia

Hazards in the environment are involved in many falls. Falls may occur when people do not notice a hazard or do not respond quickly enough after a hazard is noticed.

Environmental hazards which increase the risk of falling include:

- At home
 - Trip hazards: rugs, pets and cables
 - Stairs, steps and climbing on chairs
 - Toilets
 - Furniture
 - Slippery flooring
 - Poor lighting
 - Poor diet
 - Lack of social and practical support
 - Clothing: high-heeled shoes
- Outside the home
 - Uneven pavements and curbs
 - Unfamiliarity with surroundings
- Seasonal
 - Winter
 - Cold
 - Hypothermia
 - Winter fuel costs
 - Ice, snow, winds
 - Isolation

- Summer
 - Heat
 - Dehydration
 - Sunstroke

Most falls occur when several causes interact. For example, people with hemiplegia following a stroke and impaired vision (physical conditions) may trip on a rug or carpet riser (an environmental hazard) while rushing to answer the front door (a potentially hazardous situation).

Most falls occur indoors. Some happen while people are standing still. But most occur while people are moving – getting in or out of bed or a chair, getting on or off a toilet seat, walking, or going up or down stairs. While moving, people may stumble or trip, or balance may be lost. Any movement can be hazardous. If people are rushing or if their attention is divided, movement becomes even more hazardous. For example, rushing to the bathroom (especially at night when not fully awake or when lighting may be poor) or to answer the telephone or talking on a mobile phone can make walking more hazardous.

Often before falling, people have no symptoms. When an environmental hazard or a hazardous situation results in a fall, there is little or no warning. However, if a fall is partly or completely due to a person's physical condition, symptoms may be noticed before falling. Symptoms may include:

- Dizziness
- Light-headedness
- Irregular or rapid, pounding heartbeats (palpitations)

13.9.4 Fragility Fractures

A fragility fracture results from low-energy trauma such as a fall from a standing height or less. It suggests underlying osteoporosis. The occurrence of one fragility fracture increases the risk of a second fracture within the next two years. The incidence increases after the age of 50 years. Fragility fractures are associated with areas of low bone mineral density. The most common are the hip, spine and forearm (radius and ulna) (Figure 13.1). Other sites include the humerus, ribs, tibia, pelvis and other femoral fractures. Osteoporosis is more common with other conditions such as CKD (Figure 13.3).

13.9.5 Evidence Base

- No injury – 40–60%
- Minor injury – 30–50%
- Fractures 5% (hip fracture 1%)
- Other major injury 5–6% (e.g. head injury)

Consequences of falls may be considered in relation to morbidity, mortality and financial:

- Morbidity
 - Illness and disability
 - Fractures
 - Soft tissue injuries
 - Head injuries
 - Loss of independence

From: Traditional and Non-traditional Risk Factors for Osteoporosis in CKD

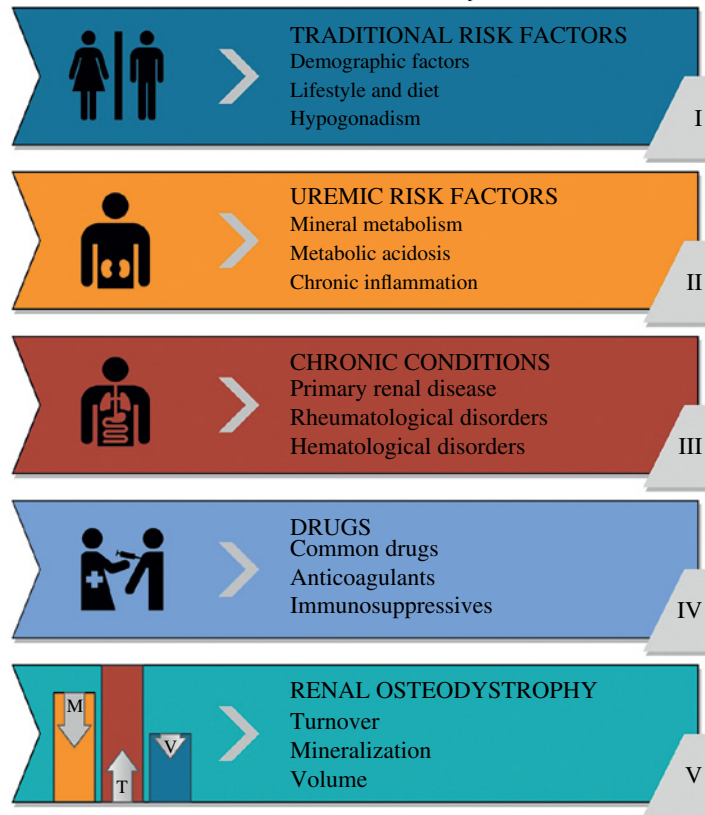


Figure 13.3 Risk factors for osteoporosis in patients with CKD. Choi et al. [41]/with permission of Elsevier.

- Mortality
Death may result directly from the falls or from an illness or resulting disability
- Financial
Personal costs to the patient and family
 - Care costs
 - Home adaptations
 - Emotional cost

After a fall, injuries are common and tend to be more severe as people age. Over half of all falls result in at least a slight injury, such as a bruise, sprained ligament, or strained muscle. More serious injuries include broken bones, torn ligaments, deep cuts and damage to organs such as a kidney or the liver. About 2% of falls result in a broken hip (Figure 13.4). Other bones (in the upper arm, wrist and pelvis) are broken in about 5% of falls. Some falls result in loss of consciousness or a head injury.

Falls can cause even more problems if people cannot get up right away or summon help. Such a situation may be frightening and may make people feel helpless. Remaining on the floor, even for a few hours, can lead to problems such as

- Dehydration
- Low body temperature (hypothermia)
- Pneumonia

Figure 13.4 Intertrochanteric fracture of the left hip. Dr. Joanna Butler © <http://www.medical-artist.com> (2024). Permission granted under licence.



The elderly have reduced bone mass progressing to osteoporosis. Patients who suffer intertrochanteric fractures are usually older than the individuals who suffer femoral neck fractures. They are commoner in women.

Mechanism of injury is a low-trauma, ground level fall.

- Pressure sores
- Rhabdomyolysis (muscle breakdown that can lead to kidney damage or failure)

The effects of a fall may last a long time. About half of people who could walk before they fell and broke a hip cannot walk as well afterwards, even after treatment and rehabilitation. They may never return to their previous level of independence. Approximately 20% enter a care home. One in three people who have long-term pain following a fracture describe it as severe or unbearable. People who have fallen may develop a fear of falling that robs them of their self-confidence. As a result, they may stay at home and give up activities, such as shopping, visiting friends and cleaning. When people become less active, joints can become stiff and muscles can become weak. Stiff joints and weak muscles can further increase the risk of falling and make remaining active and independent more difficult. For many people, falls seem to be an important factor in the decision to move to a care home or an assisted-living facility. For all these reasons, falls can greatly reduce quality of life.

Some falls can be serious and result in death. Death may occur immediately – for example, when the head hits a hard surface and causes uncontrolled bleeding in or around the brain. Much more commonly, death occurs later, resulting from complications of serious injuries caused by the fall. Following a hip fracture, 10% die within 1 month and 33% die within 12 months.

13.9.6 Key Tips for History Taking

- Presenting complaint
 - When, where and how did they fall? Is there pain or suspicion of injury?
- History of presenting complaint
 - Have they fallen before? How many times?
- Past medical history
 - Assess for comorbidities
- Drug history
 - Assess for polypharmacy
 - How many medications are they on?
 - Are there any side effects?
 - Can any be stopped?
- Social history
 - What support do they have? What do they need?
 - Are they a carer?

- Family history
 - What support do they have?
- Systems review
 - Ask about risk factors for falls?
 - Vision, cardiovascular symptoms, balance, mobility, blood pressure, syncopal symptoms, urinary continence, cognitive impairment
- Assess osteoporosis risk – fracture risk assessment tool (FRAX) score

13.10 Appetite and Weight (see also Chapter 6)

The physiological changes that occur with ageing that can impair appetite include changes to the digestive system, hormonal changes, disease, pain, changes to the sense of smell, taste and vision and a decreased need for energy. Changes to the digestive system can contribute to declining appetite. With age, there is a gradual loss of lean body mass from muscle and bone density. As early as age 30, lean body mass drops naturally by around half a kilogramme each year. Unfortunately, the lean weight is often replaced by fat.

13.11 Hearing and Vision

Hearing loss is the most common sensory deficit in the elderly affecting 37% of patients aged 61–70 years and more than 80% of those over 85 years [45]. Patients will often report finding it hard to follow conversations when two or more people are talking. Often they will ask people to repeat what they are saying. Family will often notice the patient has the TV on louder to hear what is being said. Hearing loss is covered, including possible causes, in more detail in Chapter 3. In the elderly, hearing loss will increase social isolation and risk of depression. It is also a factor in falls.

Both conductive and sensorineural deafness may occur in the elderly. Sensorineural deafness occurs more commonly in the elderly, usually due to presbycusis though acoustic neuroma and barotrauma are also causes.

13.11.1 Key Points in the History

- Onset and timeline of the loss
- Is it progressive?
- Unilateral or bilateral
- Associated symptoms
 - Vertigo
 - Tinnitus
- Past history
 - Infection
 - Barotrauma
- Ototoxic medications
 - Loop diuretics
 - Aminoglycosides

13.11.2 Vision

Blindness and visual loss are most common after the age of 50 years. More than 80% of visual loss occurs after this age [46]. By the age of 65, one-third have visual loss. Risk of visual loss increases rapidly in old age more

so for women [47]. The commonest causes are cataract, diabetic retinopathy, macular degeneration and chronic glaucoma. Consequences of visual loss and blindness include:

- Risk of falls
- Cognitive impairment
- Dementia
- Depression
- Disability
- Loss of independence

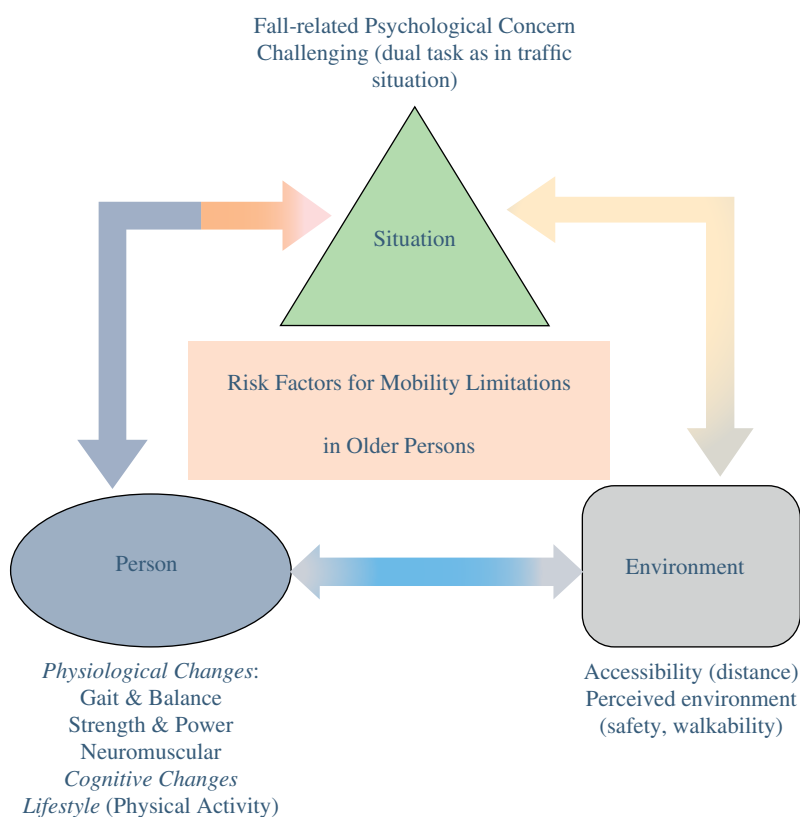
Common changes for older adults include:

- Losing the ability to see up close.
- Having trouble distinguishing colours, such as blue from black.
- Needing more time to adjust to changing levels of light.

13.12 Mobility

Mobility problems include unsteadiness while walking, difficulty getting in and out of a chair, or falls. Mobility problems often occur due to a combination of factors including muscle weakness, joint problems, pain and neurological disorder (Figure 13.5). About 35% of people over 70 years have mobility limitations while over 85 years, the majority of people are affected [48].

Figure 13.5 Interaction of risk factors for mobility limitation in older community-dwelling persons.
Source: Freiburger et al. [48]/Frontiers Media S.A./CC BY 4.0.



A history should be taken to screen for any systemic disorder but also assess for the following: [48]

- Age-related balance and gait changes
- Balance changes with ageing
- Gait changes with ageing
- Age-related changes in muscle mass, strength and power
- Risk factors
 - Mobility and chronic diseases
 - Physical and cognitive risk factors for mobility limitation
 - Psychological risk factors for mobility limitation
 - Sedentary behaviour as a risk for mobility limitation

13.13 Mental Health

Loneliness and social isolation are risk factors for mental health conditions in later life [49]. Around 14% of adults aged over 60 live with a mental disorder [49]. One in six older people experience abuse, often from carers [49]. Mental health disorders account for 10.6% of total years lived with disability for this age group [49] (Table 13.2).

Table 13.2 Signs of mental health problems in older people.

<i>Common conditions</i>
Anxiety
Delirium
Dementia
Depression
Schizophrenia
<i>Early signs</i>
Social withdrawal
Isolation
Worry
Sadness
Feelings of doubt
Sleep disturbance
Sudden change in mood
Irritability
Anger
Loss of appetite
Unintentional weight loss
Substance misuse
Self-harming behaviours

13.14 Sexuality

Sexual health is 'a state of complete physical, mental, emotional and social well-being related with sexuality' [50]. Sexual health is necessary and important for a full life including in older people [51]. Sexual activity in later life is associated with mental and physical well-being, satisfactory relationships and reduced risk of chronic disease [52]. Older adults experience sexual attraction, impulses and desires [53].

13.14.1 Pathophysiology

There are both physiological and psychological barriers to sex in older people. Men experience genital atrophy, decrease in testosterone levels, erectile delay and dysfunction, difficulty maintaining arousal and reduced desire [50]. In women, fall in oestrogen levels following menopause result in decreased lubrication, atrophy of the uterus, cervix and vagina, reduction in breast tissue, and loss of elasticity of vagina and breast [50]. The interest of older adults in sex is related to a positive perspective, openness to experimentation, perception of positive or negative relationships, the number of family members in the social network, well-being, personality traits, depression, anxiety, marital status and length of the relationship [50]. There are negative stereotypes about sexuality in older people [54].

13.14.2 Patient Experience

I've been so long on my own now, I'd stopped thinking about being with anyone. So, it's been a nice surprise to see how things have developed. We've been friends for a long time, but I don't think either of us thought about each other in that way. Not that we mind, we're like 25-year-olds again

People think we're past it, but you forget we grew up in the 60s and 70s....the sexual revolution. You never lose it

It's been a real romance...we've love being together. I never thought I'd be able to marry the love of my life. It was very difficult in the early years....lots of mocking and insults. We've made it through though. I don't think either of us has ever been happier

13.14.3 Evidence Base

Research is historically focused on younger age groups and data in older groups is emerging only recently. Two themes emerge from much of the research: psychological and relational aspects of sexuality (personal meanings and understanding of sex, couplehood and sociocultural aspects) and health and sexuality (effects of illness and/or treatment on sexuality and help-seeking behaviours) [54]. A latent class analysis of data from the National Attitudes and Sexual Lifestyles Survey (Natsal-3) identified four categories among middle-aged and older adults in Britain (Tables 13.3 and 13.4) [55].

While 72% of under-50s are sexually active, this falls to 57% over 60. This was more common in women. Chronic illness does affect sexual function and desire [56]. Few older adults report discussing sex with their doctor [57]. Only half of those with symptoms report having discussed it with a professional [58]. The current older generation came of age in the sexual revolution and permissive society of the 1960s and 1970s. They might be expected to be more open to continuing sexual expression than previous generations. Sexually transmitted infections are increasing among older age groups [59].

Sexual dysfunction in older people is associated with depression, poor relationship with a partner and lower quality of life. Sexual activity may be affected by chronic diseases, incontinence, menopause and andropause [60].

National surveys and sexual attitudes and lifestyles (NATSAL-3) found 27% of men and 21% of women over 65 years reported low sexual functioning [61]. For women, a lack of interest in sex and vaginal dryness were the

Table 13.3 Latent class analysis response for men aged 45 years and over ($n = 1887$).

