CHAPTER 1
DIABETES: A COMPREHENSIVE OVERVIEW
(5 CONTACT HOURS)

Learning objectives:
- Identify the various types of diabetes.
- Identify the prevalence of diabetes in the United States.
- Discuss the pathophysiology of diabetes.
- Identify the nonmodifiable and modifiable risk factors for developing diabetes.
- Understand the recommended screening guidelines to prevent diabetes.
- Understand the recommended diagnostic tests to confirm diabetes.
- Identify the common signs and symptoms of diabetes.
- Identify the psychological impact of a diabetes diagnosis for the patient and family.
- Compare and contrast the various treatment modalities of diabetes (nutrition/diet, oral medications, insulin, pumps and surgical options).
- Identify and understand the role of the nurse caring for a patient diagnosed with diabetes.
- Identify the cultural considerations related to caring for the diabetic patient and family.
- Discuss the future of diabetes, including stem cell research.

Introduction
Diabetes mellitus is a common, chronic, complex disease characterized by an insufficiency of, or the body’s failure to properly use, insulin [78]. Proper management of diabetes requires a collaborative approach with the patient and family to make lifelong behavioral and lifestyle changes. The nurse has an enormous role in facilitating the treatment regimen and empowering patients and families to achieve maximum states of wellness. Regardless of a nurse’s specialty, each of us has been responsible for the care of a patient living with diabetes. Although nurses may have a basic understanding of diabetes, it is important for them to understand the complexity of the disease and feel comfortable in their knowledge of it to ensure that they give patients the right information to control their diabetes and to avoid serious complications.

Diabetes is the world’s most prevalent metabolic disease and it is the leading cause of adult blindness, renal failure, gangrene and the necessity for limb amputations [58,63]. Since 2007, diabetes has reached epidemic proportions worldwide, making it the seventh-leading cause of death in the United States [58]. Growing numbers of people are dealing with acute and chronic complications, disability and death due to the diabetic disease process.

Prevalence of diabetes in the United States and worldwide
In 2011, the National Diabetes Information Clearinghouse (NDIC) and the American Diabetes Association (ADA) provided the following prevalence statistics regarding diabetes [19,58]:

- **Diabetes in the United States**
  - There are about 25.8 million children and adults (8.3 percent of the total United States population) living with diabetes. This included 18.8 million people diagnosed and 7 million who were not diagnosed. Additionally, there are 79 million people diagnosed as prediabetic. In 2011 the National Diabetes Fact sheet used both fasting glucose and A1C levels to obtain estimates for undiagnosed diabetes and prediabetes since these are the most commonly used tests in clinical practice.
  - Only a fraction of the total number of cases are found under the age of 20:
    - 215,000 or 0.26 percent of all people in this age group have diabetes.
    - About one in every 400 children and adolescents has type 1 diabetes.
  - The majority of diabetes is found in patients over the age of 20:
    - **Age 20 or older:** 25.6 million (11.3 percent) of all people in this age group have diabetes.
    - **Age 65 or older:** 10.9 million (26.9 percent) of all people in this age group have diabetes.
    - **Men:** 13 million (11.8 percent) of all men age 20 or older have diabetes.
    - **Women:** 12.6 million (10.8 percent) of all women age 20 or older have diabetes.
    - **Non-Hispanic whites:** 15.7 million (10.2 percent) of all non-Hispanic whites aged 20 years or older have diabetes.
    - **Non-Hispanic blacks:** 4.9 million (18.7 percent) of all non-Hispanic blacks aged 20 years or older have diabetes.
  - **Prediabetes in the United States**
    - Pre-diabetes is a condition characterized by blood glucose or A1C levels that are higher than normal but not high enough to be called diabetes. Persons who have pre-diabetes are at increased risk for developing type 2 diabetes, heart disease, and stroke. Research shows that pre-diabetics who lose weight and increase their physical activity can actually prevent or delay the development of type 2 diabetes and may even, in some cases, return their blood glucose levels to normal [58].
    - In 2005-2008 (based on fasting glucose or A1C levels) 35 percent of adults in the United States ages 20 years or older had pre-diabetes. Fifty-percent of these individuals were 65 years of age or older. “Applying this percentage to the entire U.S. population in 2010 yields an estimated 79 million Americans ages 20 years or older with pre-diabetes.” [58].
    - Based on fasting glucose or A1C levels, and after adjusting for population age differences, the percentage of American adults ages 20 years or older with pre-diabetes in 2005-2008 was similar for non-Hispanic whites (35 percent); non-Hispanic blacks (35 percent); and Mexican Americans (36 percent) [58].
  - **Gestational diabetes**
    - Gestational diabetes has been reported in 2 percent to 10 percent of pregnancies in the United States. Immediately following their pregnancies, 5 percent to 10 percent of women with gestational diabetes are found to have diabetes (usually type 2). Those women who had gestational diabetes have a 35 percent to 60 percent chance of developing diabetes in the next 10-20 years [58].
  - **Diabetes and death in the United States**
    - According to the Diabetes Research Institute and the Centers for Disease Control and Prevention (CDC), diabetes reduces life expectancy by one-third [37]. Based on the most recent available statistics, diabetes was the seventh leading cause of death based on U.S. death certificates in 2007. This conclusion is based on the 71,382 death certificates in 2007 in which diabetes was the underlying cause of death. Diabetes was a contributing cause of death in an additional 160,022 death certificates. In general, the risk for death among people with diabetes is about two times that of people of similar age but without diabetes [58].
  - **Cost of diabetes in the United States**
    - Diabetes is a major public health concern and debt to the U.S. population. In 2007, the most recent year for which statistics are available, the total (direct and indirect) cost in the U.S. was 174 billion. However, according to the Diabetes Research Institute, diabetes costs the American people an estimated $218 billion each year [37,58]. This includes:
      - **Direct medical costs:** $116 billion in 2007; up from 91.8 billion in 2002 [19]. After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes.
      - **Indirect costs:** $58 billion; up from 39.8 billion in 2002 [19]. Indirect costs compromise the amount spent on disability, work loss and premature mortality.

Even though the statistics are astonishing in the U.S., it is more profound globally. According to the World Health Organization (WHO), more than 220 million people worldwide have diabetes. [76] The WHO (2011) released the following data as well [76]:
- More than 80 percent of deaths due to diabetes occur in low-and-middle-income countries.
- WHO predicts that diabetes deaths will double between 2005 and 2030.
- Healthy diet, regular physical activity, maintaining a normal body weight and avoiding the use of tobacco products can prevent or delay the onset of type 2 diabetes.
Understanding the role of the pancreas and diabetes
The pancreas is a banana-shaped organ that lies behind the stomach, with the head and neck extending into the curve of the duodenum and the tail lying against the spleen. The pancreas has endocrine and exocrine capabilities [19,79]:

- **Endocrine function** involves the islets of Langerhans, microscopic structures that are responsible for two major hormones, glucagon (secreted by the alpha cells) and insulin (secreted by the beta cells) that have an enormous effect on diabetes.
  - **Glucagon** is a hormone that increases blood glucose levels when the blood sugar is low.
  - **Insulin** is a hormone that stimulates growth and promotes the movement, storage and metabolism of carbohydrates, protein and fat. Insulin plays a role in lowering the blood glucose levels by allowing glucose to move across the cell membranes into many tissues.

- **Exocrine function** is responsible for the digestive enzymes excreted to facilitate the eating process. Although the exocrine function of the pancreas plays an enormous role in excreting various digestive enzymes every day, it does not have any relation or effect to diabetes.

Normal physiology in a non-diabetic individual
When an individual eats or drinks something, the body responds by raising the blood sugar to provide energy and nutrients to the cells and organs. Carbohydrate foods provide most of the glucose absorbed and used by the body; proteins and fats provide smaller amounts [75]. According to the ADA, a patient without diabetes will maintain a fasting blood glucose level between 70-99 milligrams/per deciliter (mg/dl) and less than 140 mg/dl postprandial (two hours after eating) [2]. Our bodies cannot differentiate between 70-99 milligrams/per deciliter (mg/dl) and lower the blood glucose levels by allowing glucose to move across the cell membranes into many tissues.

During a hypoglycemic event (blood glucose 70 mg/dl) brought on by an individual choosing to skip a meal or choosing to ingest a smaller portion, the body responds by mobilizing glucose into the bloodstream and cells from the stored glycogen to raise the blood glucose levels [19]. At the same time, another major hormone, glucagon, allows glucose to be released from glycogen as needed from the storage sites (predominantly within the liver and muscles) whenever the blood glucose levels are low [19]. The glucagon will then mobilize the glucose from the storage sites to increase the concentrations of glucose in the bloodstream. It is imperative that the pancreas and hormones respond appropriately to prevent complications and a lack of glucose and nutrients from getting to organs and tissues.

Pathophysiology in a diabetic patient
In the diabetic patient, the glucose is unable to “unlock” the cell and enter into the body’s cells, allowing it to stay in the bloodstream and induce a hyperglycemic state that denies the cells their source of energy [75]. Without therapeutic levels of glucose, the body cannot function adequately because glucose is the main fuel for the central nervous system (CNS). The brain cannot store glucose; therefore it requires a continuous supply. The body attempts to compensate for the insufficiency, however. When the cells are unable to absorb the glucose, they rely on fat and protein for energy. Fat (in the form of triglycerides) and proteins should only be utilized as “reserves” for fuel and not used as energy under normal conditions [19]. If the body continues to use fat and protein for the source of energy, the cells break down, inducing a form of emaciation, muscular atrophy and weakness [63,79].

Diabetes also causes insulin to either not be produced (Type 1 diabetes) or production to be decreased (Type 2 diabetes). In either instance, without an adequate supply of insulin, glucose is unable to properly move in the bloodstream to the tissues and organs, further exacerbating the cells that are starving for energy and nutrients for survival [2]. Over time, the patient will exhibit various symptoms due to the buildup of glucose in the bloodstream and lack of insulin production (See Signs and symptoms of diabetes)

Genetics plays an enormous role in predisposing individuals to develop diabetes. In Type 1, family members are at risk of developing diabetes throughout their life. Researchers have identified genetic markers that determine immune responses, specifically DR3 and DR4 antigens on chromosome number six of the human leukocyte antigen (HLA) system, amongst 95 percent of people diagnosed with type 1 diabetes [25, 53]. The inherited antibodies can be detected in the blood years before the development of any clinical symptoms.
In the general population without any genetic predisposition, an individual has a one in 400 to one in 1,000 risk; however, a child of a diabetic patient has a one in 20 to one in 50 risk [51]. Interestingly, the offspring of a mother with type 1 diabetes has a 3 percent risk that increases to 6 percent if the father is affected [53]. The risk increases tremendously among identical twins, up to 25 to 50 percent [53].