	Class 1	Class 2	Class 3	Class 4
	Content Caseys (%)	Infrequent Indigos (%)	Low-Functioning Lees (%)	Multiple-Partner Morgans (%)
Class Label	($n = 913$)	($n = 583$)	($n = 218$)	($n = 173$)
Overall class size	48.86	30.94	11.65	8.62
No sex in last four weeks ^a	16.63	99.39	42.48	25.51
Had unsafe sex in past year ^a	0.01	0.01	0.12	68.60
≥2 sex partners in past year ^a	1.24	0.02	5.93	99.89
Diagnosed with any sexually transmitted infection (STI) in the last five years	0.78	0.02	2.34	4.30
Paid for sex in past year ^a	0.14	0.51	1.71	6.43
Low sexual function score	4.55	5.63	98.81	17.17
Dissatisfied with sex life	4.81	32.16	53.78	9.34
Distressed or worried about sex life	1.13	12.19	57.40	7.42

All estimates are unweighted. Probabilities >50% are shown in bold type to indicate items that members of a given class were more likely to report. In naming and characterising the classes, dimensions in which classes differed strongly and a probability of >50% for a certain item were considered an indication that members of a given class were more likely to report that risk factor. The methodology we employed presupposes the existence of discrete latent classes. However, there may be individuals who better fit one or more continuous latent dimensions. The model output expresses the probability of class membership for all individuals for each class as well as the probability of each characteristic given membership of each class. Given each individual had a particular probability of class membership for each class, individuals were assigned to the latent class for which they had the greatest probability of membership. Each class was named after the item that was most prevalent in members of that class.

^a Same and opposite sex.

Source: Khan et al. [55]/BMJ Publishing Group Ltd./CC BY 4.0.

Table 13.4 Latent class analysis response probabilities for women aged 45 years and over ($n = 2653$).

	Class 1	Class 2	Class 3	Class 4
	Content Caseys (%)	Infrequent Indigos (%)	Low-Functioning Lees (%)	Multiple-Partner Morgans (%)
Class Label	($n = 1245$)	($n = 1144$)	($n = 206$)	($n = 58$)
Overall class size	44.91	44.38	8.41	2.30
No sex in last four weeks ^a	23.02	99.98	45.72	41.28
Had unsafe sex in past year ^a	0.01	0.01	0.04	1.74
≥2 sex partners in past year ^a	0.91	0.01	1.65	99.76
Diagnosed with any STI in the last five years	0.30	0.65	0.18	6.27
Paid for sex in past year ^a	0.01	0.10	0.50	0.20
Low sexual function score	6.67	6.36	96.17	37.13
Dissatisfied with sex life	0.61	20.73	66.81	30.55
Distressed or worried about sex life	2.69	6.90	55.49	11.46

All estimates are unweighted. Probabilities >50% are in bold type to indicate items that members of a given class were more likely to report.

^a Same and opposite sex.

Source: Khan et al. [55]/BMJ Publishing Group Ltd./CC BY 4.0.

commonest problems while for men, 30% reported erectile dysfunction and 54% experienced at least one sexual problem lasting more than three months [61].

13.15 Elder Abuse

Elder abuse is 'single or repeated act or lack of appropriate action, occurring within any relationship where there is an expectation of trust which causes harm or distress to an older person' [62]. Prevalence is around 5–10% [63]. Many elders who experience abuse are cognitively impaired, isolated and frail [64]. Pooled prevalences for types of abuse are psychological abuse (11.6%), 6.8% for financial abuse, 4.2% for neglect, 2.6% for physical abuse and 0.9% for sexual abuse [65]. A systematic review of 49 studies identified the following risk factors [66]:

- Older person
 - Cognitive impairment
 - Behavioural problems
 - Psychiatric illness
 - Psychological problems
 - Functional dependency
 - Poor physical health
 - Frailty
 - Low income or wealth
 - Trauma or past abuse
 - Ethnicity
- Perpetrator
 - Caregiver burden or stress
 - Psychiatric illness
 - Psychological problems
- Relationship
 - Family disharmony
 - Poor or conflictual relationships
- Environment
 - Low social support
 - Living with others

13.15.1 Patient Experience

I don't see much of any of them; they come down occasionally but do not stay long. They made me sign this document saying they could collect my pension and then they made me agree to it getting paid into their bank account. I've never seen any of it. They bring me bits and pieces to eat but not every day. I'm losing weight....it's my money. They say they need it for the expense of looking after me, that I cost them too much time and effort, so they deserve it more. One night they came down and took my mobile phone because one of the kids had lost theirs...said I didn't need it...that I don't know anyone to talk to anymore anyway

13.15.2 Key Points in the History

The patient's underlying medical conditions may make a history difficult, and it may also be difficult to obtain information from an independent witness. The patient should still be asked what happened as any information

described may be relevant and useful. A carer who interrupts the patient or attempts to speak on the patient's behalf is a concern. Points to cover are:

- Current level of function – self-care and activities of daily living
- Instrumental activities of daily living (IADL) and dependence on others
- Evidence of injury – this should be combined with physical examination
- Medication review – bruising may be related to patient's medication (e.g. anticoagulants, antiplatelet agents)
- The patient and carer should be interviewed separately

Where there is serious suspicion of abuse, referral to local safeguarding services should be made urgently and a multidisciplinary team meeting arranged.

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14

Functional Symptoms

KEY POINTS

- People often have physical symptoms which don't fit the recognised symptom patterns of a particular medical condition.
- These are referred to as functional symptoms, and historically as medically unexplained symptoms or somatic symptom disorders.
- The patient is not responsible for the lack of a medical explanation.
- The patient is not imaging the symptom and it is not '*all in the mind*'. These symptoms affect the patient's function and quality of life.
- Not understanding the reason for the symptoms is distressing for patients and clinicians

14.1 Introduction

Functional symptoms affect all systems of the body, particularly the neurological, cardiovascular, gastrointestinal, respiratory and rheumatological systems. Research is increasingly beginning, for example in the field of neuro-gastroenterology, to show organic causes which begin to explain how these symptoms occur [1]. In this chapter, we will use the term functional symptoms since the clinician's management of a patient's symptom is always focused on the functional impact of the symptom on the patient's life.

A functional symptom is one without an obvious physical cause. Examples of functional symptoms include:

- Change of bowel habit
- Dyspepsia
- Chest pain
- Heart palpitations
- Breathlessness
- Headaches
- Pains in muscles and/ or joints
- Chronic fatigue

All these symptoms, and others, may also be evidence of a serious disease. Every symptom is important to the patient presenting with it. Many clinicians and students believe functional disorders are wholly psychological and that patients feign their symptoms [2]. A symptom without an obvious physical cause is so because of where medical knowledge is now. Some symptoms occur not due to anatomical change but from the way the body works or physiological dysfunction. We know it is real for the patient from the effect on the patient's functioning. Having no explanation now does not mean there will always be no explanation.

14.2 Burden of Functional Disorders

Functional disorders are common. A large-scale multinational study reported that 40.3% of respondents to internet surveys and 20.7% of those completing household surveys had functional gastrointestinal disorders [3]. Disorders were more prevalent among women than men (OR = 1.7; 95% CI, 1.6–1.7 internet) and (OR = 1.3; 95% CI, 1.3–1.4 household) [3]. Those affected have reduced quality of life and make greater use of health services [3]. Functional neurological disease has significant healthcare costs [4]. Functional symptoms are distressing for patients who may feel deprived of the legitimacy conferred by a diagnosis. There may be functional, social and financial implications of having unexplained symptoms.

14.3 Impact on Patients and Clinicians

A cursory look at the medical literature emphasises the negative connotations of having functional symptoms with the use of descriptors in the discussion such as ‘difficult’ and ‘challenging’ [5]. Attribution of ‘difficult’ to functional disorders is due not so much to individual patients as to the following [6]:

- Experience of diagnosis
- Explaining
- Communication
- Management of conditions
- Clinicians’ own emotional reaction

Doctors struggle with the discordance produced by matching a learnt ideal disease model with the lived experience of patients suffering from illness and distress [7]. Doctors are aware of the need to improve communication with patients, including more attention to the exploration of psychosocial functions and greater patient-centredness (more attention to the reason for the appointment, the patient’s story, the quality of the consultation and shared decision-making) [8]. Being left out of the ‘certainty’ of mainstream modern medicine is extremely distressing. The patient-doctor relationship provides a lifeline. Doctors and patients can have similar experiences of being stuck, unbelieving and distressed by diagnostic uncertainty [7]. Illness models focused solely on organic disease are insufficient. Reframing communication to include social and emotional support for patients is important.

14.4 Ethnicity and Culture

For both functional dyspepsia and irritable bowel syndrome (IBS), symptom presentation and disease subtyping vary between Western and Asian populations [9]. This may relate both to cultural differences in symptom perception and dietary factors. Dietary, including higher levels of fibre, and toileting practices in Asia contribute to reduced prevalence of constipation [9]. Transitions from rural to city diets together with increased psychological stresses in cities contribute to subgroup differences. Attitudes to traditional remedies, anxiety around organic disease, religious practice and quality of healthcare services all influence health-seeking behaviours in Asia [9]. Data on the experience of African American and Hispanic populations is lacking due to under-representation of these groups in clinical trial data [10]. However, there are differences apparent in greater numbers of gastroenterology procedures in non-White populations but fewer outpatient attendance than White patients [10]. A 2006 study in the US reported disparities in prevalence of IBS across ethnic groups with Whites having the highest rates (42%), Black patients (37%) and lowest in Hispanics (21%) [11]. However, there were differences in the application of diagnostic criteria across the groups. Among sufferers of IBS, there are potential referral biases, reduced

opportunities and utilisation of health care which affects ethnic minorities disproportionately [11]. Groups such as migrants and refugees report frequent experiences of negative attitudes from students and doctors [12].

14.4.1 LGBTQ+

Sexual and gender minority (SGM) people face stress and discrimination which place them at risk of greater neuropsychiatric symptoms. Data is limited, but there is evidence of higher prevalence of functional neurological disorder (FND) and other brain-mind-body conditions in this group [13]. Transgender people appear to be over-represented in FND patient populations, but it is too premature to conclude the reasons for this association [14]. However transgender people experience similar stressors and discrimination as other SGM individuals [13].

14.5 When Is it Organic Disease?

Some symptoms are obviously significant or even red flags. Examples include bleeding from any system, unintentional weight loss and night sweats. So, red flags must always be sought both at initial presentation and at follow-up. In primary care, about 10% of symptoms thought to be initially functional or medically unexplained turn out to have an organic cause. Rates are less in the filtered setting of secondary care (as low as 2–3% in neurology clinics) [5].

The risk of functional symptoms is increased by having a physical health condition. A fifth of patients with non-epileptic seizures also have epilepsy. Non-cardiac chest pain (NCCP) is common after myocardial infarction and dysfunctional breathing is often observed in asthmatics [15]. Anxiety and depression are common in this patient group with about 50% affected [15].

14.5.1 Diagnostic Delay [5]

Younger patients are at greatest risk of diagnostic delay. Younger patients also have a higher incidence of functional disorder. Clinicians should consider whether a patient is presenting outside the ‘typical’ age range for a disease (e.g. young person with familial colorectal cancer). In urological, gynaecological and lung cancer diagnostic delay is associated with the patient’s lower educational attainment. Other causes of diagnostic delay include being housebound, multiple co-morbidities and complex ‘background’ symptoms and history. Frequent attendances and seeing multiple clinicians increase the risk of diagnostic delay particularly where symptoms are attributed to level of anxiety and depression.

14.5.2 Sources of Bias

Given the attitudes prevalent among clinicians and students towards functional disorders [2], there is the risk of cognitive errors by clinicians which pre-dispose to diagnostic error and poorer clinical outcomes. Biases may manifest through inadequate history and examination to failure to investigate and follow-up where necessary. These may intersect with biases towards individuals and patient groups based on protected characteristics [16]. These include those discussed in Chapters 1 and 15 (see also Glossary):

- Premature closure
- Anchoring and conservatism
- Availability bias
- Fundamental attribution error
- Representativeness bias
- Visceral bias

14.6 Maintaining Factors

The aetiology of functional symptoms is complex and multi-layered. Once established, symptoms can be difficult to resolve to the satisfaction of both patient and clinician. Factors contributing to the persistence of symptoms fall into four groups (Table 14.1).

‘I can’t believe they can’t or won’t tell me what the problem is; they must know. I can tell there’s something wrong. My grandfather had chest pains like these when he was very young. They plagued him all his life. He never smoked or drank. It didn’t stop him having a heart attack. I haven’t slept properly for months now. Every night I’m awake until 2 or 3. Some nights, I sure I don’t fall asleep. I’m just wondering round the house doing things, cleaning up, cooking, drinking tea. I’ve lost two jobs now due to being off sick so often. My partner keeps on to me. I shouldn’t have shouted in the waiting room like that....I can’t take it anymore. No one is listening to me.’

14.7 Disorders of Gut-Brain Interaction (DGBI)

In disorders of gut–brain interaction (DGBI), alimentary tract symptoms arise from either dysfunctional or anatomically normal organs (e.g. constipation/ diarrhoea) or pain arising or referred to and from those organs (e.g. right upper quadrant pain due to inflammation of the biliary tree) (see also Chapter 4). Many alimentary conditions arise from functional disorders rather than from organic disease. The Rome Foundation has extensively classified and updated these (Table 14.2) [17, 18].

Following the publication of Rome IV diagnostic criteria, DGBI replaces the term Functional gastrointestinal (GI) disorders (FGIDs) [17, 18]. Conception of these disorders is based on a biopsychosocial model [19, 20]. Symptoms are generated through interaction between [17]:

- Microbial dysbiosis within the gut
- Altered immune function
- Altered gut signalling (visceral hypersensitivity)
- Central nervous dysregulation of the modulation of gut signalling and motor function

The Rome IV criteria provide a biopsychosocial model for considering the assessment and management of functional gut disorders. The model is based on research into the ‘brain-gut axis’ and changes in immune function and flora. The Rome IV criteria define both adult functional disorders and functional disorders of childhood [18]. Common DGBI disorders include [21]:

- Functional dyspepsia
- Irritable bowel syndrome (IBS)
- Functional abdominal bloating

Table 14.1 Maintaining factors for persistent functional symptoms.

-
- Physiological – autonomic dysregulation, central sensitisation, hypothalamic-pituitary-adrenal (HPA) axis dysfunction and sleep disturbance
 - Social: effect on self-esteem, family, relationships, employment and financial; medical uncertainty
 - Cognitive – serious misappraisal of the meaning of symptoms, focussing on symptoms; discomfort with uncertainty
 - Behaviour – avoidance, ‘all or nothing’ behaviours, poor sleep practices
-

Source: Adapted from Husain and Chalder [15]

Table 14.2 Adult disorders of gut-brain interaction (DGBI) – Rome IV.

<i>Oesophageal disorders</i>	<i>Centrally mediated disorders of abdominal pain</i>
• Functional chest pain • Functional heartburn • Reflux hypersensitivity • Globus • Functional dysphagia	• Centrally mediated abdominal pain syndrome (CAPS) • Narcotic bowel syndrome
<i>Gallbladder and Sphincter of Oddi disorders</i>	<i>Gastroduodenal disorders</i>
• Biliary pain • Functional gallbladder disorder • Functional biliary SO disorder • Functional pancreatic SO disorder	• Functional dyspepsia (postprandial distress syndrome [PDS]/epigastric pain syndrome [EPS]) • Belching disorders • Nausea and vomiting disorders • Chronic nausea/vomiting disorders • Cyclic vomiting disorders • Cannabinoid hyperemesis syndrome • Rumination syndrome
<i>Anorectal disorders</i>	<i>Bowel disorders</i>
• Faecal incontinence • Functional anorectal pain • Levator ani syndrome • Proctalgia fugax • Functional defaecation disorder • Dyssynergic defaecation	• Irritable bowel syndrome • Functional constipation • Functional diarrhoea • Functional abdominal bloating/distension • Unspecified functional bowel • Opioid-induced constipation

Source: Adapted from Drossman and Hasler [17].

- Functional constipation (FC)
- Functional diarrhoea (FD)
- Unspecified functional bowel disorder

Symptoms may be acute or chronic and there may be overlap in the patient experience and clinical features of disorders [21].

14.7.1 Natural History of DGBIs

Historically, the natural history of functional gastrointestinal disorders (DGBIs) has been poorly defined due to a lack of prospective population-based studies [22]. In addition, there have been varying and changing diagnostic criteria. This has made diagnosis and predicting the course of symptoms difficult. DGBIs are found in all regions of the world, though prevalence varies across regions based on area, culture, ethnicity, gender, age and case definition (Table 14.3) [23–26]. Community surveys in the United States report prevalences of 9–22% for IBS and 2.5–41% for functional dyspepsia [27, 28]. More than one-third of the population may have a DGBI at a given time [29]. The prevalence of abdominal pain and IBS is stable over time though this is not due to chronicity of symptoms but resolution of symptoms in some individuals and new-onset symptoms in others [23, 30]. Females may be more likely to develop symptoms or increase the range of symptoms over time [22, 31]. The prevalence is lower in over 50-year-olds than under 50s [31].

Table 14.3 Community prevalences of common DGBI (IBS and dyspepsia) [23–26].

Study	IBS (%)	Dyspepsia (%)
Iceland/Olmsted County	16.9–17.2	4.8–6.1
Japan	9.1	—
Taiwan	4.4	5.3
India	2.7	8.3

The prevalence of DGBIs is stable over time. Symptom disappearance may be due to a change in individuals' functional symptoms rather than total symptom resolution [22]. Functional gastrointestinal disorders may not be distinct entities and overlap of any two of the defined disorders may affect between 4% and 9% of the population [32].

Among people with DGBIs, one-fifth have stable symptoms, two-fifths have symptom disappearance while two-fifths report symptoms of another condition a decade later [22]. DGBIs are likely to have a common pathogenesis. Despite this extensive classification, most functional gut disorders fall into the categories of functional dyspepsia or IBS. We will concentrate on these in this discussion.

Symptom rate at onset is diarrhoea at 7.0%, constipation 3.9% and 5.1% for dyspepsia. Twenty-four per cent of participants free of abdominal pain at the beginning of one survey had developed it by the end [22].

Data from the UK, suggest high rates of DGBI with particularly high levels of faecal incontinence, opioid-induced constipation, chronic nausea and vomiting, and cannabinoid hyperemesis compared to 25 other countries ($p < 0.05$) [33]. UK meat and milk consumption is higher ($p < 0.001$) while dietary rice, fruit, eggs, tofu, pasta, vegetables and fish are lower ($p < 0.001$) [33].

14.7.2 Pathophysiology

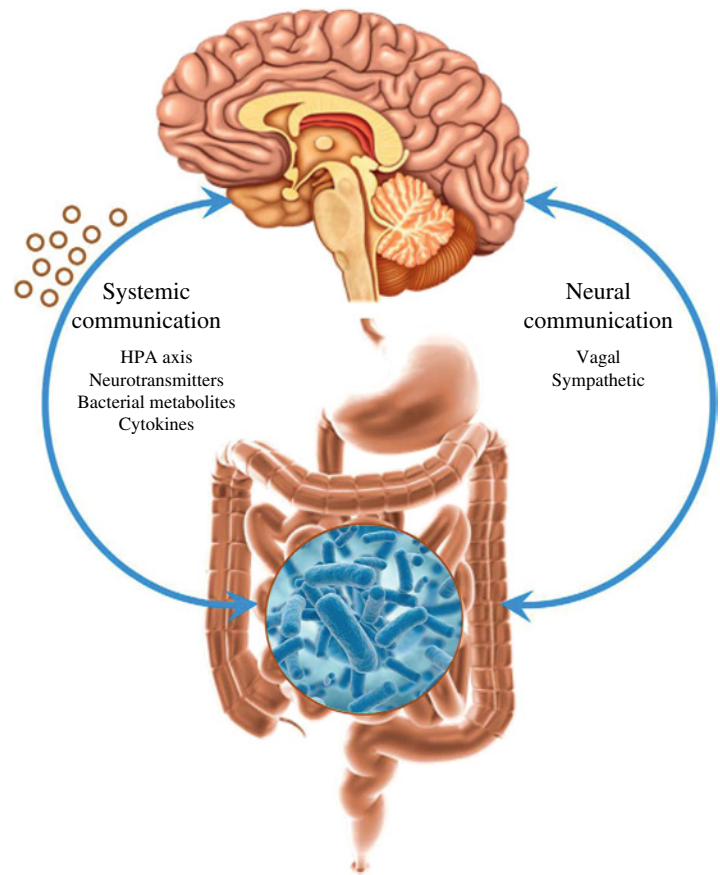
There is evidence of involvement of the following mechanisms:

- Gut-brain axis
- Chronic infection
- Genetic
- Environment
 - Diet
 - Gut microbiome
 - Use of antibiotics

14.8 The Gut-Brain Axis

The gut-brain axis is comprised of the enteric nervous system (ENS), the central nervous system (CNS), the peripheral nervous system in the gut wall and the hypothalamo-pituitary-adrenal (HPA) axis (Figure 14.1) [35]. Communication between the gut and the CNS is bidirectional and occurs via neural, hormonal and neuroimmune pathways. The vagus nerve influences secretion, motility, delivery of nutrients, microbial balance and immune function [35]. Physiologically, signals from the gut affect the brain resulting in changes to immune function, secretion and motility. These affect mood, behaviour, stress and anxiety, and the secretion of

Figure 14.1 The gut-brain axis (GBA). *Source:* Mayer et al. [34]/Society for Neuroscience



neurotransmitters [35]. The gut-brain axis regulates food intake, digestion and sensation of adequate control of gut and bowel movements. Functional disruption of the axis can alter the CNS responses resulting in functional gut disorders (Figure 14.2) [36].

14.8.1 The Enteric Nervous System (ENS)

The ENS is the largest component of the autonomic nervous system. It extends from the lower third of the oesophagus to the rectum. Intrinsic microcircuits enable it to facilitate gastrointestinal function independently of the CNS. It consists of sensory, motor and interneurons embedded in the gut wall (submucosal and myenteric plexuses). The ENS optimises the muscular and secretory activity of the GI. It exhibits learning in response to changing dietary habits or disruptions to the gut (e.g. infection).

14.8.2 Gut Biome

The microbiota in the gut weighs 1–2 kg (about the same as an adult human brain) [37]. The gut biome consists of genetic material of bacteria, viruses and fungi. There are an estimated 100 trillion organisms which co-exist with pathogens [37]. The gut biome regulates the immune and endocrine systems and influences brain, development and interacts with the enteric and CNS via the gut-brain axis. Gut bacteria produce and/ or consume a wide range of mammalian neurotransmitters [38]:

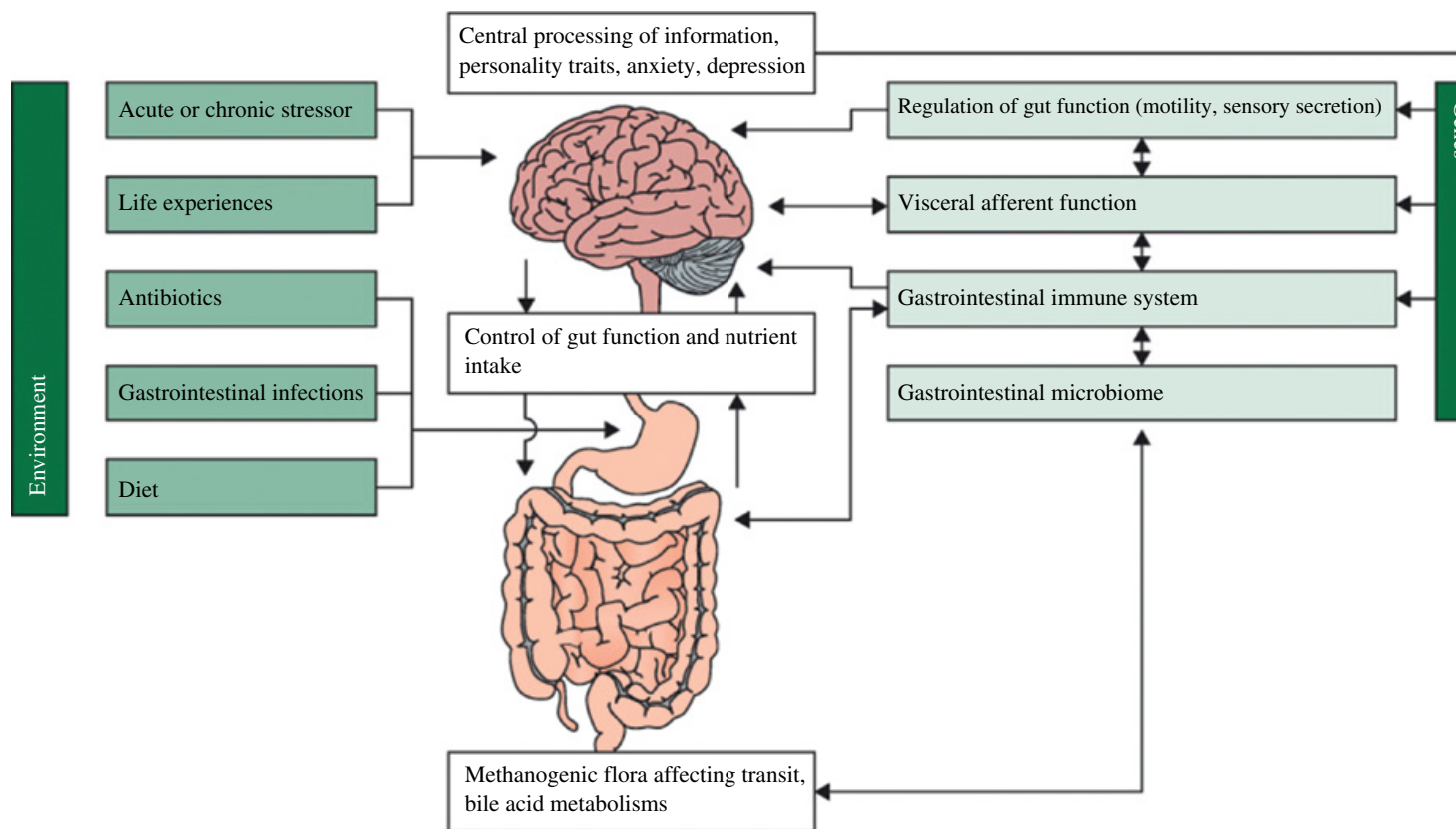


Figure 14.2 Potential factors determining the manifestation of irritable bowel symptoms. *Source:* Holtmann et al. [36]/with permission of Elsevier

- 70% of serotonin is produced by the gut microbiota
- GABA, dopamine, acetylcholine and noradrenaline are all made by gut bacteria
- Microbiota-based interventions can also alter neurotransmitter levels

Brain function depends, particularly in neonates and elderly people, on the metabolic products of gut microbes [34]. Immune signalling between the CNS and gut helps maintain the health of both. Disturbance of the gut-brain axis facilitates functional disorders of the gastrointestinal tracts (Figure 14.3) [39].

14.9 Irritable Bowel Syndrome (IBS)

The diagnostic criteria for IBS were amended on the publication of Rome IV in 2016 (Table 14.4 and Figure 14.4) [17, 18]. Rome IV has removed abdominal discomfort as a criterion; the frequency of abdominal pain has been increased to occurring at least once per week. The diagnostic criteria should be applied alongside the Bristol stool chart.

14.9.1 Patient Experience

I'm 33-years-old now and I've had these grumbling problems in my tummy over the past couple of years. I had some diarrhoea after a BBQ to celebrate the end of lockdown in summer 2022. I don't get it all the time. It comes and goes.... it's worse at times. I used to open my bowels regularly each morning. Now it is very variable and can

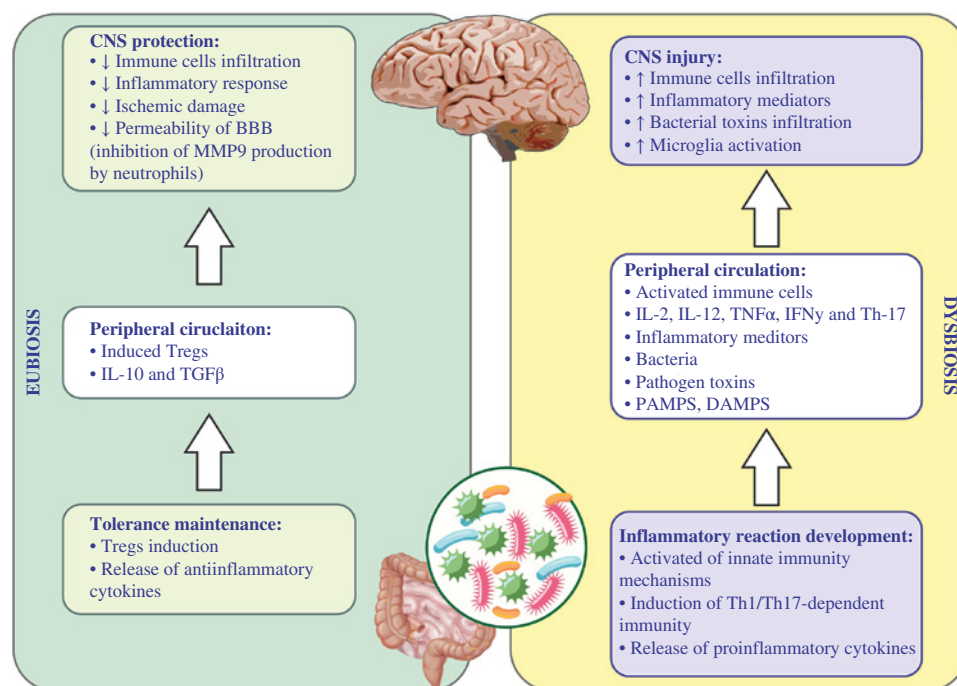


Figure 14.3 Immune signalling between gut microbiota and central nervous system during eubiosis and dysbiosis. Source: Kasarello et al. [39]/Frontiers Media S.A./CC BY 4.0.

Table 14.4 Diagnostic criteria for irritable bowel syndrome – Rome IV [18].

Irritable bowel syndrome

Diagnostic criteria^a

Recurrent abdominal pain on average at least one day/week in last three months associated with two or more of the following criteria:

Related to defaecation

Associated with a change in frequency of stool

Associated with a change in form (appearance of stool)

Diagnostic criteria for IBS subtypes

IBS with predominant constipation (IBS-C)

>(25%) of abnormal bowel movements with Bristol stool types 1 or 2 and <(25%) of bowel movements with Bristol stool types 6 or 7

Patient says: 'My abnormal bowel movements are usually constipation' (Type 1 or 2 on Bristol stool chart)

IBS with predominant diarrhoea (IBS-D)

>(25%) of abnormal bowel movements with Bristol stool types 6 and 7 and <(25%) bowel movements with Bristol stool types 1 or 2.

Patient says: 'My abnormal bowel movements are usually diarrhoea' (Type 6 or 7 on Bristol stool chart)

IBS with mixed bowel habits (IBS-M)

>(25%) of abnormal bowel movements with Bristol stool types 1 or 2 and >(25%) of bowel movements with Bristol stool types 6 or 7.

Patient says: 'My abnormal bowel movements are usually both constipation and diarrhoea' (patient should indicate combination of stool types on Bristol stool chart)

IBS Unclassified (IBS-U)

Patients who meet diagnostic criteria for IBS but whose bowel habits cannot be accurately categorised into 1 of the 3 groups above should be categorised as IBS-U

Patient says: 'I rarely have abnormal stools of constipation or diarrhoea'

^a Patient should be shown the Bristol stool chart when describing their stools.

Source: Adapted from Rome Foundation [18].

THE BRISTOL STOOL FORM SCALE

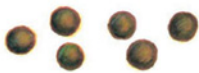
Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on its surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges (passed easily)
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces ENTIRELY LIQUID

Figure 14.4 The Bristol Stool chart. Source: Blake et al. [76]/with permission of John Wiley & Sons.

be 2–3 times daily. At other times I'm constipated and have to use laxatives. Of course, this makes me loose again. I feel more bloated and get more wind than I used to.....the bloating is worse when my bowels are playing up.

14.9.2 Evidence Base

Estimates of UK prevalence of IBS have been as high as 20%. Under the Rome IV criteria, prevalence is currently 4.3%, comparable to other countries [33]. About a third of these patients visit their doctor about their symptoms. It can occur at any age with prevalence being highest in the third and fourth decades and in women more than men. IBS impacts both work and social activity for many patients. Levels of impact are comparable with conditions like diabetes and depression. Patients with moderate to severe IBS symptoms experience diminished quality of life [40]. For 10%, IBS may follow an episode of bacterial gastroenteritis (usually diarrhoea predominant subtype).