- **Age.** Type 1 diabetes can occur at any age; however, it is more common in children and young adults, typically under 40 years of age. Type 1 diabetes may account for 5 to 10 percent of all diagnosed cases of diabetes [53].

**Type 2 diabetes**

**Type 2 diabetes** was previously referred to as non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. Type 2 diabetes begins as insulin resistance, a disorder in which the cells do not utilize the insulin produced by the pancreas properly. As the need for insulin rises, the pancreas gradually loses its ability to produce insulin. In type 2, the body either does not make enough insulin (insulin deficiency), something interferes with the action of the insulin that is made by the pancreas (insulin resistance) or there is an increase in the hepatic glucose output [21]. Type 2 diabetes is the most common form nurses will care for in their career.

- Type 2 diabetes may account for about 90 to 95 percent of all diagnosed cases of diabetes. Type 2 diabetes is associated with older age, obesity, family history of diabetes, history of gestational diabetes, impaired glucose metabolism, physical inactivity and race/ethnicity – African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or other Pacific Islanders are at particularly high risk for type 2 diabetes (31). The prevalence of type 2 diabetes among African Americans is 1.6 times higher than that of the total U.S. population [50]. It is speculated that African Americans are at a higher risk because of correlating obesity and hypertension rates, especially among African American women [50].

- Type 2 diabetes is increasingly being diagnosed in children and adolescents due to genetics, a significant incline in childhood obesity and decreased activity [25, 75].

- The patient with type 2 diabetes typically presents as an obese patient with a family history of diabetes and a recent stressor, such as a death of family member, illness or loss of a job [75].

Although the origin is unknown, research has demonstrated that type 2 diabetes is influenced by genetics along with the combination of environmental factors. Type 2 diabetes is very complex and not all that well defined because there have been numerous susceptibility genes identified. The pathogenesis of type 2 diabetes revolves around genes that either influence viability or cellular responses to insulin or beta cell function or both [48].

- **Genetics.** Genetics plays an enormous role in the development of diabetes (90 percent). However, in contrast to type 1 diabetes, there is no identified HLA link. The maturity-onset diabetes of the young (MODY) is thought to be an autosomal dominant as it affects 50 percent of first-degree relatives. At this time, there are at least six types of MODY, and it is considered to be a subset of type 2 diabetes. Each specific type of MODY is caused by a specific mutation in the enzyme that is involved in the beta cell function and insulin action. For example, MODY3 develops after a mutation occurs in the hepatocyte nuclear factor alpha-1, and MODY2 can be attributed to a defect in the glucose-sensing ability (glucokinase mutation). Since only 2 to 5 percent of cases of diabetes are monogenic, they are classified as MODY [48].

- **The offspring of people with type 2 diabetes have a 15 percent chance of developing type 2 diabetes and a 30 percent risk of developing glucose intolerance (inability to metabolize carbohydrates normally).**

- **Race/ethnicity.** Type 2 diabetes is prevalent in half of all black and Hispanic children and in over two-thirds of American Indian children [46].

- **Environment.** Environmental triggers can be exacerbated by exposure to a viral infection (mumps, rubella or coxsackievirus B4) and chemical toxins (smoked and cured meats) [53].

- **Modifiable risks.** There are certain risks that patients have the power to potentially change and control in their life, such as:

  - **Obesity.** Obesity is defined as being at least 20 percent over the recommended body weight for an individual’s height and weight or having a body mass index (BMI) of at least 27 kilograms per meter squared (kg/m2) [53]. When an individual is obese, it hinders the ability of glucose to enter the liver, adipose tissue and skeletal muscle [48]. Intrabdominal obesity is the single most important risk factor in determining who is at risk of developing type 2 diabetes. Research has demonstrated that severe obesity creates 10 times the risk of developing type 2 diabetes. In addition, having an excessive caloric intake contributes to obesity and predisposes an individual to type 2 diabetes [48].

  - **The fat accumulation in nonadipose tissue (ectopic fat) is very common in insulin resistance and type 2 diabetes.** The accumulation of lipids in the islets can be attributed to the impairment of insulin secretions, and insulin resistance has been attributed to excess fat in the muscle. Nonalcoholic steatohepatitis is the infiltration of fat within the liver and may result in cirrhosis and hepatic failure. Very little is understood about the pathogenesis of ectopic fat, but overnutrition is clearly the main culprit. Pancreatic fibrosis, which occurs in 33 to 66 percent of type 2 diabetics, can also contribute to the loss of beta cell function.

- **Physical inactivity.** The Diabetes Prevention Program, DPP a prevention study of persons at significant risk for diabetes, found that losing weight and increasing physical activity reduced the development of type 2 diabetes by 58 percent during a 3-year period. The reduction was even greater (78 percent) in adults 60 years of age and older (31).

- **Hypertension (greater than 130/85 in adults), High density lipoproteins (HDL) cholesterol less than35 mg/dl and/or a triglyceride level greater than 250 mg/ dl. (78).**

- **Insensitivity to insulin.** Interestingly, patients living with or at risk for diabetes typically have a cellular resistance factor 60 to 80 percent of the time. Resistance to insulin also increases with obesity and a condition called metabolic syndrome. An integral part in the pathogenesis of type 2 diabetes and metabolic syndrome is the decrease in beta cell responsiveness to the plasma glucose levels as well as abnormal glucagon secretions. (See the subsequent section for further explanation).

**Pre-diabetes and insulin resistance (metabolic syndrome)**

Type 2 diabetes does not just occur overnight; often a patient will have one of the following conditions before being diagnosed with diabetes [29, 57]:

1. **Prediabetes is a condition in which a patient will have a higher-than-normal blood glucose level but not high enough to be classified as diabetes.** People with prediabetes have an increased risk of developing type 2 diabetes, heart disease and a stroke. Prediabetes is a condition that needs to be assessed and monitored by health care professionals because of the seriousness and the risk of developing complicating diseases. As noted, 79 million Americans ages 20 years or older are estimated to have pre-diabetes.” (58).

- **People with prediabetes have impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT)** [19, 29, 52]:

  - **IFG is a condition in which the fasting blood sugar level is 100 to 125 milligrams per deciliter (mg/dL) after an overnight fast.** This level is higher than normal but not high enough to be classified as diabetes.

  - **IGT is a condition in which the blood sugar level is 140 to 199 mg/dL after a two-hour oral glucose tolerance test (OGTT).** This level is higher than
2. **Insulin resistance** (commonly referred to as metabolic X syndrome) is a condition in which the body produces insulin but does not use it properly. Over the past decade, there has been a lot of hype correlating diabetes, metabolic syndrome and cardiovascular disease. However, it should be noted that since the late 1960s, research has demonstrated a significant association among diabetes, hypertension, obesity and hyperlipidemia [1]. Then, in the early 1990s, researchers discovered that the same chronic cluster of disorders was caused by insulin resistance and concluded that “insulin resistance syndrome” (syndrome X and metabolic syndrome) was the appropriate name for this condition. At the same time, researchers discovered from the Framingham Offspring Study that a clustering of risk factors, including hyperinsulinemia, dyslipidemia, hypertension and glucose intolerance (rather than hyperinsulinemia alone), characterized the underlying features of the insulin resistance syndrome [1].

Individuals who are insulin resistant are unable to respond appropriately to insulin, and as a result, their bodies need more insulin to help glucose enter cells. The pancreas tries to keep up with this increased demand for insulin by producing more, but eventually the pancreas can’t keep up with the body’s needs. So excess glucose builds up in the bloodstream, setting the stage for diabetes. Many people with insulin resistance have high levels of both glucose and insulin circulating in their blood at the same time. Insulin resistance increases the chance of developing type 2 diabetes and heart disease.

A diagnosis of prediabetes or insulin resistance does not mean that diabetes and/or heart disease will definitely develop over the next few years. However, it should be looked upon as a wake-up call to make lifestyle changes to prevent or delay diabetes. According to the CDC (2008) [29]:
- Progression to diabetes among those with prediabetes is not inevitable. Studies have shown that people with prediabetes who lose weight and increase their physical activity can prevent or delay diabetes and return their blood glucose levels to normal.
- The DPP, a large prevention study of people at high risk for diabetes, showed that lifestyle intervention reduced developing diabetes by 58 percent during a three-year period. The reduction was even greater, 71 percent, among adults age 60 or older.
- Interventions to prevent or delay type 2 diabetes in individuals with prediabetes can be feasible and cost-effective. Research has found that lifestyle interventions are more cost-effective than medications.

Typically, patients with insulin resistance (metabolic X) and/or prediabetes do not exhibit any diabetic symptoms, and they may have one or both conditions for several years without noticing anything. People with a severe form of insulin resistance (metabolic X) may have a condition called acanthosis nigricans – dark patches of skin, usually on the back of the neck, elbows, knees, knuckles, and the armpits – an early sign of prediabetes. Nurses and health care providers need to be attuned to the major risk factors (similar to the development of diabetes). According to the NDIC (2008) and the ADA, the risk factors for prediabetes, insulin resistance (Metabolic X) and diabetes are typically the same [57].

Research has demonstrated that 25 percent of the general nonobese, nondiabetic populations have insulin resistance at a magnitude similar to type 2 diabetes [53]. It occurs more frequently in men and Mexican Americans between the ages of 20 to 70. While metabolic syndrome may have a basis from a genetic standpoint, other influential environmental factors may be involved, including lack of exercise, excess nutrients and obesity [48]. Metabolic syndrome has a group of clinical traits that, when combined together, increase the risk for developing cardiovascular disease significantly. According to the American Heart Association (AHA) and the National Heart, Lung and Blood Institute, metabolic syndrome is diagnosed when a minimum of three of the following criteria are met [48]:
- Elevated waist circumference (abdominal obesity). Increased abdominal adiposity (waist greater than 40 inches in men and greater than 35 inches for women). The excess fat in the intra-abdominal area is a huge component of the metabolic syndrome. The majority of experts concur that the combination of obesity, obesity-related cytokines called adipokines, excess nutrients and inflammatory cytokines are the main contributors to beta cell death and insulin resistance in type 2 diabetes. Regardless of which event occurred, the mechanisms that are responsible for insulin receptor binding or postreceptor can be reversed by weight loss [48].
- Elevated triglycerides (TG) greater than 150 mg/dl.
- Reduced HDL cholesterol (less than 40 mg/dl in men and less than 50 mg/dl for women).
- Fasting blood glucose (Hyperglycemia) greater than 100 mg/dl.
- Increased blood pressures (130/85 mm Hg or greater).

Research has also correlated other risk factors, such as physical inactivity, aging, hormonal imbalance and genetic predispositions [75].

Insulin resistance and prediabetes are diagnosed by one of the following laboratory tests [57]:
- **Fasting glucose test.** This test measures blood glucose in people who have not eaten anything for at least eight hours. This test is most reliable when done in the morning. Fasting glucose levels of 100 to 125 mg/dL are above normal but not high enough...
to be called diabetes, so that level is called prediabetes or IFG. People with IFG often have had insulin resistance for some time and are much more likely to develop diabetes than people with normal blood glucose levels.

- **Glucose tolerance test.** This test measures blood glucose after people fast for at least eight hours and two hours after they drink a sweet liquid provided by a doctor or laboratory. A blood glucose level between 140 and 199 mg/dL means glucose tolerance is not normal but is not high enough for a diagnosis of diabetes. This form of prediabetes is called IGT and, like IFG, it points toward a history of insulin resistance and a risk for developing diabetes.

For over a decade, the WHO, AHA and the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III have recognized and appreciated the significant correlation of metabolic syndrome, diabetes and cardiovascular disease [1,20]. Throughout their research they have seen a significant prevalence of metabolic syndrome with worsening glucose tolerance from 26 percent in patients with normal fasting glucose rising to 86 percent in those with diabetes. Metabolic syndrome is a very common disorder in the U.S. population for people over the age of 50. In contrast, diabetes without metabolic syndrome is uncommon in the over-50 population (only 13 percent of diabetic patients do not meet criteria for metabolic syndrome) [1].

In contrast, the ADA and the European Association for the Study of Diabetes state there is no solid evidence that any of the metabolic syndrome health factors contribute more together than they do individually. In other words, the whole is not greater than the sum of its parts. The authors recommend that doctors should [15]:

- Aggressively treat the individual health factors that lead to heart disease (diabetes, insulin resistance, unhealthy triglyceride and cholesterol levels, high blood pressure, and signs of kidney disease).
- Continue to evaluate patients for other risks that can lead to heart disease.
- Avoid labeling patients with the term “metabolic syndrome.”
- Avoid prescribing a treatment for the “syndrome” until new, solid evidence is found.

However, many health care providers have recognized the significant correlation of metabolic syndrome diabetes and cardiovascular disease. The American Academy of Family Physicians (AAFP) (2004) believes metabolic syndrome will overtake cigarette smoking as the No.1 risk for developing cardiovascular disease [18]. It is imperative to monitor and diagnose this condition as it significantly correlates to an increased risk of the patient developing type 2 diabetes and heart disease [75].

According to the NDIC (2008), people whose test results indicate they have prediabetes should be educated about changing their lifestyle behaviors, and their blood glucose levels be rechecked in one to two years. At the time of diagnoses or recognizing a patient with the risk factors for developing diabetes, clinical research trials have demonstrated that the patient and family should be educated on the following [57]:

- The first therapy should always be an intensive lifestyle modification program because weight loss and physical activity are much more effective than any medication at reducing the risk for developing diabetes.
- At this time, several drugs have been shown to reduce diabetes risk to varying degrees, but at this time there is no drug approved by the U.S. Food and Drug Administration (FDA) to treat insulin resistance, prediabetes or to prevent type 2 diabetes. However, the ADA recommends the initiation of Metformin (See Medication Modalities for Type 2 Diabetics).

### Gestational diabetes

**Gestational diabetes**

Gestational diabetes (GDM) is a form of glucose intolerance that is diagnosed in some women during the later part of their pregnancy. The risk increases especially if the pregnant woman has coinciding risk factors for type 2 diabetes [75]. During pregnancy, the extra metabolic demands required to support the pregnancy and potential other co-morbidities or risk factors may cause the onset of diabetes. Throughout the pregnancy, the woman’s hormones are providing growth for the baby, but these same hormones also block the action of the mother’s insulin in her own body, potentially leading to insulin resistance.

In a normal pregnancy, there are complex alterations in the maternal glucose metabolism, insulin production and metabolic homeostasis. It is imperative that these complex alterations occur to ensure adequate nutrition for the mother and developing fetus [77]. Glucose is the primary fuel used by the fetus through the process of carrier-mediated diffusion, implying it is directly proportional to the maternal levels. At 10 weeks gestation, the fetus secretes its own insulin at adequate levels to balance the glucose ingested by the mom. Therefore, as the maternal glucose levels rise, the fetal glucose levels are increased, resulting in increased fetal insulin secretion. Each of the metabolic changes is elaborated upon as follows [77]:

- During the first trimester (through week 12 gestation), the pregnant woman’s metabolic status is influenced by the rising levels of estrogen and progesterone. The hormones stimulate the beta cells in the pancreas to increase insulin production, promoting increased peripheral utilization of glucose and decreased blood glucose with fasting levels being reduced by approximately 10 percent. There is an increase in tissue glycogen stores and a decrease in the hepatic glucose production, which further increases the risk of hypoglycemia occurring during the first trimester.
- During the second and third trimesters, the pregnancy exerts a diabetogenic effect on the maternal metabolic status, thus increasing the risk of developing diabetes. Since there are significant hormonal changes occurring throughout this period, there is a decreased tolerance to glucose, increased insulin resistance, decreased hepatic glycogen stores and increased hepatic production of glucose. Maternal insulin requirements gradually increase from 18 to 24 weeks gestation to about 36 weeks. At 36 weeks, insulin requirements usually level off until labor begins.
- At birth (typically between 38 and 40 weeks gestation), the expulsion of the placenta prompts an abrupt decrease in levels of circulating placental hormones, cortisol and insulinase. Therefore, the maternal tissues quickly regain their prepregnancy sensitivity to insulin and she does not receive insulin unless the blood glucose level is greater than 200 mg/dL.
  - If the new mom is not breastfeeding, the prepregnancy insulin-carbohydrate balance returns in about seven to 10 days.
  - If the new mom is breastfeeding, lactation uses maternal glucose, thus the breastfeeding mom’s insulin requirements will remain low as long as she is nursing.

There are several risk factors that predispose women without a prior diabetic history to develop GDM, such as [27, 48]:

1. Family history of diabetes.
2. Delivering a baby greater than 4,000 g (macrosomia).
3. Belonging to one of the high-risk ethnic groups (similar to the type 2 diabetic).
4. Older than 25 years of age.
5. Body Mass Index (BMI) greater than 25kg/m².
6. PCOS.
7. Prior history of GDM and/or a history of complications of obstetrical associated with gestational diabetes (stillbirth).

### Other/rare forms of diabetes

- **Latent autoimmune diabetes in adults** (LADA), also referred to as 1.5 diabetes or double diabetes, is diagnosed in individuals over the age of 30. The individuals demonstrate signs and symptoms of both type 1 and type 2 diabetes. Initially, the individual with LADA will still produce their own insulin, similar to a type 2 diabetic, but within a few years must take insulin to control blood glucose levels. In LADA, as in type 1 diabetes, the beta cells of the pancreas stop making insulin because the body’s immune system attacks and destroys them [55].

- **Diabetes related to genetic conditions**, such as maturity-onset diabetes of youth (MODY) or mutated genes. These rare genetic forms of diabetes are elaborated as follows per the current medical diagnosis and treatment (CMDT) 2007 guidelines [53]:
  - **MODY** is a rare monogenic disorder characterized by noninsulin diabetes with an autosomal dominant inheritance in a person younger than 25 years of
age. Typically, the patient presents with hyperglycemia related to impaired glucose, induced secretion of insulin and is nonobese.

- **Diabetes due to mutant insulins** is a rare form of nonobese type 2 diabetes with an autosomal dominant genetic disposition in which the individual has only one normal insulin gene. The diabetes is mild and does not appear until middle age.

- **Diabetes due to two mutant insulin receptors genes.** Over 40 percent of all diabetic patients have a defect in one of their insulin receptor genes; however it is rare for it to occur in two. If an individual has two mutant insulin receptor genes, it will be noted in infancy. The newborn will have a leprechaun-like phenotype and unfortunately, rarely survives.

- **Diabetes associated with a mutation of mitochondrial deoxyribonucleic acid (DNA) impairs the transfer of leucine or lysine into mitochondrial proteins.** This rare form is transmitted only by the mother because sperm do not contain mitochondria. Typically the diabetes is mild and the patient responds to oral hypoglycemic agents. Interestingly, two-thirds of the patients with this form of diabetes have a hearing loss, and others in smaller amount (15 percent) may have coinciding Myopathy (muscular weakness), Encephalopathy (degenerative brain injury), Lactic Acidosis and Strokelike episodes (MELAS).

- **Wolfram's syndrome** is an autosomal recessive neurodegenerative disorder that presents in childhood. Wolfram's syndrome consists of Diabetes Insipidus (DI), Diabetes Mellitus (DM), Optic Atrophy and Deafness (DIDMOAD). At this time there is no treatment for DIDMOAD, and the patient typically lives to about 30.

- Other rare forms of diabetes may result from one of these [31, 55]:
  - Surgery.
  - Drugs (steroid hormones, Dilantin, thiazide diuretics and thyroid hormones as they may impair the normal action of insulin).
  - Malnutrition.
  - Infections.
  - Other illnesses (pancreatitis or cystic fibrosis).

All of the rare forms of diabetes, including the mutated genes and genetic predispositions, account for 1 to 5 percent of all diagnosed cases of diabetes [31]. Due to the rare cases, little data is available online and/or in textbooks elaborating upon the details and mechanisms.

**Signs and symptoms of diabetes**

Many times, patients may be unaware of their potential risk or living unknowingly with diabetes. The initial signs and symptoms of diabetes may be very subtle, and a patient may assume it is related to another reason. The classic signs and symptoms of diabetes in general are the “three polys”; polyuria (excessive urine output), polydipsia (increased thirst), and polyphagia (extreme hunger) [63]. Other clinical signs noted during a clinical exam, revealed in blood and urine tests, include: hyperglycemia, glycosuria (glucose in the urine) and ketonuria (ketones in the urine) [49, 63, 78]:

- **Polyuria** occurs from increased glucose circulating in the blood, resulting in hyperglycemia. The hyperglycemia causes serum hyperosmolality, drawing water from the intracellular spaces into the general circulation. All of the extra fluid increases blood volume, leading to an increase in flow to the kidneys. The buildup of glucose, especially in the renal tubules, acts as an osmotic diuretic, thus increasing urine output.