IBS comprises a range of symptoms which vary and fluctuate over time. The main symptoms are characterised by pain or discomfort and change in bowel habit. Symptoms can originate from anywhere within the alimentary tract. Patients may also experience non-alimentary symptoms including fatigue, urinary symptoms and headache. Three main subtypes have been described – 'diarrhoea predominant', 'constipation predominant', 'alternating symptoms'. These are reflected in the diagnostic criteria.

Patients with IBS may not consult a clinician because they feel their symptoms are not sufficiently serious or because they are worried about it being a serious illness [41, 42].

14.9.3 Key Points in the History

Areas of enquiry should include:

- Bowel habits
 - Constipation
 - Diarrhoea
 - Flatulence
- Dyspepsia
- Fatigue
- Nausea
- Backache
- FH history of inflammatory bowel disease
- FH of colon cancer
- Red flags and risk factors

Diagnosis is safe if red flag symptoms are absent (see Chapter 5), the patient has had similar symptoms before and the history is consistent with IBS. Presence of any red flags or any abnormality in the physical examination requires further investigation. The age and gender of the patient should also be considered.

14.10 Functional Dyspepsia

Functional dyspepsia is the most commonly occurring DGBI [43]. Dyspepsia suggests pain or discomfort in the upper abdomen. However, there is often variation in how patients describe this symptom and what they mean by this term. Similarly, there is variation in clinicians' own understanding of the term [44]. Since the important differentials for functional dyspepsia includes gastro-oesophageal cancer, it is essential to establish what the patient means by the description of the symptom and work with that definition:

'So, you say you've got [insert patient's words] what exactly do you mean by that? Can you describe what you are feeling when it occurs?'

14.10.1 Anatomical Site

These symptoms localise to the distal oesophagus, stomach and duodenum.

14.10.2 Pathophysiology

As with IBS, evidence is emerging of possible mechanism for the onset of this symptom complex including [45, 46]:

- Gastric neuromuscular dysfunction
- Altered visceral sensitivity
- Duodenal acid exposure, dysmotility and inflammation
- Psychological distress
- Immune function, inflammation and epithelial permeability
- The microbiome

14.10.3 Patient Experience

These are repeated symptoms of upper abdominal disturbance:

It's been going on for years now; I think most of my adult life. I've had lots of tests in the past but they're always normal. I've changed my diet many times – blander, sloppier food. Stopping alcohol has helped a bit, probably not enough to make it worthwhile. It's not all the time. . . it comes and goes. When it happens, I quickly feel full and then bloated. I can get a burning sensation in my stomach even just thinking about eating. If I feel very full and bloated, I make myself belch to relieve the pressure otherwise I think it could be dangerous. My weight and appetite are fine.

14.10.4 Evidence Base

The Rome IV criteria for functional dyspepsia are shown in Table 14.5:

Dyspepsia affects 20–40% of people in the UK and accounts for 1.2–4% of all GP consultations [47]. Thirty-eight per cent have postprandial distress syndrome, 27% have epigastric pain syndrome and 35% have both forms [48].

Table 14.5 Diagnostic criteria for function dyspepsia – Rome IV.

• Presence of one or more symptoms of postprandial fullness, early satiety, epigastric pain, or epigastric burning • No evidence of structural disease which could explain the symptoms	
<i>PDS</i>	<i>EPS</i>
Postprandial fullness or early satiety three or more days per week for the past three months and onset six or more months before diagnosis	Epigastric pain and/or burning one or more days per week for the past three months and onset six or more months before diagnosis
<i>Symptoms</i>	<i>Symptoms</i>
Early satiety	Epigastric pain
Bloating	Epigastric burning
Nausea	
Vomiting/retching	
Decreased appetite	

Source: Adapted from Rome Foundation [18].

About half are diagnosed with functional dyspepsia. Most people do not see their GP but instead, self-manage with lifestyle and over-the-counter medication. Associated symptoms include depression, anxiety and psychological distress. Most dyspepsia resolves within a few months.

Assessing patients with dyspepsia should include consideration of other diagnoses including peptic ulcer disease, *H. pylori*, gastro-oesophageal reflux and cancer. No pattern of symptoms reliably predicts functional dyspepsia. Patient descriptions include:

- Early fullness
- Postprandial fullness
- Epigastric pain
- Epigastric burning
- Bloating
- Belching

It can be appreciated these symptoms may also be the presenting features of organic conditions including cancer. This emphasises the need for an initially broad differential diagnosis. Trial of time, of treatment, negative investigation results and stable symptoms may all be helpful at follow-up in excluding serious organic disease. Many patients have associated symptoms of an irritable bowel, gastroparesis and gastro-oesophageal reflux [47]. Endoscopy is normal in around 70% of those investigated [45]. Fifty to sixty per cent will be given a diagnosis of functional dyspepsia [45].

The history should be explored using open and closed questions as discussed in Chapters 1 and 5. Screening for red flags is essential. Weight loss is common in functional dyspepsia and may be considered a red flag given the age and context of the patient [46].

14.10.5 Red Flag Symptoms

UK NICE alarm symptoms are:

- Dysphagia at any age
- Age 55 years and over and any two of the following:
 - Dyspepsia
 - Upper abdominal pain
 - Reflux
- Referral criteria for assessment of possible gastro-oesophageal cancer:
 - Haematemesis
 - Age 55 years and over with:
 - Treatment resistant dyspepsia
 - Dyspepsia with nausea or vomiting or raised platelet count
 - Upper abdominal pain with low haemoglobin, raised platelet count or nausea or vomiting
 - Reflux with raised platelet count, or nausea or vomiting
 - Nausea or vomiting with any of the following: weight loss, reflux, dyspepsia, or abdominal pain

14.11 Functional Cardiovascular Symptoms

Chest pain, breathlessness and palpitations can be associated both with functional disorder and separately as manifestations of life-threatening disease. They commonly overlap but can also occur separately (see Chapter 4). Here, we will consider further aspects relevant to the history where the diagnosis may be a functional disorder.

14.11.1 Model for the Pathogenesis of Functional Cardiovascular Disorders

The cardiovascular symptoms associated with functional disorders at any age are [49]:

- Non-cardiac chest pain (NCCP)
- Palpitations
- Breathlessness
- Blackouts (syncope)

Patients may present with one symptom or with multiple symptoms (including across systems). Models combining both biomedical and psychosocial factors for the development of functional cardiovascular symptoms are likely to be most accurate (Figure 14.5) [49].

14.11.2 Patient Experience

I've been getting chest pains over the last couple of months. They are happening more often. The pain is intense and goes right across the front of my chest. It is sharp and spreads from one side to the other. Sometimes it can last the whole day. It doesn't often stop me doing anything. When I get into bed at night, I notice sometimes my heart is beating fast.

There are high levels of patient dissatisfaction with the outcome of investigation with half of patients not convinced by negative results [50]. Many patients continue to experience chest pain immediately following testing with the mean duration of ongoing pain being 5.4 months [50].

14.11.3 Evidence Base

Around half of the patients referred to chest pain clinics have NCCP [50]. Functional symptoms may account for 30–40% of all presentations in cardiology clinics and 3–10% of all functional symptoms presenting in primary care.

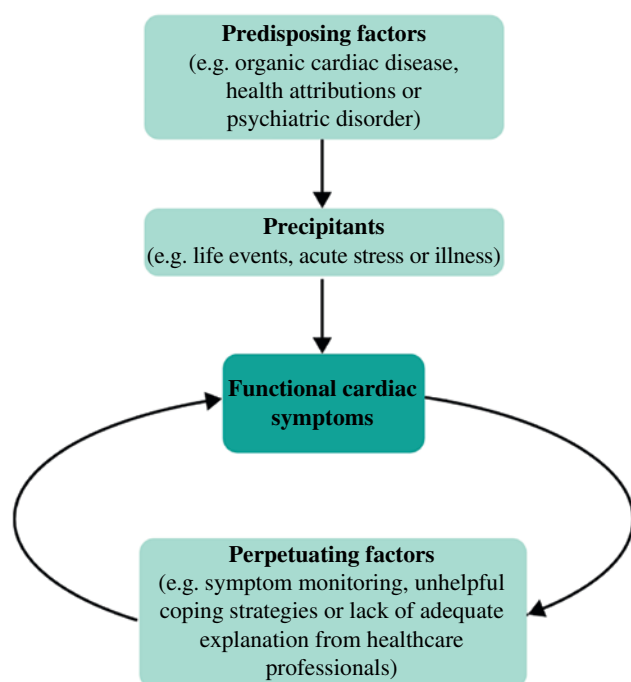


Figure 14.5 Model for the pathogenesis of functional cardiac disorders. *Source:* Rogers et al. [49]/with permission of Elsevier.

14.11.3.1 Non-cardiac Chest Pain (NCCP)

NCCP is defined as angina-like pain without evidence of coronary heart disease [49]. The pathogenesis is unclear. The exact cause of chest pain in patients with normal coronary arteries remains contentious. Most patients have a mix of dysfunctional small vessel perfusion and heightened awareness.

Increased sensitivity to pressure and pain in the oesophagus has been described [51]. NCCP has a one-year prevalence of 14% and accounts for up to 61% of adult presentations to the emergency department [52, 53]. It is common in younger adults (no significant gender difference) [49]. It is important to consider coronary heart disease in older patients, particularly where risk factors are present.

The lifetime incidence of chest pain in primary care is 20–40% with an annual incidence of around 1% [5]. Patients with NCCP are a heterogeneous group and around 40% of patients have co-existing coronary heart disease [54]. This group have a poorer prognosis than NCCP without coronary heart disease (CHD) [54]. Smaller numbers prove to have cancer or other serious diseases. It is important to look for changes in the clinical picture. This includes the explanation of red flags for the patient to present again as part of safety-netting.

History-taking should assess the probability of cardiac or pulmonary disease. Low-risk chest pain tends to be either intense or transient, often lasting only a few seconds. It may persist over several days with little variation. There is no distinct relationship between effort and rest. Possible descriptors used by patients include ‘sharp’ or ‘like a knife going in’ [5]. Relationship to exercise, breathing and rest should be assessed in the history.

Gastro-oesophageal reflux may be present in up to 67% of patients with NCCP while frequency of heartburn is a risk factor for NCCP [54]. Low-risk patients with associated symptoms of panic, anxiety and depression occur in about 10% of chest pain in primary care. Ongoing pain may be experienced by up to 90% of patients four years later with female sex and total number of symptoms predictors of ongoing symptoms [55, 56].

14.11.3.2 Palpitations

The prevalence of palpitations in primary care is 0.5% per year [5]. While one-third of these patients will have a detectable arrhythmia, not all will be clinically important [5]. The incidence of significant arrhythmia increases with age.

Most functional palpitations are either sinus tachycardia or awareness of the heart rate. This is experienced as a fast heart rate, missed beats or as pounding in the chest. Rhythm disturbance (one or two beats), a regular rate of less than 100/min and a pounding sensation in the chest all suggest functional symptoms. No single feature is diagnostic of functional disorder. Important domains to explore in the history are:

- Does the patient have any cardiovascular risk factors?
- Are any of the patient’s palpitations?
 - Suggestive of ischaemic pain (related to exertion, relieved by rest)
 - Suggestive of impaired cardiac output (e.g. breathlessness on exercise).

Though not always possible, the patient should be interviewed and examined during the palpitations. Minor palpitations due to ectopic beats are associated with anxiety disorders. In very low-risk patients, palpitations last less than five minutes and don’t occur at work or when asleep [5].

14.12 Functional Respiratory Symptoms

14.12.1 Breathing Pattern Disorder

Research is lacking on the pathophysiology, symptoms and classification of this disorder [57]. Confusion regarding nomenclature and case definition makes it a challenging diagnosis for clinicians [58]. There is no gold standard diagnostic method [59]. It may be defined as ‘an alteration in the normal biomechanical patterns of breathing resulting in intermittent or chronic symptoms which may be respiratory and/ or non-respiratory’ [60].

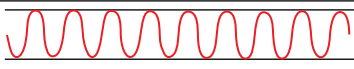
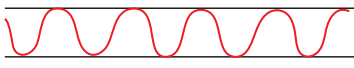
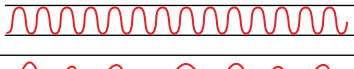
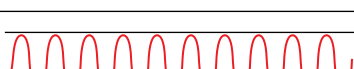
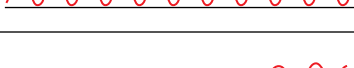
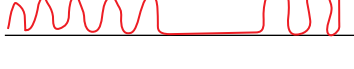
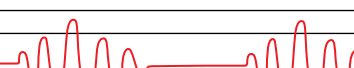
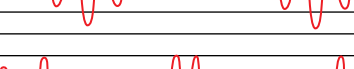
	Definition	Graphic Representation
Eupnea	Normal, breathing at 12–18 breaths/minute	
Bradypnea	Slower than normal rate (<10 breaths/minute), with normal depth and regular rhythm	
Tachypnea	Rapid, shallow breathing >24 breaths/minute	
Hypoventilation	Shallow, irregular breathing	
Hyperventilation	Increased rate and depth of breathing (called Kussmaul's respiration if caused by diabetic ketoacidosis)	
Apnea	Period of cessation of breathing. Time duration varies; apnea may occur briefly during other breathing disorders, such as with sleep apnea. Life threatening if sustained.	
Cheyne-Stokes	Regular cycle where the rate and depth of breathing increase, then decrease until apnea (usually about 20 seconds) occurs.	
Biot's respiration	Periods of normal breathing (3–4 breaths) followed by a varying period of apnea (usually 10 seconds to 1 minute).	

Figure 14.6 Patterns of variation in breathing. *Source:* Journal of Engineering Research and Sciences (2022) 1:36–44/CC BY SA 4.0.

14.12.2 Models of Pathology in Breathing Pattern Disorder

In dysfunctional breathing, breathlessness occurs in the absence of, or disproportionately to, established respiratory disease. These breathing patterns may occur in respiratory disease but when occurring in the absence of respiratory disease they may be part of a functional disorder. The most clearly defined functional disorder of breathing is hyperventilation syndrome (HVS). Though it may be caused by organic conditions, HVS is caused mainly by psychosocial factors including anxiety, depression, perfectionism and feelings of inferiority [61]. HVS occurs as either acute or chronic hyperventilation (increased minute volume) at rest or during exercise or stress (Figures 14.6 and 14.7) [61].

14.12.3 Patient Experience

A 25-year-old man presents to A&E on a Friday evening with difficulty breathing. He has a history of asthma since childhood and IBS was diagnosed 18 months ago. He was admitted with Covid-19 in December 2022. Since then, he has had several A&E attendances and hospital attendances with difficulty breathing. He is currently on the maximum recommended treatment for his asthma.

Public knowledge of cardiovascular and respiratory symptoms is widespread. Even if understanding is not wholly accurate, the layperson understands the heart's importance to life. Symptoms from the cardiorespiratory systems can be very frightening. Whether symptoms are organic or functional, they are often associated with depression and anxiety which may also require management.

14.12.4 Evidence Base

Assessment for Breathing Pattern disorder should be made once organic disease has been excluded and the efficacy of asthma/chronic obstructive pulmonary disease (COPD) treatment has been assessed. The Nijmegen Questionnaire is used widely for identifying affected individuals. Originally developed to screen for HVS, the questionnaire includes questions on physiological and psychological factors [62], and has sensitivity and specificity of 91% and 95%, respectively. It is validated for HVS in asthma but not for breathing pattern disorder more widely (Figure 14.8) [63]. A proposed classification of dysfunctional breathing includes Table 14.6 [59].

Many patients with lung disease have dysfunctional pattern breathing. Patients may present with hyperventilation with panic attacks. Stopping for breath, unusual breaths or sighs may be signs [5]. Breathlessness brought on by deeper breathing is likely to indicate dysfunctional breathing. A perception of breathlessness is common in patients with functional disorders. Shortness of breath is one of the items on the PHQ15 tool [64]. It is a common cause of limited capacity in patients with multiple functional symptoms.