- **Polyuria** can be measured in the urine when the blood glucose level exceeds the renal threshold for glucose, usually about 180 mg/dl. The condition is called glucosuria.

- **Polydipsia** occurs due to a decrease in the intracellular spaces. Water is pulled out into the general bloodstream and then compounded with an increased urinary output leading to dehydration and the patient having an urge to drink continuously.

- The glucose is unable to enter the cell without insulin, therefore the energy level declines (fatigue), but it will stimulate the patient to have the urge to eat more (polyphagia). It is important to note that although the patient is increasing food intake, he or she will typically lose weight (maybe even become emaciated) because as the body loses water, it will break down proteins and fats in attempt to replenish the energy source.

Other potential signs and symptoms of diabetes are [8, 45, 48, 53, 78]:

- Dehydration leading to hemoconcentration (increased blood concentration), hypovolemia (decreased blood volume), hyperviscosity (thick concentrated blood), hypoperfusion (decreased circulation) and hypoxia (poor tissue oxygenation).

- **Unusual weight loss** related to the breakdown of protein and fats and depletion of water, glycogen and triglycerides due to the lack of insulin. Therefore, reduced muscle mass occurs as the amino acids are diverted to form glucose and ketone bodies [8, 10].

- **Increased fatigue** due to a lack of energy from inappropriate absorption of glucose in the cells.

- **Irritability** due to fluctuations and/or changes in the blood glucose levels.

- **Blurred vision** typically occurs with polydipsia as it often develops when the lens are exposed to hyperosmolar fluids.

- **Postural hypotension** results from a lower plasma volume.

- **Paresthesias** (numbness and tingling of the lower extremities; “feeling the limbs are asleep”) may or may not be present at the time of diagnosis as a result of a temporary dysfunction of peripheral sensory nerves. Paresthesias typically resolves once insulin is replaced and the glycemic levels are restored to a homeostasis level.

In addition, health care professionals should always contemplate a potential diagnosis of diabetes in women who have delivered large babies (macrosomia; greater than 9 pounds, or 4.1 kilograms), history of polyhydramnios (excess amount of amniotic fluid in the sac; occurs in 1 to 2 percent of all pregnancies) or pre-eclampsia or unexplained fetal loss, even if she did not develop GDM [53].

- **Type 1 diabetes** affects the metabolism of fat, protein and carbohydrates so glucose accumulates in the blood and leaks into the urine when the glucose exceeds the kidney’s ability to excrete it appropriately. Type 1 diabetes is correlated to the destruction of beta cells. Unfortunately, the patient typically does not exhibit any signs or symptoms until 80 to 90 percent of them are destroyed and insulin falls to critically low levels [63]. The major initial clinical manifestations noted in type 1 diabetes include the “three polys” [48].

- **Type 2 diabetes** is typically more nonspecific because the patient will often complain of polyuria and polydipsia along with often being overweight, hyperlipidemic (high lipid levels) and high blood pressure. However, children and adolescents may not present with only symptoms of polydipsia or polyuria and acanthosis nigricans [25]. Children often present with a preceding minor illness, such as a flulike episode prior to being diagnosed with diabetes [46]. In addition, there have been several cases of children and adolescents who were undiagnosed with type 2 diabetes who had reported to the emergency room or their primary care provider in a hyperglycemic hyperosmolar state (HHS) that was confused with a diabetic ketoacidosis (DKA) and unfortunately had a high mortality rate due to the lack of recognition and proper treatment [25]. (See the section, Hyperglycemia and Diabetes for further explanation).

The type of obesity fat seen in type 2 diabetic patients is predominately distributed on the upper segments of the body (especially in the abdomen, chest, neck and face) and less often on the appendages [53]. However, nurses should never think that type 2 diabetes occurs in only obese patients. Some who suffer it can be emaciated due to the breakdown of fat and protein. Another aspect in type 2 diabetes is the onset is usually slow and insidious, making the diagnosis difficult [48, 53]. Since the symptoms may be very subtle and/or intertwined with other co-morbidities, it is important to ensure the primary care provider recognizes other manifestations such as [8]:

- **Recurrent infections**, which are common due to the proliferation of
increasing glucose circulating in the blood stream, impairing the blood supply and thus hindering the healing process.

- **Acanthosis nigricans**, a hyperpigmentation and thickening of the skin with velvety irregularities apparent in skin folds of the neck, axillae, elbows, knees, groin and abdomen [25].
- **Genital pruritus**, common especially in women due to circulating glucose and glycosuria (glucose excreted in the kidneys) which both promote the growth of fungus, such as Candida.
- **Visual changes** that occur from the water balance in the eye fluctuating due to increased glucose levels.
- **Type 2 diabetes** has a unique manifestation, **HHS**, characterized by a plasma osmolarity of 340 mOsm/L (greater than the normal range of 280-300 mOsm/L), elevated blood glucose (greater than 600mg/dl and may be as high as 1,000 to 2,000 mg/dl) and an altered level of consciousness [53]. HHS is a serious, life-threatening complication of type 2 diabetes (See Hyperglycemia and Diabetes for further explanation).

**Gestational diabetes** may or may not have any present symptoms. Many women remain asymptomatic throughout their pregnancy if they have no previous history of diabetes prior to conceiving. However, if a woman is at risk or may be developing symptoms, she may test positive with polyuria and glycosuria during her routine prenatal care appointments and she may complain of any of the following symptoms [22]:

- Polydipsia.
- Frequent urination.
- Fatigue.
- Nausea.
- Frequent infections of bladder, vagina and skin.
- Blurred vision.

**Screening and diagnosing diabetes**

There are over 7 million people in the U.S. living unknowingly with diabetes. Health care professionals must learn to recognize the symptoms and then educate patients and the community to ensure people recognize the signs and symptoms to prevent long-term complications. Some patients may present to their health care provider with the classic symptoms of the “three polys” (polyuria, polydipsia and polyphagia). Others may be diagnosed as they present for another concern or complaint. Unfortunately, there are some patients who skip through the radar because they avoid seeing doctors or they do not have access to adequate health care.

Health care professionals typically complete a routine urinalysis on each of their patients because it is relatively inexpensive. All patients over the age of 3 will have a urinalysis completed before seeing their health care provider. In a routine urinalysis, the health care provider will be able to screen for the following presence of glucose, but the test is not used for diagnostic measures [34, 53]:

- Glycosuria (sensitive to picking up less than 0.1 percent of glucose in urine) occurs when the renal threshold for glucose is exceeded (180 mg/dl or greater) due to osmotic diuresis [25].
- Ketonuria, with any amount found a concern as it may imply the possibility of diabetic ketoacidosis (DKA). Ketonuria occurs due to an abnormal breakdown of fatty acids (the backup source of energy) that may accumulate in the blood and urine when insulin is not available [49].

If glucose and/or ketones are found on the urinalysis, then the health care provider will initiate blood testing to confirm a diagnosis of prediabetes (insulin resistance/metabolic syndrome) or diabetes. However, nurses should realize there are different recommendations circulating among health care professionals to screen for diabetes, so the practice of the primary care provider may be different.

1. **Children**

Since 2007, the ADA and the American Academy of Pediatrics (AAP) have recommended a fasting blood glucose (FBG) at the age of 10 or the onset of puberty, and every two years if overweight (BMI greater than 85th percentile for age and sex), plus two additional risk factors (family history of diabetes in a first- or second-degree relative; high risk race/ethnicity; signs of or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, or PCOS) [32, 45].

2. **Adults**

Since 2003, the U.S. Preventive Services Task Force (USPSTF) has recommended that adults with high blood pressure or high cholesterol be screened for type 2 diabetes (insulin-resistant diabetes) as part of an integrated approach to reduce their risk of cardiovascular disease, but concluded that further research is needed to determine whether widespread screening of the general population would improve health outcomes [62].

The National Guideline Clearinghouse (2009) and Current Practice Guidelines (2008) recommend that between the ages of 18 and 39, screening may be indicated in patients with risk factors for diabetes, previously identified impaired FBG or OGTT, history of GDM, hypertension, HDL-C less than 35 mg/dl and/or triglyceride greater than 250 mg/dl, PCOS, or history of vascular disease. Beginning at the age of 45, a fasting plasma glucose is recommended every three years on all patients, especially if the patient has a body mass index greater than 25 [45, 59].

The ADA (2007) guidelines are partially congruent with the previous recommendations that screening should begin with a FBG or OGTT every three years, beginning at the age of 45, especially if BMI greater than 25. In addition, screening should be initiated earlier and more frequently in overweight patients with diabetes risks factors (family history, high risk ethnic group, history of impaired glucose testing, GDM, mother with an infant birth weight greater than 9 pounds, comorbid conditions hypertension (greater than 140/90), dyslipidemia HDL less than 35mg/dl or Triglycerides (TG) greater than 250 mg/dl), overweight (BMI greater than 25), PCOS or acanthosis nigricans, history of vascular disease and/or habitually physically inactive [45,81].

3. **Adults with comorbid hypertension or dyslipidemia (metabolic syndrome)**

The AAFP (2007) and USPSTF (2003) recommend screening for type 2 diabetes in patients with hypertension and/or dyslipidemia due to the potential correlating metabolic syndrome and risk for developing type 2 diabetes. However the specific testing and frequency is not mentioned or suggested. There is strong evidence that in hypertensive patients, the health care provider needs to be more aggressive in controlling the blood pressure when diabetes is coinciding [45].

According to the Journal of Family Practice (2009), research reiterates the information provided by the AAFP and USPSTF that although there are no specific guidelines for patients with hypertension (HTN) or dyslipidemia, practitioners should still educate their patients at risk. In addition, unless the patient meets another guideline or recommendation, then all patients should be screened beginning at 45 per the ADA [60].

4. **Pregnant women**

The USPSTF (2003) and AAFP (2007) have found insufficient evidence that routine screening for gestational diabetes substantially improves the health of mothers or their babies, although it is implemented in care among pregnant women between 24 and 28 weeks gestation [45,62].