Breathing Pattern Disorder (BPD) should be considered in patients where breathlessness is at odds with clinical findings. It may occur in patients with asthma, COPD or NCCP where symptoms and signs are disproportionate to clinical signs and symptoms [5]. Life-threatening conditions may appear in the same way. Functional breathlessness

Primary dysfunctional breathing

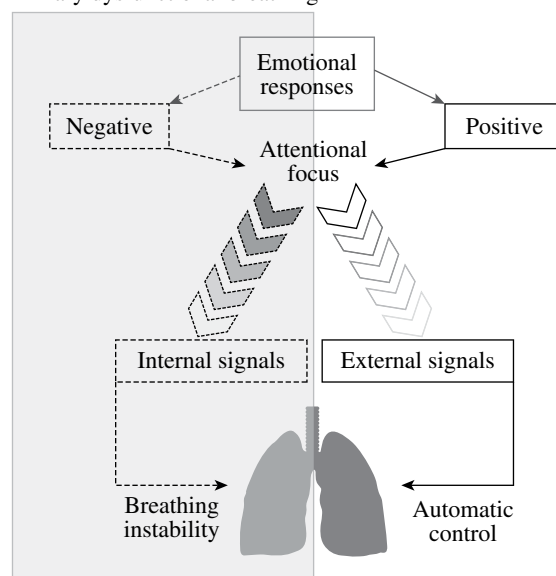


Figure 14.7 Model for effect of attentional mechanisms on breathing. Source: Vidotto et al. [77].

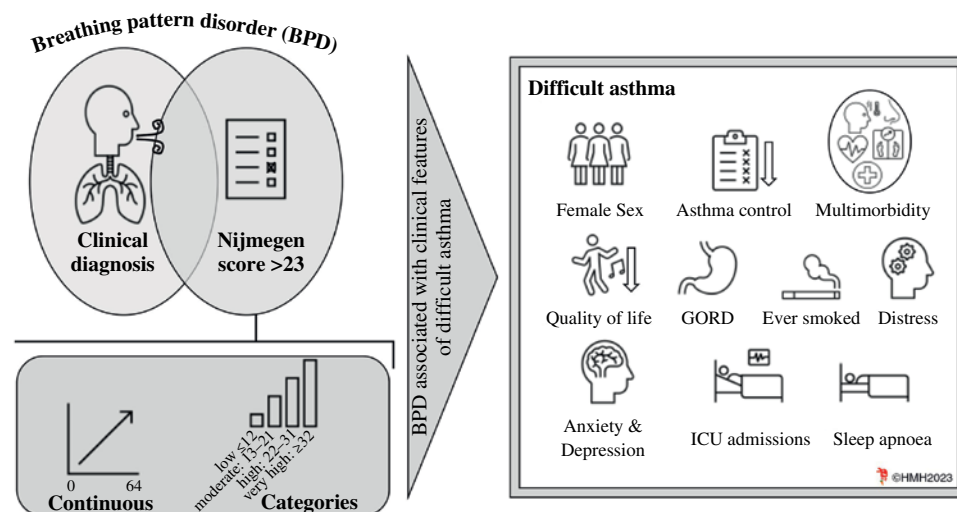


Figure 14.8 Breathing pattern disorder and difficult asthma. Source: Freeman et al. [63]/with permission of Elsevier.

Table 14.6 Proposed classification of breathing pattern disorders based on published evidence.

Breathing Pattern	Number of Papers	Key References	Linked Conditions
Hyperventilation syndrome	43	[1, 2, 5, 15]	Asthma Panic disorder
Periodic deep sighing	12	[8, 9, 45–47]	Asthma Panic disorder
Thoracic dominant breathing	4	[11, 47–49]	Asthma COPD Heart failure Panic disorder
Forced abdominal expiration	2	[50, 51]	COPD
Thoraco-abdominal asynchrony	6	[52–54]	Obstruction Neuromuscular disease Respiratory failure

COPD, chronic obstructive pulmonary disease.

Source: Adapted from Boulding et al. [59]. Reproduced with permission of the © ERS 2024.

is associated with light-headedness, less often with pins and needles. Carpo-pedal spasm is rare and its absence does not rule out hyperventilation/ dysfunctional breathing.

14.13 Functional Neurological Disorder (FND)

FND is a group of neurological movement disorders due to an abnormality in the function of the brain [65, 66]. Historically, it was referred to as ‘conversion disorder’ (Sigmund Freud) as he believed a psychological disorder had converted to a physical one. Diagnostic criteria for FND as defined by DSM V state it should be a rule-in diagnosis based on history, examination and investigation results [67]. Psychological stressors should be noted only once the diagnosis has been made [67].

14.13.1 Pathophysiology

Research in neurobiology characterises the condition as resulting from dysfunction within and across several brain networks (Figure 14.9) [68].

14.13.2 Patient Experience

‘One side of my body feels weak. It came on suddenly when I was lying in bed. I got up and walked around to try and make the feeling go away. My right side feels as though it doesn’t belong to me. My face feels sort of numb. Sometimes I drop things. I can be standing up and suddenly my knee will give way on me. I have to grab something, so I don’t fall. When I’m tired the whole of my right side can ache. I’ve found it difficult to concentrate at work’.

14.13.3 Evidence Base

14.13.3.1 Incidence and Prevalence of FND

Motor FND (abnormal movements and weakness) has an incidence of 4–5/100 000 per year and seizure type FND (psychogenic non-epileptic or dissociative seizures) 1.5–4.9/100 000 per year [65, 66, 69, 70]. It is more

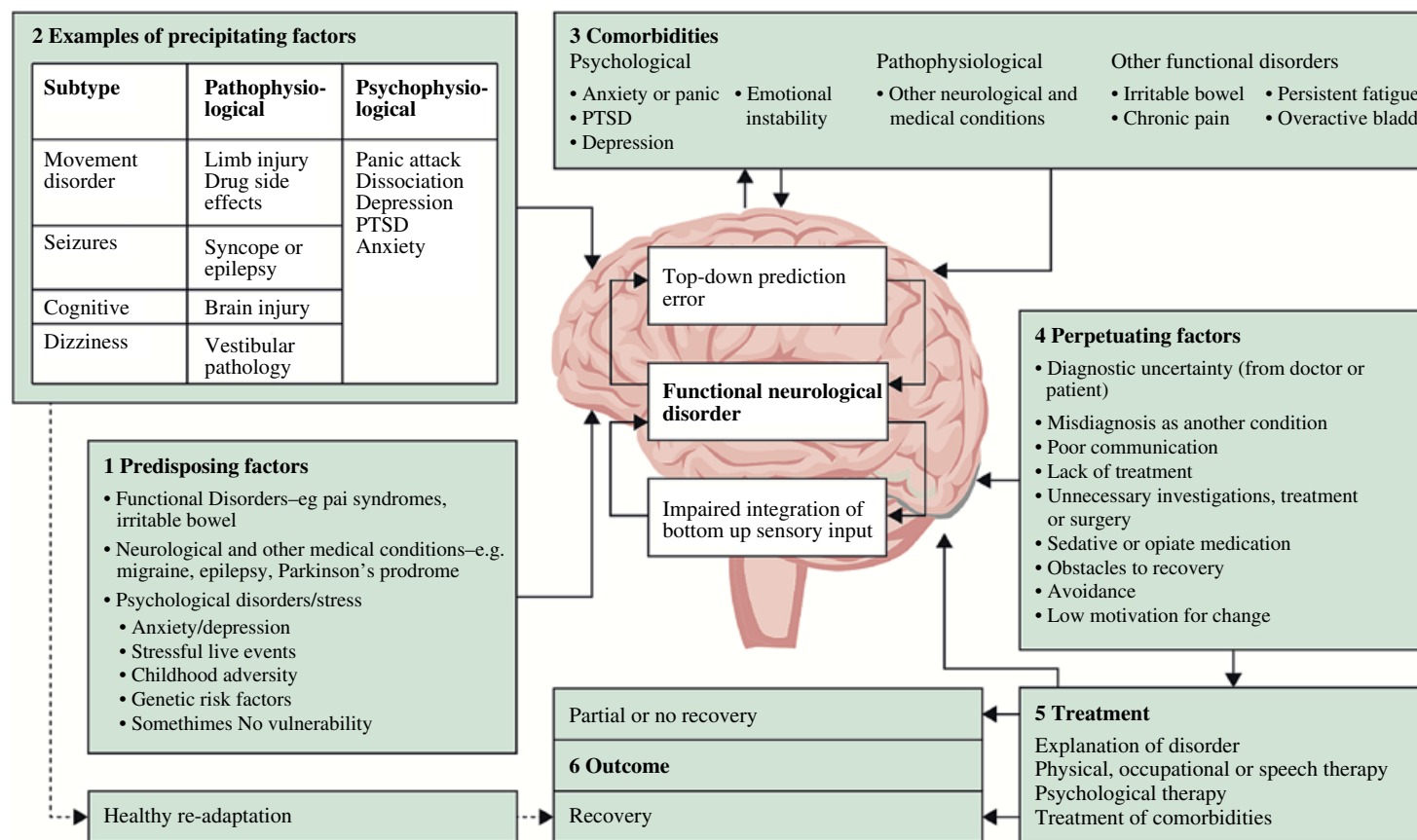


Figure 14.9 Pathophysiology and psychophysiological events that might trigger functional neurological disorder. *Source:* Hallett et al. [68]/with permission of Elsevier.

Table 14.7 Diagnosis criteria for functional neurological disorder (FND).

	DSM-V	Comment
Motor or sensory symptom. . .	Yes	Includes limb weakness, movement disorder, gait, blackouts, vision, speech, and hearing symptoms. Not pain, fatigue, dizziness, or memory symptoms
Causing distress or difficulty to the patient	Yes	
Positive physical signs of internal inconsistency or incongruity with recognised disease	Yes	Not a diagnosis of exclusion. Emphasises how these disorders should be diagnosed
Patient must have an identifiable psychological stressor	No	Often not present
Intentional feigning must be excluded	No	This applies to all psychiatric disorders. It is impossible to exclude feigning

Source: Stone et al. [75]/Oxford University Press.

common in young people and has a poor prognosis in many patients [67]. Though it may occur at any age, it is rare before 10 years.

14.13.3.2 Diagnosis

The diagnostic criteria for FND are in Table 14.7 [66].

Category A of DSM-5 requires FND to be diagnosed on positive evidence such as incongruity and inconsistency of limb weakness, rather than simply the absence of disease. When patients present with motor symptoms they can be divided into negative (lack of movement, weakness) or positive (tremor, jerks, dystonia) [67]. The other common subtype of FND is functional seizures characterised by brief episodes resembling epileptic seizures [67].

Category B for diagnosis requires ‘clinical findings provided evidence of incompatibility between the symptoms and recognised neurological or medical conditions’ [67].

The patient’s description of symptoms does not conform to patterns of organic neurological conditions (e.g. the patterns of weakness or movement expected for stroke, multiple sclerosis, or Parkinson’s). These findings enable a diagnosis of FND to be ruled in rather than being a diagnosis of exclusion [67]. Validated signs have high specificities (64–100%) though lower sensitivity (9–100%) [67]. Inter-examiner agreement is good to excellent (k = good/>0.8 excellent) [67].

14.13.3.3 Weakness

Patients with functional weakness commonly report [5]

- Weakness of one side of the body
- A feeling their limb does not feel part of them
- Tremor
- Sudden twitching or jerking of muscles or a limb
- They drop things
- Their knee keeps giving way
- Problems with walking or balance
- Muscle stiffness

Associated symptoms include pain, fatigue and concentration problems. Diagnosis should not be based on the presence or absence of stressful life events which are less common than the term ‘conversion’ events

suggest [5]. Although the history may suggest a functional diagnosis, it should be made only following a physical examination.

A key symptom is the inconsistency of movement. Less reliable predictors are a global pattern of weakness in the limb, sensory disturbance that stops at the shoulder or groin and 'give way' weakness in which the limb gives way to light pressure but can return to normal with encouragement. Weakness may also encourage the onset of migraine but should resolve within 24 hours.

14.13.3.4 Blackouts/Seizures

One in seven patients referred to a 'first fit' clinic and up to 50% of patients brought into hospital have a diagnosis of non-epileptic attacks including [5, 67]:

- Pseudoseizures
- Psychogenic non-epileptic attacks
- Dissociative non-epileptic attacks

Features of attacks include generalised shaking, symmetrical loss of muscle tone, retained consciousness, suddenly falling and lying still and 'blank spells'. Patients do not often report warning symptoms and rarely report triggering by stressful events. Symptoms of panic and dissociation can often be found though the patient may be reluctant to confirm this. Positive signs in this context are lack of sudden change of facial expression, facial jerks, head drop and trunk fall.

14.13.3.5 Dizziness

Prevalence of dizziness is around 20% in the community with around 30% of older adults affected (see also Chapter 6). Patients with functional dizziness often have conventional causes such as migraine, benign paroxysmal positional vertigo (BPPV) or acute vestibulopathy (labyrinthitis). In chronic subjective dizziness, the experience is of an over-awareness of balance symptoms which the patient continues to self-monitor. Associated symptoms include:

- Anxiety
- Agoraphobia
- Hyperventilation
- Fatigue
- Dissociative symptoms.

14.14 Fibromyalgia

Patients experience chronic musculoskeletal pain. This is a symptom complex which includes pain, stiffness, poor sleep, fatigue, anxiety, depression, cognitive dysfunction and a reduction in activity and quality of life [71].

14.14.1 Pain

Pain in multiple sites of the body is common. Chronic widespread is pain which is present on both sides of the body and above and below the waist. Fibromyalgia is severe widespread pain where other somatic symptoms are present and influence the patient's function. Widespread pain is present in 11% of the population while 2% have fibromyalgia [5]. Both are more common with increasing age. At all ages, they are associated with poor

mental health and reduced quality of life. Chronic pain may be divided into primary and secondary. Secondary pain arises from conditions that include osteoarthritis and neuropathic pain (e.g. shingles, cancer, multiple sclerosis). Chronic primary pain includes:

- Fibromyalgia
- Complex regional pain syndrome
- Chronic primary headache
- Orofacial pain
- Chronic primary visceral pain
- Chronic primary musculoskeletal pain

Causal mechanisms include:

- Central pain processing
- Stress
- Genetic
- Psychosocial
- Work factors

14.14.2 Patient Experience

I feel my whole body is in pain. I ache. . .my joints are agonising. There are parts of me I don't want anyone to touch. I feel so low. I've been this way for years, but it is getting worse. None of the tablets work. I feel in despair, I can't concentrate, I'm tired. I've seen physios, specialist, had injections and x-rays. I bet its cancer and they're not telling me. It aggravates my headaches. I can't go on.

14.14.3 Evidence Base

Widespread pain occurs around the axial skeleton and in at least two quadrants of the body. The symptoms should have been present for at least three months. 'Pain points' characterise areas of hyperalgesia [72]. Pain should also be present in at least 11 out of 18 sites (Figure 14.10) [73]. Other physical symptoms may be present:

- 1) Bowel disturbance
- 2) Fatigue
- 3) Frequent attenders
- 4) Cognitive problems
- 5) Mood disorder
- 6) Anxiety
- 7) Sleep disturbance

The pain points are the basis of the widespread pain index (WPI). Using a list of 19 body areas, the areas the patient has felt pain over the past week are calculated. Each area counts as one point. The total WPI ranges from 0 to 19. The Symptom Severity scale score focuses on fatigue, waking unrefreshed and cognitive symptoms. Each item is scored 0, 1 (mild), 2 (moderate) or 3 (severe). Symptom scores are added together to give an overall score of 0–12. A diagnosis of fibromyalgia can be made if the following three conditions are met:

- 1a) The WPI score (Part 1) is greater than or equal to 7 **and** the SS score (Parts 2a and 2b is greater than or equal to 5
OR

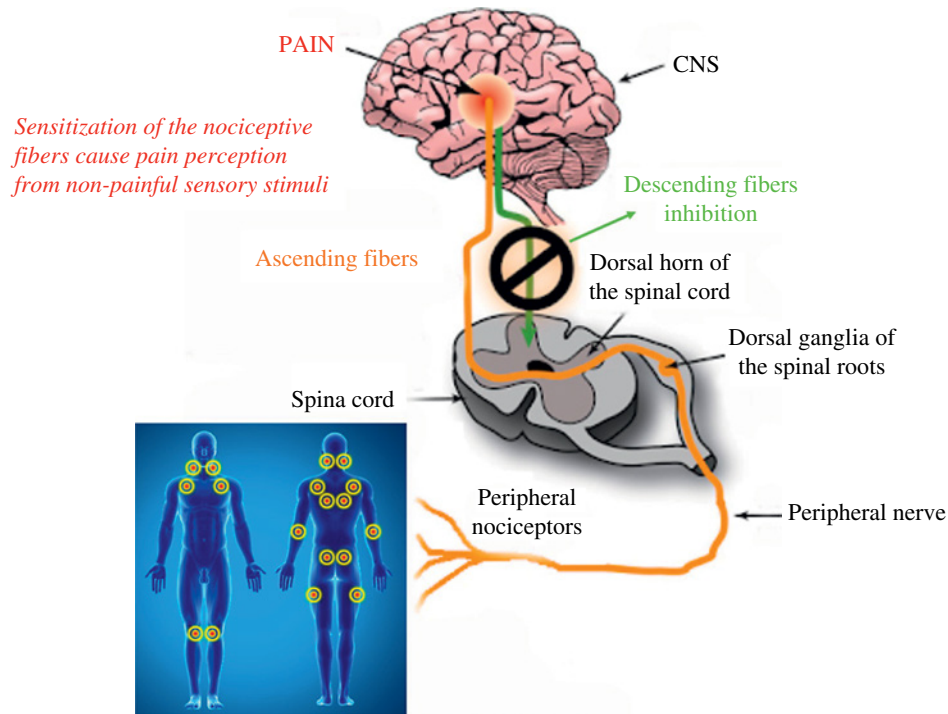


Figure 14.10 Ascending and descending pathways that influence pain sensitivity – approximate trigger points indicated.
 Source: Siracusa et al. [71]/MDPI/CC BY 4.0.

- 2b) The WPI score (Part 1) is from 3 to 6 **and** the SS score (Parts 2a and 2b) is greater than or equal to 9f
- 3) Symptoms have been present at a similar level for a least three months
- 4) The patient does not have a disorder that would otherwise explain the pain

14.14.4 Red Flags

Widespread pain is also associated with inflammatory polyarthritis, connective tissue disease and types of cancer. Serious diseases should be considered with:

- Morning stiffness of more than 30 minutes
- Weight loss
- Fever/sweats
- New onset Raynaud's
- Visual disturbance
- Dry eyes and mouth

14.15 Patient-Doctor Communication and Functional Symptoms

Functional symptoms are associated with significant distress, a loss of role and high use of services. Patients often report clinicians do not take their concerns seriously and are dismissive [15]. Doctors report feeling unprepared

in how to help patients [15]. Risk factors and presenting symptoms often cut across specialities while symptoms including fatigue, pain and sleep disturbance occur in a number of diagnoses [15].

Barriers to communication include the apparent complexity of the symptoms and patient's uncertainty of how best to describe and present their symptoms. Patients value their relationship with their GP [74]. Domains for developing communication are [74]:

- Helping patients understand the complexity of their symptoms
- Attending to psychosocial aspects at the same time as managing physical symptoms
- Ensuring patients perceive exploration of psychosocial factors as a necessary area of the history

One approach is the Reattribution Model which has been widely adopted internationally [74] (Table 14.8). The approach is that the psychological context can help to explain physical symptoms where the patient's own explanations of their symptoms are not successful. The broadening of the patient's understanding of the origins of their symptoms contributes to an improvement and also enables the clinician to address underlying psychosocial or social problems [74].

14.15.1 Key Points for the History

- Allow the patient to make an opening statement ('the golden minute') [15]
- Explore the main presenting symptoms using open questions and the 'open-to-closed' cone

Table 14.8 The reattribution model.

Stage of Reattribution	Task for GP	Topics Probed within Interview
Feeling understood	• Obtain all relevant information on complaint • Explore illness beliefs • Respond to emotional cues	• Experience and view of GP's response to patient cues • Experience of exploration of illness beliefs and sharing of beliefs • Experience of GP expression of empathy
Broadening the agenda	• Summarise physical and psychosocial findings • Explore patient's openness to idea of linking bodily complaint to psychosocial issue	• Experience of exploration of emotional aspects of illness • Acceptability of discussion of emotional concerns
Making the link	• Give explanation relating physical symptom to psychosocial problems because of link in time or physiological mechanism	• View of any link presented • Subsequent embellishment of illness explanation by patient
Negotiating further treatment	• Establish if further treatment is required and its nature • If necessary, arrange treatment of symptoms, psychosocial problems or mental disorder	• Experience of treatment • Involvement in treatment negotiation • Modification/adaptation of explanation • Self-management

Source: Peters et al. [74]/with permission of Springer Nature.

- Common associated symptoms
 - Fatigue
 - Pain
 - Disturbed sleep
- Triggers
 - What brings the symptoms on?
 - Did you have illness when the symptoms first started?
 - Did you have any stresses or big life events when the symptoms started?
- Systems review
 - Red flags
 - Depression
 - Anxiety
- Impact of current symptoms
 - Home life – activities of daily living
 - Relationships and social life
 - Mobility
 - Caring role
 - Work/education
 - Describe a typical day
- Sleep
 - Sleep hygiene
 - Difficulty initiating sleep
 - Night-time waking
 - Early morning waking
 - Length of sleep
 - Do you wake feeling refreshed?
 - Daytime napping
- Current medication
- Past medical and mental health history
- Family history
 - Has anyone else had similar symptoms to yours?
- Social history – work, housing, household, financial
- Drugs, alcohol and smoking – recreational drugs, use of painkillers including opiates
- Personal history – childhood adversity/illness, parental ill health, traumatic events, family attitudes to illness

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15

Bedside Teaching

KEY POINTS

- Proficiency in taking a medical history relies on deliberate practice
- Learners need plentiful opportunities to see and interact with patients
- History-taking needs to be observed by teachers, patients and peers
- Feedback on clinical communication and exploring symptoms should be detailed and specific
- Teaching should focus on improving learners understanding of the aetiology of symptoms and disease
- Case-based discussion can assist reflection on clinical reasoning and inclusion in the patient interview

Teaching About Symptoms and Diseases

Understanding the basis of symptoms will help us understand the range and likelihood of an individual developing a particular disease. For each symptom we should know:

- The anatomy of the symptom
- The pathophysiology
- The prevalence of the symptom in the community and among people who consider themselves in good health and those who are ill
- The effect on the patient's function
- The other systems and structures which could cause these symptoms
- The patient's experience and description of their symptoms
- Which combinations of clusters of symptoms interact to produce disease

From symptom scripts, we move to illness scripts, a prototypical model providing us with a scaffold around which we can comprehend, compare, and contrast diseases to arrive at first a problem list, then a diagnosis and a management plan. We need to acquire knowledge to facilitate this, but we need to see patients to develop this ability.

15.1 Settings

Though the traditional image of bedside teaching is at the patient's side on a busy hospital ward, the definition and student experience of this is far wider in 2024 and includes:

- The hospital ward
- The outpatient clinic

- Emergency department
- Acute care settings
- The general practitioner (GP) surgery
- Treatment rooms
- Community clinic
- Home visits
- Telephone and video consultations
- Online teaching sessions
- In-person preclinical teaching with patients

These are all legitimate settings as they all represent places in which modern healthcare is delivered. All provide opportunities in varying degrees for learners to practice interviewing, presentation and discussion of cases.

Since 2020, the COVID-19 pandemic has affected all aspects of healthcare including medical education. Although most settings are now in recovery, the sudden, unforeseen transfer to virtual learning of clinical skills impacted learners worldwide.

15.2 Bedside Teaching

Transition into the clinical phase of teaching represents an exciting, though perhaps daunting, time, for all healthcare students. This is why we went to medical school, and this is when, for many of us, the course comes alive, and we begin to see ourselves as doctors.

This is the opportunity to see the consequence and application of all the anatomical, physiological and pathology knowledge acquired in the lecture theatres, online tutorials, and textbooks. The patient's 'bedside' is where it all becomes integrated and where, if given sufficient opportunity and support, we understand the patient's history as 'the most powerful, sensitive, and the most versatile instrument available to the physician' [1]. For the learner, bedside teaching serves many important functions (Box 15.1).

Learners understand the value of bedside teaching [2–4]. Students in their early years who are anxious about approaching patients value the opportunity of bedside teaching [5]. There are benefits also to clinical teachers. The anecdote that having a student on placement in our clinical practice, 'keeps us on our toes' is supported by the evidence [6]. Bedside teaching also enables teachers to role model interactions with patients and the wider healthcare team [7].

Nonetheless, bedside teaching has declined in the last 50–60 years. Reasons for this include [7–9]:

- Excessive reliance on tests
- Time spent in front of computer screens
- Reduced availability of time for bedside rounds and teaching
- Perceived lack of teaching skills among clinicians
- Concerns about possible lack of respect for patients during the teaching process
- Concerns about patient's lack of confidence in trainees when mistakes are highlighted during teaching
- Overreliance on technology
- Rapid patient discharges
- Clinical teachers worry about their own knowledge gaps being revealed in front of patients and students

15.2.1 The Patient's Perspective

Though patient preference is often cited as a justification for reduced bedside teaching, the majority of patients are very positive about students being involved in their care [10]. Patients do not experience increased stress during bedside teaching [11]. Patients do expect to be properly informed, particularly where sensitive and intimate

Box 15.1 Benefits to the Learner of Observing and Participating in Bedside Teaching

- Effective communication improves the bond between doctor and patient and contributes to better health outcomes
- Encountering and learning about people from a different background and culture to their own
- Taking a good medical history
- Learning to examine patients with physical signs
- Learning the importance of symptoms, their onset, progress, and the effect on function of the patient
- Identification of the patient's problems
- Understanding of patients and their problems
- Direction of the physical examination
- Judicious and cost-effective selection of diagnostic tests
- Developing understanding of problem framing and representation as a step to differential diagnosis
- Understanding of differential diagnosis
- Clinical reasoning
- Development of management plan
- Witnessing or performing procedural skills
- Presentation and interprofessional communication skills
- Understanding the role of professional values in providing safe patient care
- Role modelling of clinical skills by an experienced tutor

examinations are concerned, and to be asked to consent to their involvement [12]. A patient survey in India drew two important conclusions [10]:

- 1) Patients' own understanding of their medical condition was increased by discussing it with the students
- 2) Patients believed bedside teaching was a necessity for the students to learn and become capable doctors in the future

Patient ethnicity may influence perceptions of bedside teaching. A non-White British population had a lower acceptance of medical students than a White population [13]. This may reflect aspects of the healthcare experience of marginalised groups more generally. In terms of patient groups, older patients have concerns about their health issues and stressors arising from this, while younger patients' concerns about students are around privacy and confidentiality [10]. A majority of patients (68%) are willing for their case to be presented in front of them with only 6% disliking bedside teaching [14].

15.3 Organising Bedside Teaching

Concerns about the development of trainees' clinical skills have previously led the American Council for Graduate Medical Education (ACGME) and the World Health Organisation (WHO) Advisory Committee on Medical Training to recommend medical schools increase opportunities for bedside teaching [8]. The Twelve Tips series advocates key strategies for teachers divided into pre-rounds, rounds and post-rounds [8]. This can be modified and adapted to reflect the needs of individual institutions (Box 15.2).

15.3.1 Process

Students should understand the connections between good clinical communication, active listening skills, efficient use of time and quality data from the history. Clinical teachers can demonstrate with examples, positive and

Box 15.2 Delivery of Bedside Teaching Session on History-Taking*Before a session*

- Identify the current stage of training of the learner group
 - What would they like to learn about this time?
- Identify suitable patients to help meet the learning objectives for the session
- Brief the patient on what the teaching will involve and obtain informed consent
- Brief the learners on the purpose of the session

During a session

- Communicate enthusiasm to the learners
- History-taking
- Establish rapport with the patient and the group
- Allow students to demonstrate the interview and/or physical examination skills
- Invite student to present the history
- Facilitate feedback from the group using an observation guide
- Invite the patient to give feedback on the 'bedside manner' of the learner and the content of the history
- Provide supportive feedback to the learner

Clinical reasoning tasks

- Discuss symptom aetiology and illness scripts as relevant to the patient
- Don't be afraid to look things up and encourage learners to do the same – share the information and discuss; it is safer for patients.
- Thank the patient

After a session

- Debrief the learners
- Give supportive feedback
- Reflect on your own teaching and development needs

negative, from our own experience. The evidence underpinning good content needs to be emphasised during bedside teaching.

The Calgary-Cambridge clinical communication model has distinct phases during the interview and discrete skills within each phase [15]. The model includes an observation guide which provides both a checklist of skills and an aide-memoire for students to generate feedback for the interviewer following a consultation [16]. This can be adapted to enable students and teachers to feedback on aspects of clinical reasoning and differential diagnosis (see Box 15.3).

Where teaching process skills is the priority, the model allows flexible creation of pre-written scenarios which can be enacted by patient simulators or actors [17]. This also enables planning of a clinical communication curriculum (Figure 15.1). Simulated patients are now engaged in many healthcare education settings. Well-trained simulated patients are as effective as real patients in being interviewed. Supportive feedback including from simulators enables the self-awareness of learners and facilitates development of a range of strategies when interviewing patients of different backgrounds and presentations (e.g. taking a sexual history or a history of acute abdominal pain in a transgender patient).

Box 15.3 Adapted Calgary-Cambridge Observation for Feedback on the Communication (Process) Skills of the Medical Interview [16]

<i>Initiating the session</i>	<i>Comments</i>
1) Greets the patient 2) Introduces self 3) Demonstrates interest and respect 4) Identifies and confirms patient's problem list 5) Negotiates agenda	
<i>Gathering information</i>	
1) Encourages patient to tell story 2) Appropriately moves from open to closed questions 3) Listens attentively 4) Facilitates patient's verbal and non-verbal responses 5) Use concise, easily understood questions 6) Clarifies patient's statements 7) Establishes dates	
<i>Understanding the patient's perspective</i>	
1) Determines and acknowledges patient's ideas 2) Explores concerns 3) Determines patient's expectations 4) Encourages expression of feelings and thoughts 5) Picks up verbal and non-verbal clues	
<i>Structuring the consultation</i>	
1) Summarises at the end of a specific line of enquiry 2) Progresses using transitional statements 3) Structures in logical sequence 4) Attends to timing	
<i>Building relationship</i>	
1) Appropriate non-verbal behaviour 2) Reads or writes in a manner that does not interfere with dialogue 3) Accepts legitimacy of patient's views 4) Empathises with and supports patient 5) Deals sensitively with embarrassing and disturbing topics 6) Appears confident and relaxed 7) Shares thinking with patient when appropriate	
<i>Explaining and planning – closing the session</i>	
1) Gives explanation at appropriate times 2) Gives clear, well organised information 3) Checks patient's understanding and acceptance 4) Encourages patient to discuss any additional points 5) Closes by summarising briefly	
<i>Clinical reasoning and differential diagnosis</i>	
1) Elucidates a problem list 2) Identifies items of present illness 3) Possible diagnoses listed 4) Provides supporting factors 5) Provides refuting factors	

Source: Kurtz and Silverman [16]. This has been published previously in the ABC of Clinical Communication. Wiley, 2017.

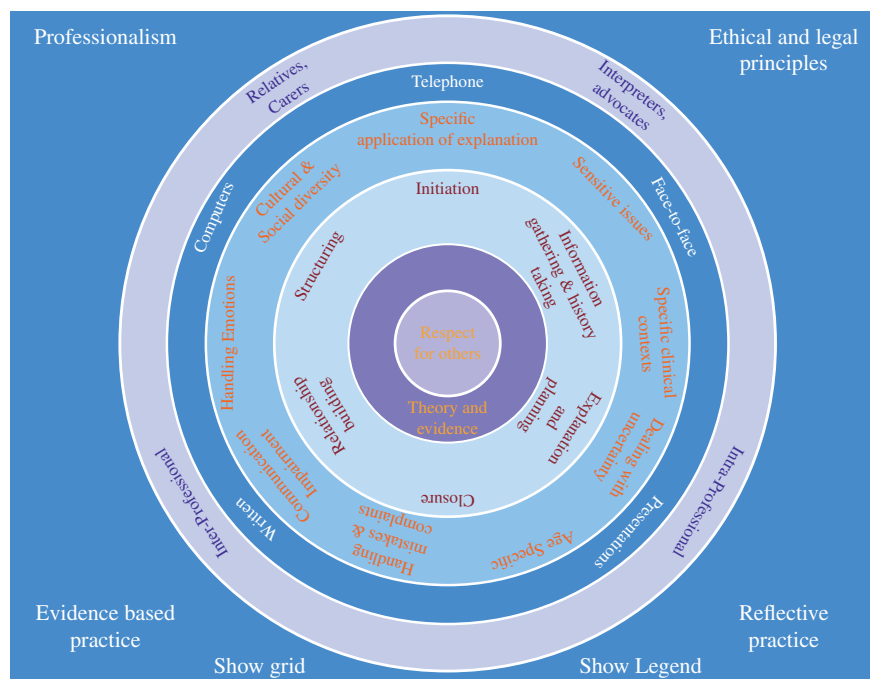


Figure 15.1 The curriculum wheel for clinical communication. *Source:* von Fragstein et al. [18]/with permission of John Wiley & Sons.