According to the ADA (2007), all pregnant women should be screened for the potential risk of developing GDM at their first prenatal visit [45]:

- A woman with a high risk of developing GDM (obesity with a BMI greater than 27, family history, personal history of GDM, glycosuria, previous delivery of a large for gestational age infant, or PCOS), is urged to get an OGTT completed as soon as possible. If an OGTT is not completed with the initial testing, then the woman should be tested between 24 and 28 weeks gestation.
- A woman with an average risk of developing GDM is recommended to test between 24 and 28 weeks gestation.
- A woman with a low risk of developing GDM (less than 25 years old, not of Hispanic, African, Native
American, South or East Asia or Pacific Islander ancestry], with weight normal before pregnancy, no history of abnormal glucose tolerance, no previous history of poor obstetric outcome and no known diabetes in a first-degree relative) is no glucose testing is recommended.

Most health care providers also will order a routine electrolyte panel at least annually, regardless of any symptoms or family history due to the prevalence of diabetes in our country. However, according to the Quality Adjusted Life Year (QALY) (2004), failure of health care providers to adhere to the recommended guidelines is not cost-effective for our health care system and budget [45].

Before assessing fasting blood glucose (FBG) or OGTT, the patient should be free from any acute illnesses. If so, then the nurse should instruct the patient three days before testing to continue a regular diet with at least 150 to 200 grams (g) of carbohydrates daily and then no caloric intake at least eight hours before the test [35]. If the patient is having a serum fasting blood glucose, the blood will be taken upon arrival at the laboratory. However, if the patient has been ordered an OGTT, the patient will be instructed to drink 75 to 100 g of glucose over five minutes. OGTT may be ordered for one or two hours in nonpregnant adults [35].

The ADA and AAFP (2007) and the USPSTF (2003) comply with the following acceptable diagnostic measurements for children and nonpregnant adults [35, 45, 46, 53]:

- **Diabetes** is diagnosed by:
  1. A fasting blood glucose level greater than 126 mg/dl on two or more occasions (a normal FBG is less than 100 mg/dl).
  2. A random plasma glucose concentration greater than 200mg/dl taken at any time, regardless of the last meal.
  3. Two-hour plasma oral glucose tolerance test (OGTT) greater than 200 mg/dl (two hours after ingesting 75g of a glucose load). A normal FBG level for nondiabetics is 70-110 mg/dl. A normal OGTT is less than 140mg/dl. There are certain medications that may skew the OGTT, such as diuretics, contraceptives, glucocorticoids, niacin and phenytoin [10].

- **Prediabetes** (High risk for developing diabetes). Normoglycemia is defined as a plasma glucose level less than 100 mg/dl in the FBG and less than 140 mg/dl in the two hour OGTT.
  1. Impaired glucose tolerance (IGT) is diagnosed in a patient without any prior history of diabetes by:
     - FBG greater than 126mg/dl and a plasma glucose 140-200mg/dl
     - 2 hour-OGTT 140 mg/dl, but less than 200 mg/dl
  2. Impaired fasting glucose (IFG) is diagnosed in a patient without any prior history of diabetes by:
     - FBG 100-125 mg/dl and a plasma glucose less than140mg/dl.

It can be a little tricky to find a normal level because the levels may be different if a patient is pre-diabetic, undiagnosed or living with diabetes. The ADA and the American College of Endocrinology (ACE) have provided the following 2008 ranges to ensure compliance by patients and health care professionals; see Table 1 [3, 13].

Table 1: Diagnostic Results for Pre-diabetes and Diabetes

<table>
<thead>
<tr>
<th></th>
<th>Pre-diabetes per the ADA &amp; ACE</th>
<th>Living with Diabetes guidelines per the ADA and ACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal fasting blood glucose level</td>
<td>less than100 mg/dl</td>
<td>70–130 mg/dl</td>
</tr>
<tr>
<td>Postprandial (2 hours after eating)</td>
<td>less than140 mg/dl</td>
<td>less than180 mg/dl</td>
</tr>
</tbody>
</table>

Diagnostic for diabetes

- Fasting plasma glucose (FPG)
- 2 hours Postprandial (after eating) oral glucose tolerance test (OGTT)
- greater than 126 mg/dl
- greater than 200 mg/dl
- greater than 126 mg/dl
- greater than 200 mg/dl

Table 1 devised based upon the ADA & ACE literature review.

In a pregnant woman, the ADA and AAFP (2007) and USPSTF (2003) recommend the following diagnostic measurement for GDM [45, 67]:

- FBG greater than 126 mg/dl or a casual plasma glucose greater than 200mg/dl and precludes the need for an OGTT challenge.

However, most providers caring for pregnant women will order an OGTT between 24-28 weeks gestation. Diagnosis is confirmed if:

- Initial screening for gestational diabetes is accomplished by performing a 50-g, one-hour OGTT at 24 to 28 weeks of gestation. Normal should be less than 130 to 140 mg/dl; both are accepted. If the patient does not pass the one-hour test (results greater than 140 mg/dl), the woman will have to complete a 75 or 100-g, three-hour OGTT. The patient will be instructed to remain without food or drinks for eight to 12 hours before the exam. During the exam, she will be tested upon arrival to obtain a fasting level.

Then she will drink the 75- or 100-g glucose challenge within five minutes, and then be tested every hour for three hours and three-hours after she completes the glucose challenge.

Once diabetes is diagnosed, then the patient can anticipate having the following routine tests completed to monitor the management and appropriate care [36, 53]:

- **Chemistry profile** to assess the electrolyte panel, especially the blood sugar and kidney function.

- **FBG** will be ordered if the patient is experiencing any signs or symptoms of hypoglycemia or hyperglycemia because it is quick and cheaper than the chemistry profile. In addition, it may be ordered to assess for complications, such as DKA or HHS.

- **Glycosylated hemoglobin (c) (HbA1c)** is a laboratory test that should be monitored every six months if the patient is meeting specific treatment goals; otherwise it will be completed every three months. The HbA1c will be ordered approximately every three months to monitor the average glucose level over the previous three months; however it is not used as a diagnostic measurement for diabetes. Anytime the glucose level is elevated or erratic, glucose attaches to the hemoglobin molecule then remains there for the life of the hemoglobin, typically 120 days in a healthy person. The normal level should be below 7 percent, typically 4 to 6 percent in healthy individuals [34]. According to the CDC (2008), for every 1 percent reduction in results of A1C blood tests (e.g., from 8.0 to 7 percent), the risk of developing eye, kidney and nerve disease is reduced by 40 percent [30]. The ADA recommends all diabetics keep their HbA1c less than 7 percent [7].

- **Urinalysis** to assess for the presence of glucose, ketones and proteins [34]:
  1. The presence of glucose in the urine indicates hyperglycemia (greater than 180 mg/dl).
  2. The presence of ketones indicates that carbohydrates in the body are diminished and fats are broken down. If ketones are present in the urine, ketonuria is diagnosed and is an indicator of DKA. However, if DKA is speculated and the urine ketones are negative, rule out renal insufficiency as it may skew the data. If the kidneys are not functioning appropriately, the kidneys may not be able to filter the ketones, leading to a false negative.
  3. The presence of protein in the urine (microalbuminuria). Normally, less than 150 mg of protein is excreted in the urine within a 24-hour period. If microalbuminuria is noted, it is an early indicator of nephropathy in diabetic patients. It is important to assess for
of understanding the relationship between foods and insulin [25, 47].

- Typically, the ADA encourages most patients to be familiar with the following food groups:
  - **Carbohydrates** since they are the body’s main and preferred energy source. The ADA recommends that most patients limit their total carbohydrates to 40 to 60 percent of their total calorie intake; however it may be customized by the patient’s average blood glucose levels [49, 74]. Carbohydrates are composed of starches (breads, cereals, rice, and pasta), fruit, milk/yogurt, and sugars/sweets (gum, sodas, fruit drinks and pastries) [74].
  - **Fiber** is also considered a carbohydrate, but the body does not digest it. Therefore, it cannot raise the blood glucose level. Fiber is an important nutrient that promotes health by improving carbohydrate metabolism and lowering the patient’s cholesterol levels [19]. Main sources are whole grains, legumes, fruits and vegetables. All diabetics should be encouraged to increase the fiber in their diet to control their blood glucose as well as adhering to the recommended carbohydrates per meal [44]. The ADA recommends that individuals be ingesting 20 to 35 grams of fiber a day from a variety of sources [74].
  - The nurse should educate patients to increase fluids and to gradually add high fiber in their diets to reduce abdominal cramping, loose stools and flatulence [19]. In addition, increasing too much high fiber at one time can increase the risk of hypoglycemia.
  - **Proteins** help the body function appropriately by maintaining homeostasis and helping in the repair of tissues. Proteins are very complex, since there are complete proteins and nonproteins. A complete protein is a food that contains nine essential amino acids (found in meat, poultry, seafood, dairy products, eggs and soy) [74]. Incomplete proteins are missing one or more essential amino acids (beans, peas, nuts, seeds and vegetables) [74]. Protein is very important to patients with diabetes. The ADA recommends protein intake be approximately 15 to 20 percent of total calorie intake for people with normal kidney function [49, 74]. For patients with microalbuminuria (increased protein in the urine), protein should be reduced to 10 percent of their total calories a day to slow the progression of kidney failure [49].
  - For type 1 diabetics, protein has little effect on glucose levels if the patient is taking enough insulin. However, if the patient ingests large amounts of protein, it can increase the blood glucose level, thus increasing the insulin needed [74]. The newer school of thought per the ADA and research is to have the individual patient monitor his or her protein intake and blood glucose levels to assess whether any changes need to be addressed with their provider.
  - If the patient is a type 2 diabetic, protein stimulates the production of insulin; therefore a small rise in insulin does lower the blood glucose levels [74].
  - **Fat** is required in small doses to provide essential fatty acids, carry the fat soluble vitamins (A, D, E and K), maintain healthy skin and produce components needed for some hormones [74]. Similar to proteins, fat typically has little effect on the total blood glucose levels. However, it can affect the blood lipid levels, thus increasing the risk of heart disease. Therefore, the patient should avoid any fat high in trans-fatty acids [49].
  - **DASH diet.** The DASH diet may be encouraged and/or collaborated with the diabetic diet if the patient has a coinciding cardiac issue, such as HTN and/or dyslipidemia. The DASH diet emphasizes fruits, vegetables, low-fat dairy foods, whole grains, poultry, fish and nuts, while reducing saturated fats, red meat, sweets and sugar-containing beverages. Reducing sodium intake can further reduce blood pressure or prevent the increase in blood pressure that may accompany aging [20].