15.4 Marrying Process and Content

In the early years of clinical communication teaching, a divergence emerged between the traditional factual approach and the newer approach which emphasised the patient's perspective. Preclinical students were often learning an evidence-based model for interviewing patients only to see their clinical teachers on the wards continue to use the question-and-answer approach to elicit the factual content. The need to marry process and content in communication models was re-emphasised [18]. Clinical communication is a skill requiring the use of process skills to discover the factual content necessary to diagnose and manage the patient's condition [18]. Learners need to learn both to achieve good history-taking skills [18]. They are 'two sides of the same coin' [19].

15.4.1 Content Observation

The use of an observation guide whilst a learner speaks to a patient facilitates structured and detailed, specific feedback on the content of the patient's symptoms (Box 15.4) [17]. This can be used by observers to gather information on the process and content skills of the history. The observations provide raw material and data which facilitates discussion within the group of the process of interviewing a patient to make a diagnosis.

15.4.2 Feedback on the Content of the History

Detailed, specific feedback is essential if interviewing skills are to be developed [15]. Feedback should also be supportive. The interviewer is doing so on behalf of the whole group, and it can feel stressful to talk to a patient whilst being observed by other people. On the other hand, it is equally unhelpful to be told '*You were awesome*', '*You smashed it*' or '*You nailed it*'. If the learner doesn't know exactly what they did well and why, they (and the rest of the group) may never be able to repeat or develop it.

Box 15.4 GEM Observation Guide (Division of Medical Sciences and Graduate Entry Medicine, University of Nottingham)
Communication and professionalism

- 1) Introduces self and checks patient's name
- 2) Clarifies own role
- 3) Obtains consent
- 4) Hand washing
- 5) Allows the patient to make an opening statement
- 6) Identifies a reason for the consultation
- 7) Continues with open questions to explore the presenting symptoms
- 8) Uses pertinent closed questions
- 9) Checks and summarises
- 10) Closes the consultation and 'hands over'

The presenting complaint

- 1) Is the presenting symptom(s) clearly identified?
- 2) Were appropriate descriptors used?
- 3) Were associated symptoms identified?
- 4) Is the sequence of events clear?
- 5) Is the level of detail appropriate?
- 6) Were relevant positives and negatives identified?

Review of symptoms

- 1) Was an appropriate review of symptoms performed?
- 2) Were any key relevant features missed?

Past medical history (PMH)/family history (FH)/social history (SH)

- 1) Was the past medical history identified?
- 2) Were irrelevant events avoided?
- 3) Were items already presented in the presenting complaint left out?
- 4) Were all medications listed with generic names?
- 5) Were alternative and over-the-counter medicines listed?
- 6) Were allergies and the nature of the reaction included?
- 7) Was smoking/ alcohol/ substance misuse identified?
- 8) Were major medical issues in the family discussed?
- 9) Were relevant aspects of the social history included?

Physical examination

- 1) Did examination start with a description of the patient's physical appearance?
- 2) Were vital signs measured?
- 3) Did the examination follow a logical sequence?
- 4) Was the examination appropriate and detailed enough for the presenting complaint?
- 5) Was anything missing?

Differential diagnosis

- 1) A list of possible diagnoses is identified in descending order of likelihood
- 2) The conditions listed are relevant to the patient's age, gender identity, ethnicity, and setting
- 3) The conditions listed are relevant to the patient's history and examination findings
- 4) The differential diagnosis is supported by clear reasoning

Summary

- 1) Was the presentation clear, concise, and well organised?
- 2) Were summaries of both the history and presenting complaint both presented?
- 3) The presentation was made with appropriate eye contact with the patient and the rest of the group
- 4) There was minimal use of notes as an aide-memoire

Instructions to learner: Use the following structure to present your history. Pause briefly between each section. When describing the patient's symptoms and their effects, try to use the patient's own words avoiding medical terminology. Medical terminology should be used only when discussing the interpretation of symptoms with your medical colleagues.

Source: Nicola et.al., 2017/John Wiley & Sons.

It can be helpful to the learner if, at the onset, they are invited to define areas of their interview where they would like feedback (the learner's agenda):

'I'm always forgetting to ask about all the associated symptoms, so I find it difficult to develop a differential diagnosis at the end. Could you tell me how I do with that?'

The general principles of detailed, specific feedback are [15]:

- 1) Look at the outcomes learner and patient are trying to achieve
- 2) Encourage **self-assessment** and self-problem-solving first
- 3) **Involve the whole group** in problem-solving
- 4) Use **descriptive feedback** to encourage a **non-judgemental** approach
- 5) Provide **balanced** feedback
- 6) Make **offers and suggestions**: generate alternatives
- 7) **Rehearse** suggestions
- 8) Be well intentioned, valuing and **supportive**
- 9) Value the interview as a **gift of raw material** for the group
- 10) Opportunistically introduce concepts, principles, research evidence and wider discussion (role of your facilitator)
- 11) Structure and **summarise learning** so that a constructive endpoint is reached

15.4.3 Presenting the History

On completion of a patient history, learners should be encouraged to present their history. This is an important skill they will need to use in a range of settings:

- Ward rounds
- Acute care
- Telephone conversations including situation, background, assessment, recommendation (SBAR)
- Written communications
 - Patient record keeping
 - Referral letters
 - Hospital discharge summaries
- Bedside teaching rounds
- Grand rounds
- Medical meetings
- Case conferences
- Scientific meetings

Formats of case presentation vary from the full history and examination of an educational bedside session or an acute admission to summarising the main points to a senior doctor. An example grid is shown in Box 15.5.

Box 15.5 Grid for Structuring a Long Case Presentation During Bedside Teaching [17]**The presenting complaint**

A brief description of your patient and his/her main symptom

'This is' name, age, sex 'who is a' occupation 'presenting with' main presenting symptom

History of the presenting complaint

'The problem first began when.....

- Describe onset, duration, variation of symptoms, exacerbating, relieving factors
- Effect on patient's life, occupation, social, family
- Associated features – accompanying symptoms or features, often within the same system which may suggest a particular disease
- Risk factors
- Relevant past medical history
- Patient's ideas and concerns about the problem

Past medical history

- Review of systems
- Major diagnoses
- Medication – including allergies/intolerances
- Smoking/alcohol if not mentioned above
- Family and social history

Summary of the history – no more than two to three sentences

'In summary, this is name, age, sex, occupation, who presents with key presenting symptom(s). S/he is concerned about effects on life, effects on health'

Patient's problem list

The patient's main problems at the present time are: (you should now frame these in terms of medical pathology)

Differential diagnosis

My differential diagnosis would be.....

- 1) because.....
- 2) because.....
- 3) because.....
- 4) because.....

Instructions to learner: Use the following structure to present your history. Pause briefly between each section. When describing the patient's symptoms and their effects, try to use the patient's own words avoiding medical terminology. Medical terminology should be used only when discussing the interpretation of symptoms with your medical colleagues.

Frain and Abdalla [17]/John Wiley & Sons.

Presentation of the history requires structure and clarity. As well as being essential for care, for the learner the case presentation:

- Conveys an understanding of the information gathered in the interview
- Facilitates clinical reasoning, identification of a problem list and development of a differential diagnosis

When presenting, the speaker should be encouraged to pause briefly between each section. When describing the patient's symptoms and their effects on function, they need to use the patient's own words avoiding medical

terminology. Medical terminology should be used only later when discussing the interpretation of symptoms with peers and colleagues, identifying the problem list, and elucidating a differential diagnosis.

15.5 Teachable Moments

The teaching of the history presents many opportunities for engaging with learners either individually or in a group. Even within the pressure of busy clinical practice, several interventions will help clarify understanding, content and clinical reasoning. Initial questions might include [7]:

- What have you learnt from the patient so far?
- What is the most important thing the patient has told you?
- What do you think is the thing the patient is most concerned about?
- How would you make this patient more comfortable?
- What do you think we need to do next?

Questions should encourage critical thinking about the topics being covered and gaps in knowledge in a way that encourages learning [7]. It is important for teachers to role model to learners it is ok to admit to a lack of knowledge and to look things up for the safety of the patient. Questions which ask ‘How?’ or ‘Why’ are more valuable, and less intimidating than those which ask ‘What?’ [7]. This is helpful when considering the aetiology of the patient’s symptoms, how they interact and why they are producing disease.

15.5.1 One-Minute Preceptor [20]

The one-minute preceptor model is a brief teaching intervention. It has been demonstrated as successful in highlighting learners’ key points for further development across a range of settings in busy clinical environments. Most often it is used in relation to clinical reasoning and decision-making though it can be applied also to other aspects of bedside teaching such as professionalism and inclusion themes. The model is outlined in Box 15.6 [21].

The model can guide a detailed discussion of a patient’s presentation in an extended bedside teaching session. Alternatively, pertinent questions can be selected for brief interventions in the context of busy, high-pressure clinical settings.

15.5.2 SNAPPS

Summarise, narrow, analyse, probe, plan and select (SNAPPS) is more learner-centred. It examines the learners’ approach to the task involved in history-taking differential diagnosis and clinical reasoning (Box 15.7) [22].

15.5.3 Clinical Reasoning Tools

Several clinical tools have been developed which provide structure to evaluating the patient history both in person and in case-based discussion. These allow a walk-through of a case for learners in self-directed or small-group study but also during bedside teaching. The Manchester Clinical Reasoning Tool is a good example of this (Figure 15.2) [23]. Its initial emphasis on ‘Who?’ is person-centred but also facilitates an initial discussion of the patient’s pre-test probability. Within the structure, there is also the opportunity to reflect on sources of bias and exclusion from healthcare and the contribution these make to diagnostic errors. This is an important challenge to take on as clinical teachers and learners if we are to address the exclusion many patients feel when they engage with health services and the impact this has on their health outcomes (Box 15.8) (Figures 15.3 and 15.4).

This approach can facilitate reflection by teacher and learner together on their own sources of bias and how this can affect patient care. Ideally, this would be ‘at the bedside’ so the patient’s perspective is also heard. However, it can also be incorporated into case-based discussion (Box 15.9)

Box 15.6 The One-minute Preceptor Model

- 1) Get a commitment
 - a) What do you think is going on?
- 2) Probe for supporting evidence
 - a) Why do you think that?
 - b) How did you arrive at this?
 - c) What other evidence did you consider?
 - d) What other diagnoses did you consider?
 - i) What supported or refuted these ideas?
- 3) Teach general rules
 - a) In this situation, I'd try....
 - b) Don't focus on the rare case or outlier
 - c) Share some general evidence-based information about this particular complaint, diagnosis or treatment
 - d) Pearls of wisdom
- 4) Reinforce what was right
 - a) Comment on presentation skills
 - b) Comment on quality of history
 - c) Comment where quality of data collected helped differentiate between different diagnoses
 - d) Did any of the above influence the treatment plan?
- 5) Correct mistakes (should be done privately)
 - a) Include how to improve next time
 - b) Go and read about.....

Source: Adapted from Neher et al. [21].

Box 15.7 The SNAPPS Tool

- Summarise briefly the history and findings
- Narrow the differential to two or three relevant possibilities
- Analyse the differential by comparing and contrasting the possibilities
- Probe the preceptor by asking questions about uncertainties, difficulties or alternative approaches
- Plan management for the patient's medical issues
- Select a case-related issue for self-directed learning.

Source: Adapted from Wolpaw et al. [22].

15.6 Topics for Reflecting on the History

15.6.1 Can We Teach Pre-Test Probability at the Bedside?

Discussion of the patient's background characteristics, age, gender and risk factors can establish the concept of pre-test probability in learner's minds. It is against the background of the patient's pre-test probability of a disease that clinicians evaluate the information which emerges in the history. Pre-test probability is the chance the patient has the disease before the test result (e.g. the history and examination) is known. Application of the test (the history) generates a post-test probability. Post-test probability tells us the patient's chance of

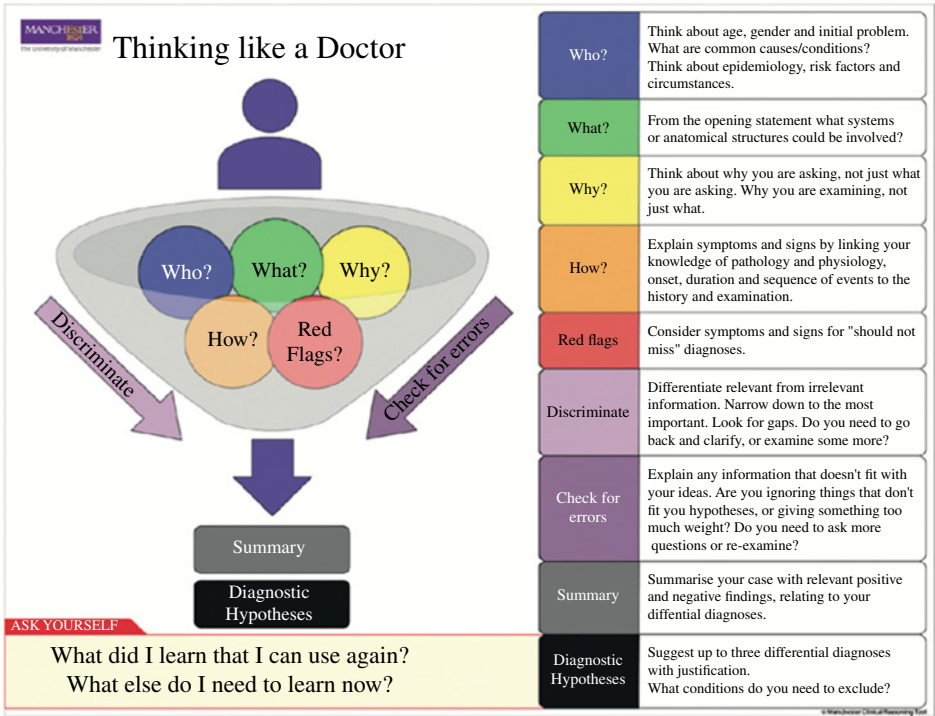


Figure 15.2 The Manchester Clinical Reasoning tool. *Source:* Singh et al. [23]/Walter de Gruyter GmbH/CC BY 4.0.

Box 15.8 Who Is My Patient?

Who? Think about age, gender and initial problem.
What are common causes/conditions? Think about epidemiology, risk factors and circumstances.

Source: Adapted from Singh et al. [23].
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having a disease. It is used to either accept a diagnosis of disease, rule out a diagnosis or request further investigations (blood, imaging, etc.)

Single symptoms are very rarely diagnostic of a condition and even fewer exclude a diagnosis [26]. In their study of clinical findings for 67 diagnoses in the JAMA Rational Examination series, Kennedy et al. found a clinical finding is useful only if it has a moderate effect on pre-test probability. In practice, this means symptoms and signs with positive likelihood ratios (LRs) greater than 5 and negative likelihood ratios less than 0.2 [27]. In this series, only 21% of single-item LRs caused a shift in the probability of diagnosis [26]. An understanding of the significance of symptoms (presenting and associated) and their interactions is therefore essential to formulate diagnostic ideas.