There are various approaches to acclimate patients and their families to the importance of maintaining a healthy balance of nutrition and controlling their diabetes. Since 1995, the ADA and the American Dietetic Association have adopted the United States Department of Agriculture (USDA) Food Guide Pyramid [74]. It is a great diagram and tool to teach about food groups and appropriate portion sizes. In addition, the ADA recommends different tools to plan the most appropriate meals for patients and families. People should understand that they can change their plans as they gain better control of their diabetes. Patients should always be referred to a registered dietician to help them customize their meals.
1. Carbohydrate counting is a practice that has been utilized for many years. In order to count the carbohydrates, the patient needs to know their allotted carbohydrates for the day based upon the individual food intake, lifestyle, diabetes medications and physical activity [40]. The RD will be the best health care professional to help the patient and family determine this daily allotment. Carbohydrate counting focuses on the total grams of carbohydrates, regardless of the source [49]. The ADA has determined the following advantages and disadvantages for carbohydrate counting [47, 49]:

- Advantages:
  - The patient may perceive it to be easier to focus only on the carbohydrates ingested on a daily basis.
  - Typically the patient is able to achieve a stable blood glucose control if their carbohydrate intake is consistent every day.
  - Patients on insulin or an insulin pump can match the carbohydrates ingested to the amount of insulin needed. For example, an initial formula of one unit of rapid acting insulin is administered for each 15 g of carbohydrates. Patients become proficient at reading their labels or weighing each item to ensure they calculate the appropriate insulin dosage required for that particular snack or meal.

- Disadvantages:
  - Although the patient may enjoy focusing on just one food group, it may also be a disadvantage if the patient loses focus on the other nutrient value of the food. For example, if a patient eats bacon or sausage for breakfast, the carbohydrates will be counted based upon the total number and type ingested. However, the patient may ignore the fat content, and too much fat exacerbates the risk of heart disease, cancer and weight gain.

2. Fat-gram counting is a practice that has been around for almost 30 years that helps the patient learn about eating a low fat diet to reduce the risk of cancer. Fat gram counting is helpful for type 2 diabetics who are overweight to help reduce their total weight.

- The ADA has determined the following advantages and disadvantages for fat-gram counting [47]:
  - Advantages:
    - Provides flexibility and control over the food choices ingested. Typically, the patient who counts fat grams will choose healthier foods such as low fat fruits, vegetables, grains and low-fat dairy products.
  - Disadvantages:
    - Blood glucose levels may be inconsistent because the patient is only focusing on the fat ingested.

3. Food exchange system is a unique way to group foods with similar nutritional values into lists to help the diabetic patient eat consistent amounts of nutrients [47]. It is probably the most popular since it was initiated back in the 1950s [74]. The ADA and the American Dietetic Association have actually published handy books, such as Exchange Lists for Meal Planning on three broad groups (the carbohydrates, meat and meat substitutes, and the fat group). In addition, there are books published every year that discusses the total number of nutrients based upon the patient’s food choices at restaurants and their ethnic/cultural considerations.

- The ADA has determined the following advantages and disadvantages for food exchanges [47]:
  - Advantages:
    - The patient has more knowledge of various nutrient groups and the correlation to their glucose level.
    - Typically it results in more consistency in the patient’s blood glucose levels.
  - Disadvantages:
    - It requires the diligent patience of the patient to truly grasp the concept of “exchanging” foods.

4. Calorie counting is a tool that has been encouraged for many years to lose, gain or maintain an individual’s weight. Similar to the carbohydrate counting, the RD will be more apt to customize it to the patient based upon their weight, height and activity level.

- The ADA has determined the following advantages and disadvantages for calorie counting [47]:
  - Advantages:
    - Allows the patient to expand the choices of foods as long as he or she abides by the total calorie goal a day.
  - Disadvantages:
    - May be time-consuming to calculate the caloric content of each food ingested.

Nursing considerations and education for the diabetic patient in regards to nutrition [52]:

- Assess the blood glucose level for the type 1 diabetic and type 2 diabetic (on insulin) within one to two hours after meals to determine whether the insulin/carbohydrate regimen is adequate to emulate a “functioning” pancreas.
- If the patient is within an average weight (typical type 1 diabetic), encourage the patient to avoid gaining weight. Hyperinsulinemia (chronic high blood glucose levels) can occur with intensive treatment schedules and may result in weight gain.
- If the patient is overweight and/or obese (typical type 2 diabetic), reiterate to the patient the importance of monitoring and reducing their total intake of saturated fat, cholesterol and sodium levels, especially if they have coinciding conditions and comorbidities. Research has demonstrated that reducing the total calories by 250 to 500 a day and increasing physical activity improves diabetes and weight control. In addition, reducing 10 percent of the body weight can significantly reduce the HbA1c levels.

- Exercise. Exercising has phenomenal benefits on the metabolism of carbohydrates and insulin sensitivity [49]. According to the AAP (2004) and the AHA, all diabetic patients should be encouraged to exercise as it will improve physical fitness, emotional well-being, weight control, decrease cholesterol and triglyceride levels, and improve work capacity and decrease cardiac complications [5, 20]. Regular physical activity reduces very low density lipoprotein (VLDL) levels, raises HDL cholesterol, and in some people, lowers the LDL levels. It also can lower blood pressure, reduce insulin resistance and improve the function of the heart [70]. It should be important for the health care provider to find a level of activity that the patient can accomplish over the long term [18]. The AAFP (2004) recommends a combination of resistance and aerobic exercise, but any activity is better than none, and patients who have been sedentary need to start with walking and gradually increase duration and intensity [19, 20].

- Initially, the patient can be instructed to use low-weight dumbbells, elastic exercise bands or even heavy food containers that can provide the needed weight for resistance training.
- Instruct the patient to stretch for five to 10 minutes prior to performing any exercise, then have a five- to 10-minute cool-down period afterwards to reduce the risk of dysrhythmias.
- Gradually work up to aerobic exercise
for 40 to 60 minutes. Aerobic exercise includes walking briskly, running, jogging, stationary or regular bicycling, swimming, dancing, rowing and cross-country skiing as they each improve cardiac output. If the patient is a type 1 diabetic, the patient should limit the exercise time to 20 to 40 minutes four to seven days a week.

- Nursing considerations and exercise education for the diabetic patient [19]:
  - Assess the blood glucose level before exercise.
    - If the patient is hyperglycemic (greater than 250 mg/dl), check the urine for ketones. If the patient has positive ketones, the patient should be instructed not to exercise because exercise would cause the patient to become hyperglycemic.
    - Type 1 diabetics should only perform vigorous exercise if their blood glucose levels are 80 to 250 mg/dl and no ketones are present.
    - Although the patient is at risk of becoming hyperglycemic, the patient can also become hypoglycemic. Therefore, encourage the patient to keep a snack on standby. Type 1 diabetics are unable to make the shift in hormones because the inadequate insulin supply doesn’t allow proper flow of glucose to the cells. Hypoglycemia can occur during exercise and continue for up to 24 hours afterward, so patients might require an additional carbohydrate.
    - Avoid exercising within one hour of insulin administration or at the peak of the insulin. Exercise can increase the absorption of insulin from the injection site, increasing the blood glucose levels.
    - Avoid exercising in extreme cold or heat.
    - Assess for the following complications related to exercise:
      - If the patient has peripheral neuropathy, observe and limit the risk of foot and joint injuries. (See below, ADA recommendations for all diabetic patients to avoid injury).
      - If the patient has retinopathy, educate the patient to avoid the Valsalva maneuver and activities that increase the blood pressure because heavy lifting, rapid head motion or jarring activities can cause hemorrhage or retinal detachments.
      - If the patient has nephropathy, exercise may increase proteinuria (microalbuminuria).
      - It is important to note that the ADA recommends that all diabetic patients adhere to the following when they exercise to avoid injury and complications [10]:
        - Utilize proper fitting footwear.
        - Never walk barefoot.
        - Inspect the feet daily and after exercising.
        - Avoid exercise in extreme heat or cold.
        - Avoid exercise during periods of poor glucose control, avoid smoking to ensure adequate circulation, and any diabetic patient over 35 should have an exercise-stress electrocardiogram prior to any exercise routine.

- Stress management (illness, surgery, corticosteroid therapy). Any time a diabetic patient is ill, the blood glucose levels will increase, even though the intake has diminished [49]. The nurse should educate all patients on the following [25, 49]:
  - Assess the blood glucose levels at least four times a day while ill. As with patient exercise, assess the urine ketones if the glucose level is greater than 250 mg/dl.
  - Encourage the patient to continue taking the usual insulin dose or an oral hypoglycemic agent.
  - Encourage the patient to drink extra fluids, sipping 9 to 12 ounces of fluid each hour.
  - Encourage the patient to substitute easily digested liquids or soft foods if solids are not being tolerated.
  - Encourage the patient to notify their health care provider if they are unable to eat for more than 24 hours or if vomiting and diarrhea last more than six hours.

- Monitoring blood glucose levels. Self-monitoring of the daily blood glucose level (SMBG) is important for the diabetic patient, and devices to do so are available to purchase. It is important that patients and their families are adequately trained on their specific machine to ensure accurate readings. It is also important to note that self-monitoring is vital for the patient to understand their average blood glucose readings, but a health care professional caring for the patient will not change the treatment plan based upon the patient’s home readings because there are multiple variables that may skew the data. The accuracy of self-monitoring results depends upon the patient adhering to the manufacturer’s directions and the following variables [68]:
  - Quality of the meter, test strips and patient’s training. The patient should always read and follow the directions from the manufacturer. Failure to comply may result in inaccurate results. In addition, if the patient has any sensory deficits or is unable to comprehend the directions, the nurse should encourage the patient to bring in their machine to ensure proper understanding and demonstration.
  - Patient’s hematocrit level. If the patient has a higher-than-normal hematocrit value, the patient will usually test lower on their SMBG than patients with normal hematocrit. In addition, if a patient has lower hematocrit values, their SMBG will test higher.
  - Other substances in the body may interfere with the testing results, such as uric acid (a natural substance in the body that can be more concentrated in some people with diabetes), glutathione (an “anti-oxidant” also called “GSH”), and ascorbic acid (vitamin C).
  - Altitude, temperature and humidity. Altitude, room temperature and humidity can cause unpredictable effects on glucose results. Therefore the patient should be referred to read the manufacturer’s directions if the climate changes or they travel to another part of the country.

The ADA recommends that all diabetics maintain their daily blood glucose levels as follows [7]:
1. Pre-prandial 70 to 130 mg/dl.
2. Postprandial less than 180 mg/dl.

- Collaborating with their health-care provider and endocrinologists
Typically, the patient’s diabetes will be ultimately managed by their primary health care provider, and then followed up by an endocrinologist or a cardiologist if other co-morbidities are present or as needed. Patients can expect their primary care provider or endocrinologist, whichever one is responsible for the treatment modalities, to see them every three months to assess their laboratory data (FBG, A1C, lipids). Other referrals include ophthalmologists and podiatrists. The patient should be seen annually unless their ophthalmologist or podiatrist informs them otherwise. It is important that any referrals or education are documented appropriately to avoid any potential complications to the patient and legal consequences for the health care provider.

In addition to the patient taking their diabetic agents (insulin and/or oral meds), the patient may be prescribed any or all of the following medications [24]:
- Annual flu vaccination to provide coverage two weeks to a month after...
hyperlipidemia/ŠBaby aspirin/ŠPneumonia vaccination can be administered anytime during the year. According to the ADA, for most people, one shot will provide protection for life and typically provides effectiveness 60 percent of the time against the deadliest pneumonia pneumococcus and meningitis. However, people under 65 who have chronic illnesses or weakened immune systems should discuss with their doctor a potential repeat vaccination every five to 10 years [9].

An Ace inhibitor (ACEI), such as Lisinopril, to help prevent the conversion of angiotension two, especially in the larger blood vessels, which causes vasoconstriction, may be prescribed. ACEI are ideal in diabetic patients to enhance vasodilatation, especially to the kidneys. The JNC 7 and the ADA recommend that the majority of patients with diabetes require two or more antihypertensive agents from different classes. Research has demonstrated that combining agents with two different mechanisms of action can result in an additive blood pressure lowering effect and may permit for lower doses of each agent to be used, possibly decreasing the potential for dose-related side effects. Furthermore, the National Kidney Foundation recommends that patients with chronic kidney disease (including albuminuria and/or nephropathy), should be treated with an ACEI and/or Angiotensin receptor blockers (ARB) (prevent the conversion in the smaller arterioles) in combination with a diuretic.

Baby aspirin up to 325mg every day.

Due to the coinciding hyperlipidemia/dyslipidemia, the third report of the expert panel on detection, evaluation and treatment of high blood cholesterol in adults (Adult Treatment Panel III) (ATP) and the national cholesterol education program (NCEP) recommend that the lipids should be controlled. The LDL cholesterol goal of therapy for most persons with diabetes should be less than 100 mg/dL. When LDL cholesterol levels are in the range of 100-129 mg/dL at baseline or on treatment, several therapeutic options are available [70]:

- Increasing intensity of LDL-lowering therapy.
- Adding a drug to modify atherogenic dyslipidemia (fibrate or nicotinic acid).
- Intensifying control of other risk factors including hyperglycemia.

Table 2: Drugs Affecting Lipoprotein Metabolism [69]:

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Agents and Daily Doses</th>
<th>Lipid/Lipoprotein Effects</th>
<th>Side Effects</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMG CoA reductase inhibitors (statins)</td>
<td>Lovastatin (20-80 mg), Pravastatin (20-40 mg), Simvastatin (20-80 mg), Fluvastatin (20-80 mg), Atorvastatin (10-80 mg), Cerivastatin (0.4-0.8 mg)</td>
<td>LDL-C ↓18-55%; HDL-C ↑5-15%; TG ↓7-30%</td>
<td>Myopathy; Increased liver enzymes</td>
<td>Absolute: -Active or chronic liver disease -Relative: -Concomitant use of certain drugs*</td>
</tr>
<tr>
<td>Bile acid Sequestrants</td>
<td>Cholestyramine (4-16 g), Colestipol (5-20 g), Colesevelam (2.6-3.8 g)</td>
<td>LDL-C ↓15-30%; HDL-C ↑3-5%; TG No change or increase</td>
<td>Gastrointestinal distress; Constipation; Decreased absorption of other drugs</td>
<td>Absolute: -dysbeta-lipoproteinaemia -TG greater than 400 mg/dL. -Relative: -TG greater than 200 mg/dL.</td>
</tr>
<tr>
<td>Nicotinic acid</td>
<td>Immediate release (crystalline) nicotinic acid (1.5-3 gm), extended release nicotinic acid (Niaspan ®) (1-2 g), sustained release nicotinic acid (1-2 g)</td>
<td>LDL-C ↓5-25%; HDL-C ↑15-35%; TG ↓20-50%</td>
<td>Flushing; Hyperglycemia; Hyperuricemia (or gout); Upper GI distress; Hepatotoxicity</td>
<td>Absolute: -Chronic liver disease -Severe gout -Relative: -Diabetes -Hyperuricemia -Peptic ulcer disease</td>
</tr>
<tr>
<td>Fibric acids</td>
<td>Gemfibrozil (600 mg BID), Fenofibrate (200 mg), Clofibrate (1000 mg BID)</td>
<td>LDL-C ↓5-20% (may be increased in patients with high TG); HDL-C ↑10-20%; TG ↓20-50%</td>
<td>Dyspepsia; Gallstones; Myopathy</td>
<td>Absolute: -Severe renal disease -Severe hepatic disease</td>
</tr>
</tbody>
</table>

If triglyceride levels are greater than 200 mg/dL, non-HDL cholesterol becomes a secondary target of cholesterol-lowering therapy.

See Table 2- Drugs affecting Lipoprotein Metabolism [69].

According to the AHA (2007), children (boys over 10 and girls after menarche) should also be placed on drug therapy if after a six- to 12-month trial of fat and cholesterol restricted dietary management [45]:

- LDL is greater than 190 mg/dL.
- LDL is greater than 160 mg/dL and there are a positive family history of premature cardiac heart disease and two or more risk factors.

The goal is to maintain the LDL less than 110 mg/dL to 130 mg/dL with a statin (HMG CoA reductase inhibitor).

Medication modalities for the type 1 diabetic

Patients living with Type 1 Diabetes are reliant on insulin for the rest of their lives. Failure to administer exogenous or endogenous insulin injections will result in death. Other patients who may be required to receive insulin include[53]:

- People with type 2 diabetes who are unable to control their glucose levels with oral antidiabetic drugs and/or diet.
- People with type 2 diabetes, who at the time of diagnosis are unable to achieve glycemic control, especially if blood glucose values are greater than 250 or 300 (depending on the health care provider), AIC greater than 10 or the patient initially presented in a DKA state [25].
- People with diabetes who are experiencing physical stress (infection, surgery or corticosteroid therapy) and are unable to control their blood glucose levels between 110 and 180 mg/dl per the ADA.
- People with type 2 diabetics who are already taking two oral agents but are unable to maintain glycemic control.
- Pregnant women, regardless of whether they have a previous history of any form of diabetes or GDM.
- People with DKA or HHS.
- People who are receiving high-calorie tube feedings or parenteral nutrition.

Insulin is derived from animals (pork pancreas) or synthesized in the laboratory from either an alteration of pork insulin or recombinant DNA.
technology, using strains of Escherichia coli (E.coli) to form biosynthetic human insulin. Insulin is an endogenous hormone, secreted by the beta cells of the pancreas to lower the blood glucose levels by stimulating glucose passage across the cell membranes and uptake into the cells [25]. In addition, insulin also promotes the conversion of glucose to glycogen and inhibits hepatic glucose production from glycogen [25]. It should be noted that there are different types of insulin and it should be prescribed on an individual basis.

Insulins are available in rapid-acting, short-acting, intermediate-acting and long acting preparations. (See Table 3- Insulin Preparation).

Once an individual has been diagnosed with type 1 diabetes, it is important to discuss the potential options of administering insulin since it is a lifelong commitment. Insulin therapy can be administered in one of the following manners:

1. Subcutaneous shot; dispensed in 100 units administered in one of the following manners:
   - A lifelong commitment. Insulin therapy can be potential options of administering insulin since it type 1 diabetes, it is important to discuss the

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Table 3- Insulin Preparation [25].

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Name</th>
<th>Onset (hours)</th>
<th>Peak (hours)</th>
<th>Duration (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid acting or</td>
<td>Lispro (Humalog)</td>
<td>Less than 15 minutes (typically 5 to 10 minutes)</td>
<td>30 to 60 minutes</td>
<td>3-4</td>
</tr>
<tr>
<td>ultra-shorting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>acting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short acting</td>
<td>Regular Humulin (R)</td>
<td>0.5-1.0</td>
<td>2-3</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>Regular Lletin II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Velosulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>Lente Humulin (L)</td>
<td>2</td>
<td>6-8</td>
<td>12-16</td>
</tr>
<tr>
<td>acting</td>
<td>Lente Lletin II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NPH Humulin (N)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NPH Lletin II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NPH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long acting</td>
<td>Ultralente (U)</td>
<td>2 No onset</td>
<td>16-20</td>
<td>24+</td>
</tr>
<tr>
<td></td>
<td>Lantus</td>
<td></td>
<td>No peak</td>
<td>24</td>
</tr>
<tr>
<td>Combinations</td>
<td>Humulin 50/50</td>
<td>0.5</td>
<td>3</td>
<td>22-24</td>
</tr>
<tr>
<td></td>
<td>Humulin 70/30</td>
<td>0.5</td>
<td>4-8</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Novolin 70/30</td>
<td>0.5</td>
<td>4-8</td>
<td>24</td>
</tr>
</tbody>
</table>

Basal-bolus therapy, in which it is administered once a day using glargine (a pre-filled lightweight syringe), then a bolus of rapid-acting insulin is administered with each meal and snack.

Avoid if the patient has any visual or neurological impairments.

Continuous subcutaneous insulin infusions (CSII) “pump therapy” is becoming popular among children and teenagers.

Advantages of the CSII:

- CSII are more effective in controlling blood glucose levels than a multiple injection schedule.
- Externally worn pump that contains a syringe and reservoir with rapid or short-acting insulin and is connected to the patient via an infusion system.
- Disadvantages of the CSII

- Site infections occur if the infusion site is not cleaned or the needle is not changed every three days.
- Hypoglycemia may result if the patient is receiving rapid-acting insulin and has a normal blood glucose level.
- Higher risk of developing ketoacidosis if the patient does not adhere to the CSII recommendations due to infection, noncompliance or infusion obstruction.