As well as symptom scripts, discussion of clinical reasoning often includes the concept of illness scripts. These are prototypical models of disease or an organised mental summary which allow us to organise and store knowledge, retrieve from memory, and compare the patient in front of us with patients we have seen in the past. Key components of an illness script are based on knowledge, patients we have seen with typical features of the

Discriminatory biases

Visceral
Availability
Fundamental attribution error
Representativeness
Anchoring

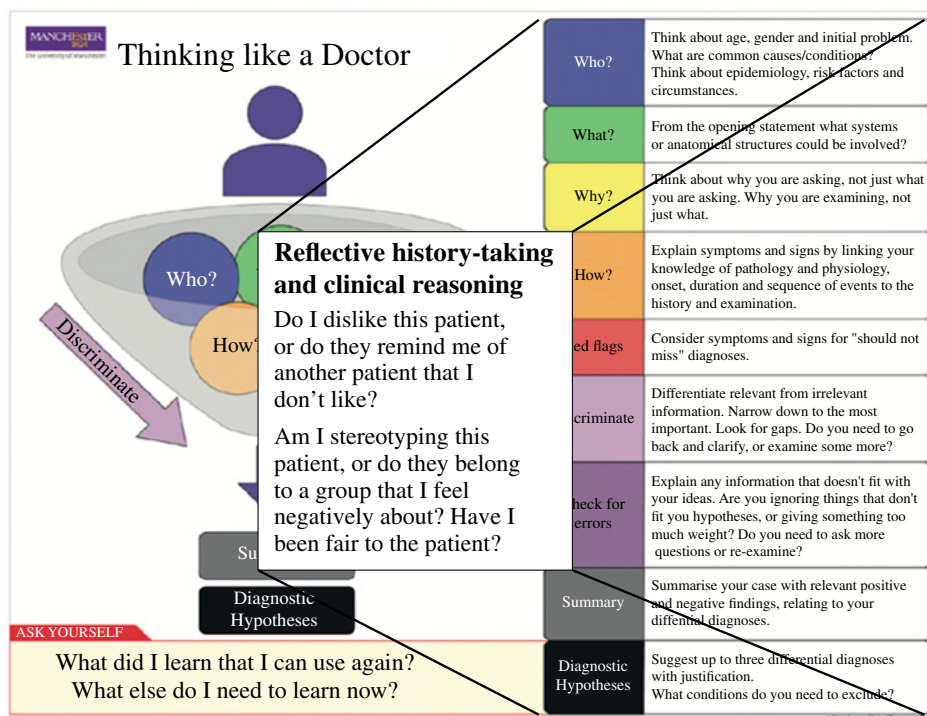


Figure 15.3 Adapting the Manchester Clinical Reasoning tool to reflect on sources of clinician bias in the history and clinical reasoning. *Source:* Adapted from Singh et al. [23] and Croskerry [24]. This work is licensed under the Creative Commons Attribution 4.0 International License.

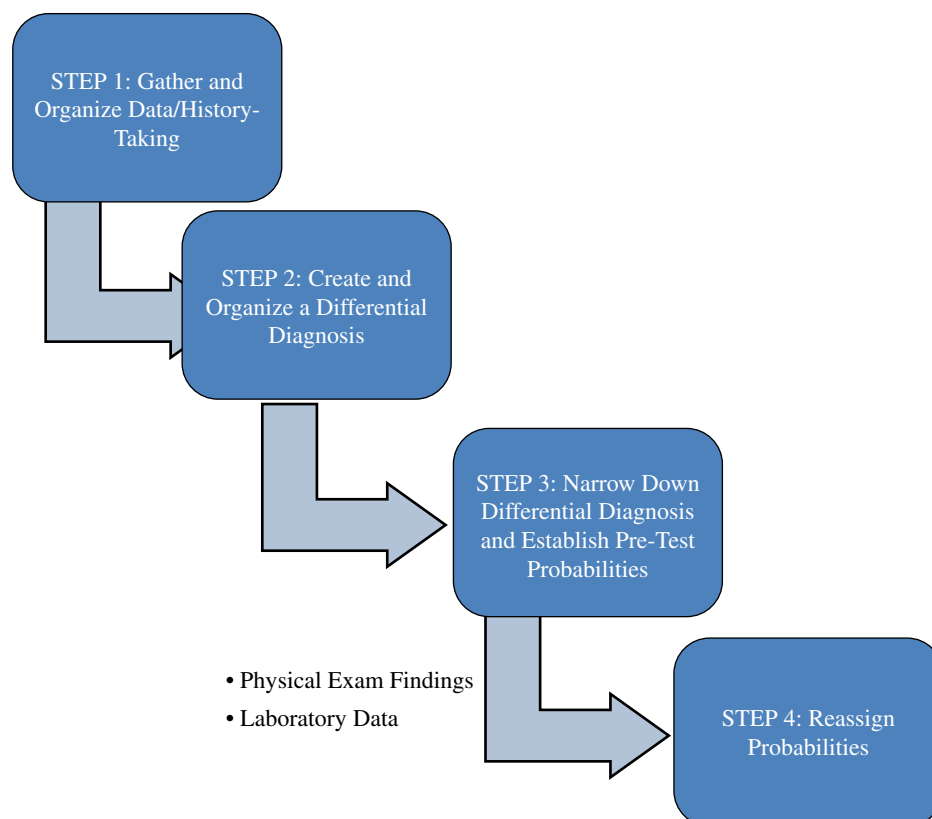


Figure 15.4 Modified Bayesian model for introduction of concept of probabilistic thinking in clinical reasoning. *Source:* Addy et al. [25]/with permission of Taylor & Francis.

Box 15.9 When Bias Clouds Our Judgement**Part A**

I was a surgical senior house officer (SHO) at XX Hospital in the UK. I was joining my consultant in theatre. Between cases, he received a call from the A&E consultant asking him to send one of his team to discharge a 'rude' patient who was after a morphine injection. The patient claimed that he had anal pain. The patient was examined, and no abnormality was detected.

When he was told nothing had been found and he was to be discharged, he became angry and said he would not leave the hospital till a surgeon saw him. So, the A&E consultant phoned the surgical consultant.

I was sent for a well-defined easy task – go and discharge him! From my first moment in A&E, when I was asking 'Where is this patient?', everyone was making funny faces and saying, 'Ahh the rude patient!'

- What is going on here?
- Patients from which backgrounds might be described as rude?
- Using the clinical reasoning tool, discuss sources of bias in the patient history and assessment which may have led to this situation

Part B – the outcome

- I found him in one of the rooms. He had an eastern Mediterranean appearance
- He had his belongings in a plastic bag, and he was shouting that he was in pain
- I asked for a fresh set of observations while I read his notes
- His temperature was 38.5°
- I asked him to lie on the couch to be examined and found a palpable urinary bladder
- His catheter drained 1100 ml urine
- Per rectum (PR) examination was normal (as the A&E doctor stated)
- He was sent to the theatre for examination under anaesthesia
 - Diagnosis of high perianal abscess
- I was late to re-join my consultant in theatre

disease and those we have seen with atypical variants. The more patients we have seen with the disease, the more refined and accurate our illness script for that disease. Our mental summary contains:

- Pathophysiology of the disease
- Epidemiology – what are the risk factors? Who gets it?
- Timeline – acute, chronic, what happens if the disease is not treated?
- Key symptoms and physical signs
- Useful diagnostic tests
- Management – treatment, prognosis, how will we explain it to the patient?

Our initial illness scripts come from our lectures and books. Textbook or 'classic' presentations are extremely rare in practice. First, they do not take into account the natural history of a disease, the sequence of events from the moment the patient was last well until the resolution of the condition (return to health, permanent disability, or death). Second, belief in textbook presentations may lead us to overestimate the specificity of a symptom or sign and rule in a diagnosis inappropriately ('If it's there, then the disease must be present ...') [26]. Alternatively, we may overestimate the sensitivity of a symptom or sign and rule out a diagnosis inappropriately ('If it's not there, then the disease must be absent ...') [26]. There is clearly scope for diagnostic error in this process. A key concept in teaching clinical reasoning is understanding how clinicians engage in probabilistic reasoning to reach an accurate diagnosis.

Bayesian reasoning is the concept used to describe the process of using pre-test probabilities and new clinical information from the history, examination and investigations to arrive at a post-test probability and a diagnosis [28]. Many clinicians feel uncomfortable with the statistical concepts underpinning this aspect of clinical reasoning. Nevertheless, many argue an understanding of Bayes rule and its role in probabilistic reasoning is crucial to addressing and reducing diagnostic error [29]. Furthermore, many argue also that experienced clinicians are natural Bayesian thinkers, using probabilistic thinking to sift and evaluate the patient's symptoms and other clinical data [30].

Many anticipate a coming revolution in medicine with artificial intelligence (AI) and matching learning. Exploring symptoms in the history may benefit from this transformation. An improved understanding of probabilistic reasoning, along with more responsive and up-to-date symptom and disease prevalences and illness scripts will be necessary to create these technologies [31].

Teaching Bayesian methods does have benefits for medical students though modest at present [32]. Introduction of a modified Bayesian method to second-year medical students was well received by both faculty and students and believed to assist the development of clinical reasoning skills [25]. These are concepts from which students and patients will benefit and could be better introduced and embedded among all clinicians through bedside teaching.

15.6.2 The Opening Statement

The 'golden minute' (30–150 seconds) in which the patient shares the reason for their attendance is crucial to the efficiency of the consultation. Far from wasting time, establishing the patient's problem list at the outset is time efficient. Patients attend a consultation with a clear idea of their expectations. In one study [15]:

- 55% wanted specific treatment
- 60% had specific ideas about why they had developed symptoms
- 40% had specific concerns about their symptoms

Time efficiency is improved by remembering [15]:

- Patients do not describe their symptoms in order of their clinical importance
- Doctors assume often the first problem mentioned by the patient is the most important one
- The patient should be allowed time to make an opening statement at each interview or attendance

15.6.2.1 Teaching Tip

Try timing the length of a patient's opening statement and feed this back to the learner. How long did the statement last? When was the first interruption and did it encourage the patient to continue ('uh huh; go on') or cut across the patient's story?

15.6.3 The Importance of 'What Do You Mean by That?'

There can often be misunderstandings between patients and clinicians in terms of how symptoms are described by the patient and then understood by the clinician [33]. This can result in delayed or late diagnosis [33]. For example, for upper GI symptoms, patients will use words like 'acid', 'reflux', 'indigestion' and 'heartburn'. Sometimes, these terms are used by patients when they experience difficulty in swallowing [33]. At the same time, clinicians will use and apply their own understanding to 'heartburn', 'reflux' and 'dyspepsia'. Unless the patient's meaning and the clinician's understanding coincide, there is clearly scope for misunderstanding and error. There is also a similar issue around chest pain in women [34].

Further examples include dizziness ('I feel the room is spinning', 'I feel as though I'm going to pass out', 'I feel light-headed', 'I feel as though I'm going to fall over') and erectile dysfunction which patients can understand as any one of premature loss of erection, absence of ejaculate with orgasm, premature ejaculation or loss of desire [35].

15.6.3.1 Teaching Tip

Encourage learners to explore the patient's meaning of the symptom. Help them allow the patient to define the anatomical and physiological areas affected by the symptom using encouraging, open questions (inductive foraging) [23, 36].

15.7 Case-Based Discussion

An alternative to seeing patients for history-taking and developing clinical reasoning is case-based discussion. Effective cases [37]:

- Should be real
- Should be based on careful research and study
- Should be created explicitly for discussion and include sufficient detail and information to enable analysis and interpretation by users

Live cases are most effective in terms of learning outcomes followed by video and paper cases [37]. Interactivity and opportunity for involvement are important for the acquisition of clinical reasoning skills [37]. More interactive formats enable collaboration between learners which collectively benefits their development of clinical reasoning skills [37].

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Glossary of Terms

Anchoring a tendency to rely too heavily on the first piece of information offered.

Availability bias a diagnosis is foremost in your mind because ‘there’s a lot of it about’ or you have seen several cases recently.

Clinical communication the skills used in eliciting and giving to the patient information about his or her health, including listening, hearing, talking, body language and always showing courtesy with a professional attitude. It is also referred to as the ‘process’ by which information about a patient is gathered.

Clinical reasoning the process of thinking, both intuitive and analytical, which enables the clinician to elucidate the meaning of the symptoms, signs, and investigation results to appropriately diagnose the patient’s illness and plan future management.

Depersonalisation a feeling of being outside oneself and observing one’s actions, feelings and thoughts from a distance.

Derealisation the world feels unreal to the patient.

Diagnosis the original Greek word meant ‘to distinguish’ or ‘to discern’. The term means the process of defining the disease(s) responsible for a patient’s condition.

Diaphoresis tremor, tachycardia, anxiety, weakness, hunger and nausea secondary to an adrenergic stress response.

Differential diagnosis sometimes one of several conditions may be responsible for the patient’s condition and, until it becomes clear which one is correct, they are considered together as a differential diagnosis. A careful history and examination usually raise no more than four to five realistic differential diagnoses. As well as the history and examination, the differential diagnosis is based on factors such as the patient’s age, gender, occupational and risk factors.

Disease a disorder of structure or function affecting a specific location or system(s) of the body whose presence is manifested by the occurrence of symptoms and physical change.

Diversity the practice of including people from a range of different social and ethnic backgrounds and of different genders, sexual orientation, ages etc.

Early symptom or sign this is a physical abnormality which occurs at an early stage in the natural history of a patient’s illness. For example, breathlessness on heavy exertion may be an early sign of heart failure.

Equality the state of being equal to other people, especially in status, rights and opportunities.

Examination the process of measurement and evaluation of the patient’s body and its function through the four stages of observation, palpation (feeling), percussion (tapping the body surface with the fingers) and auscultation (listening with a stethoscope).

Examiner (observer) variability the difference occurring in the interpretations of the findings on examination of the same patient under the same conditions. Variation may occur between doctors

(inter-examiner variability) and between the findings of one doctor examining the same patient on two separate occasions (intra-examiner variability). It is important to appreciate the existence of variability as it is an important source of error in the history and the examination.

Gut-brain axis a bidirectional communication between the central and the enteric nervous system.

Health-seeking behaviour activities which are undertaken by an individual to maintain good health.

History the information or content gathered by the doctor during the medical interview which is useful in directing and interpreting the physical examination and subsequent investigation and in formulating a diagnosis.

Incidence the rate of new cases of a disease in a population at risk.

Inclusion the practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalised, such as those who have physical or mental disabilities and members of other minority groups.

Investigation a test (e.g. blood, urine, X-ray, scanning) selected based on the patient's history, examination, and differential diagnosis to help further determine the cause of a patient's illness.

Late symptom or sign occurs late during the natural history of a patient's illness. Examples would be lying on extra pillows to aid breathing (orthopnoea) in heart failure or swelling of the optic disc (papilloedema). These symptoms or signs denote established and possibly advanced disease. Two points are important here:

- 1) Excluding a condition from your differential because a late sign(s) is not present may lead to an error or errors in diagnosis
- 2) Waiting for late symptoms or signs to develop before your diagnosis can delay treatment for the patient

Management the combination of communication skills, history, examination, investigation, treatment, discussion and record-keeping which ensures the patient is maintained in an optimum state of health.

Metoidioplasty a female-to-male gender-affirming surgery where the clitoris is released from surrounding tissue to allow it to grow under the influence of testosterone therapy.

Natural history the progression of a disease from the moment of exposure to a causal agent or change within the body through the onset of symptoms and physical signs until the patient's recovery or death. The stage reached of the natural history is signified by the observed symptoms and signs.

Phalloplasty a gender-affirming female-to-male surgery which creates a penis and scrotal sac.

Premature closure a tendency to close off the history or clinical assessment before fully exploring all other possibilities.

Prevalence the total number of cases of a disease in a population divided by the total number of people in the population.

Primary (disease) describes a condition arising anew and not in association with previous disease or injury.

Professionalism a set of values, behaviours and relationships that underpins the trust the public has in doctors.

Prognosis (foreseeing) a prediction of the progression of the disease based on the usual behaviour of the disease, patient characteristics and treatment given.

Protected characteristics the population characteristics which are protected under the UK Equality Act 2010.

Prudent diet the avoidance of excess energy, increased dietary fibre, reduction in fat intake to 30% of total energy intake and with a high proportion of the fat as the polyunsaturated form.

'Red Flag' a symptom or sometimes a physical sign the presence of which suggests a more serious underlying pathology or serious illness. The presence of a red flag should always be thoroughly evaluated although often they may be found to be of little or no significance.

Reliability the consistency of an aspect of the history or examination in obtaining information about the patient's state of health. A reliable history, sign or examination will produce similar information which is used in the same conditions in the same or different patients.

Representativeness bias overreliance on pattern recognition may lead to atypical presentations being missed.

Risk factor a feature of the patient's history which is likely to increase the chance of a disease occurring (e.g. smoking, age, cholesterol level).

Secondary (disease) describes a condition which develops because of earlier or pre-existing disease or injury.

Sensitivity a test which correctly identifies patients as having a particular disease. It should be considered alongside specificity.

Sign the objective evidence of a patient's health found by physical examination. These may be normal and found in all patients (e.g. the radial pulse or blood pressure) or evidence of change in the physical characteristics of the body caused by disease (e.g. clubbing of the fingers in respiratory disease).

Specificity a test which correctly identifies patients who do not have a particular disease.

Symptoms are that which patients feel or experience leading them to believe they may be ill.

Syndrome a group of symptoms and signs occurring consistently together in association with a condition.

Validity whether the question, physical sign or examination measures or examines what it claims to measure or examine in the patient.

Visceral hypersensitivity the experience of pain in the visceral organs.

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