Implanted insulin pumps are implanted in the peritoneal cavity where insulin is absorbed by local blood vessels, similar to natural insulin release. The pump provides a reservoir re-filled with 400 units of insulin every one to two months. Complications that may arise include catheter blockage, pump failure and subcutaneous inflammation in the subcutaneous pockets.

Nursing considerations for the patient taking insulin [75,78]:

- Educate the patient about the technique and sites.
- Technique. The patient should be instructed to inject the insulin in the subcutaneous tissue at a 90-degree angle. In contrast, if it is a thin patient, inject at a 45-degree angle and avoid intramuscular (IM) since it has a faster absorption. It is not necessary to aspirate the blood.
- Sites. The patient should always rotate the sites to prevent day-to-day changes in absorption and to prevent the development of lipohypertrophy (increased fat deposits in the skin) or lipatrophy (loss of fatty tissue). Absorption is faster in the abdomen, followed by the deltoid, thigh and buttocks.
- Educate the patient about insulin storage, disposal and syringes. According to the ADA, the following guidelines are recommended [14]:

- Storage. Although manufacturers recommend storing your insulin in the refrigerator, injecting cold insulin can sometimes make the injection more painful. To counter the reaction, many providers suggest storing the bottle of insulin you are using at room temperature; it will last one month. Always put the date and time that the insulin was opened, and check the
expiration date to avoid administering insulin that has already expired.

- **Syringe re-usage.** Ideally, it is better to always use new, clean insulin syringes and needles. However, the ADA says that many people safely reuse their insulin syringes. But it should be avoided if the patient is ill, has any open wounds on the hands or has poor resistance to infection. If the patient will re-use the needle due to financial constraints, instruct the patient to always keep the needle and syringe clean by recapping the needle when it is not in use. Syringe makers will not guarantee the sterility of syringes that are reused. The patient should never use another person’s syringe or allow another person to use their personal syringe.

- **Syringe disposal.** Always dispose of the needles appropriately and safely to avoid anybody else picking up a used needle. The patient should place the needle or entire syringe in an opaque (not clear), heavy-duty plastic bottle with a screw cap or a plastic or metal box that closes firmly.

If the elderly patient or one with a sensory impairment, it is important to ensure the patient is safe while administering their insulin.

In 2005, the FDA approved, Symlin, an injectable medicine to control blood sugar for adults with type 1 and type 2 diabetes. Symlin is to be used in addition to insulin therapy in patients who cannot achieve adequate control of their blood sugars on intensive insulin therapy alone [42]. Since the approval in 2005, Symlin is to be used only in combination with insulin to help lower blood sugar during the three hours after meals. Symlin has a medication guide (FDA-approved patient labeling) and a risk minimization action plan (RiskMAP) due to three areas of concern.

First, the principle risk associated with Symlin therapy is hypoglycemia, and this risk is greatest in patients with type 1 diabetes and in patients with gastroparesis (motility problems of the stomach, a long-term complication of diabetes).

Second, the potential for medication errors, specifically mixing of Symlin with insulin in the same syringe, which can alter the activity of the insulin, is addressed in the medication guide and in physician labeling.

Finally, the potential for off-label use in patients where the benefit/risk profile has not been characterized or demonstrated is also a concern and will be monitored by the sponsor.

Symlin should not be used if patients cannot tell when their blood sugar is low, have gastroparesis (slow stomach emptying), or are allergic to pramlintide acetate, metacresol, D-mannitol, acetic acid or sodium acetate. Side effects associated with Symlin include but are not limited to nausea, vomiting, abdominal pain, headache, fatigue and dizziness. Symlin has not been evaluated in the pediatric population [42].

### Medication modalities for the Type 2 diabetic

The major goal for treating type 2 diabetic patients is controlling the blood glucose level and HbA1c levels, decreasing weight, increasing exercise, normalizing lipid profiles and blood pressure and preventing complications [25]. The treatment laboratory goal for type 2 diabetes is to maintain an HbA1c less than 7 percent and a fasting and pre-prandial blood glucose of 70-130 mg/dl [45]. According to Clinical Diabetes (2002), blood glucose control has been shown to decrease the risk of macrovascular and microvascular complications of type 2 diabetic patients. At this time, it is unknown whether the blood glucose control decreases the risk of cardiovascular mortality, however, the United Kingdom Prospective Diabetes Study (UKPDS) suggests that good glycemic control probably does decrease cardiovascular risk in patients with Type 2 Diabetes [28].

Typically, the initial treatment for type 2 diabetes begins with education on changing the diet and exercising to lower the blood glucose level. In addition, many health care providers typically initiate a single oral diabetic, such as Metformin, as it helps lower the blood glucose and decrease weight. Children are even started on Metformin once they are weaned off insulin if they were initially placed on it due to a hyperglycemic state or DKA [25].

- **Metformin** improves the sensitivity of target cells to insulin, slows the gastrointestinal absorption of glucose and reduces the hepatic and renal glucose production. The dosage can be gradually increased to improve metabolic control. It should only be prescribed under the following conditions:
  - Normal liver and kidney function, and no ketosis present.

If Metformin is not well tolerated and/or the patient does not achieve euglycemia and another medication needs to be added, sulfonylurea or meglitinides may be used. However they are not approved for children in the U.S. due to liver toxicity [25].

If the HbA1C is equal or greater than 7 percent, the ADA and European Association (2007) recommends adding either basal insulin (the most effective) or a sulfonylurea (least expensive) [45]. It is important to note that the treatment should be customized to the patient’s risk for hypoglycemia, the very young or older age, end-stage renal disease, advanced cardiovascular or cerebrovascular disease and the life expectancy [45].

At this time, there are several distinct classes of antidiabetic (hypoglycemic agents) available, each displaying unique pharmacologic properties designed to correct one or more of the metabolic abnormalities. The patient is typically started at the lowest dose, and then increased every one to two weeks until the patient reaches an acceptable blood glucose level [19]. These classes are the dipeptidyl peptidase IV inhibitors (DPP-4), sulfonylureas, meglitinides, biguanides, thiazolidinediones and alpha-glucosidase inhibitors [10,68,82,83,84].

- **DPP-4 inhibitor sitagliptin** was approved by the FDA in 2006. These drugs prolong action of incretin hormones. Sitagliptin can use as a monotherapy or in combination with metformin or a glucitzone. In 2009 the DPP-4 inhibitor saxagliptin was approved and linagliptin in May, 2011. As of this writing, another DPP-4 inhibitor, vildagliptin, is currently under FDA review. DPP-4 inhibitors do not cause the weight gain that other classes (e.g. sulfonylureas) may instigate.

- **Sulfonylureas (SU)** are insulin secretagogue’s, meaning they force the pancreas to increase insulin production. Therefore SU’s are reserved only for patients with some remaining pancreatic beta cell function. The anticipated reductions while taking a sulfonylurea is a 0.8 to 2.0 reduction in the HbA1c and 60 to 70 points lower on the FBG. It is important that the nurse monitors the renal function and speaks with the doctor before administering as there is a crossover for patients with sulfa allergies. In addition, the nurse should educate the patient that the drugs are potentially photosensitizing and hypoglycemia may occur. Hypoglycemia is more likely to occur with Diabinese and Novo-Propamide, due to their longer duration of action. In addition, underweight older adult patients with cardiovascular, liver or kidney impairments are susceptible.

- **First generation:** acetohexamide (Dymelor), chlorpropamide (Diabinese, Novo-Propamide), tolazamide (Tolinase), tolbutamide (Orinase).

- **Second generation:** glyburide (Micronase/DiaBeta), gipizide (Glucotrol), glimepiride (Amaryl).

The second generations are used more frequently than the first generation medications because of a higher risk of hypoglycemia with the first-generation medications.

- **Biguanides** are insulin sensitizers as they reduce hepatic glucose output. The anticipated reductions while taking a Biguanide is a 1.5 to 2.0 reduction in the HbA1c and lowering the FBG by 50 to 70 points. It is important to monitor the creatinine level and to avoid if the creatinine level rises above 1.4. The nurse needs to educate the patient to avoid taking the medication and to inform their physician prior to any radiocontrast use and/or surgery on the day of the procedure and for 48 hours post-recovery. The major risks that may occur if the patient continues the medication is dehydration, impaired renal function and hypovolemia because everything is going through the kidneys, leading to a condition called lactic acidosis. In addition, the nurse should be conscious about signs and symptoms of those conditions, even if the patient is not scheduled for a procedure with
radiocontrast and/or surgery. Hypoglycemia may occur if the patient is taking a coinciding SU and/or insulin.

- Metformin (Glucophage) is one of the most common, first-line medications prescribed for type 2 diabetics, metabolic syndrome and/or PCOS because it has amazing results in reducing weight and inducing ovulation. Patients should be educated that diarrhea is a common complaint once the medication is initiated, but it typically resolves. Regardless, the patient should inform their prescribing health care provider to avoid dehydration.

- Meglitinides are similar to the SU agents due to their typical short-acting insulin secretagogues. The anticipated reductions while taking a meglitinide is a 1 to 1.5 percent in the HbA1c. The goal of meglitinides is a reduction in the postprandial glucose level as it helps with the absorption of carbohydrates while eating. Therefore, the patient should be instructed to take it one to 30 minutes before eating. During the meal, the medication provides a quick insulin burst approximately 20 minutes after swallowing the pill. Meglitinides should be strongly encouraged if the patient has difficulty managing postprandial blood glucose levels. The main concern is to use with caution in patients with renal or hepatic impairments. Again, similar to SU agents, the major side effect is hypoglycemia, especially with Starlix. Therefore, if the patient skips a meal, he or she should not take a scheduled dose of Starlix to avoid hypoglycemia.

- Repaglinide (Prandin), nateglinide (Starlix).

- Thiazolidinediones (TZD) are insulin sensitizers as they work by promoting glucose utilization in the muscles and tissues. The anticipated reduction while taking a thiazolidinediones is 1 to 2 percent in the AIC. TZD’s are potent drugs on the liver; therefore the nurse should monitor the alanine aminotransferase (ALT) before administering the dose as there is a rare risk of hepatic toxicity. In addition, there is a risk of edema, especially if the patient is on a SU or insulin. Therefore, do not initiate it if there are any signs and symptoms of heart failure. If the patient has any cardiovascular risks (as many diabetics do), TZDs should not be used with nitrates as it may exacerbate the risk of developing edema or heart failure. TZDs are not an ideal medication to administer to a female patient taking an oral contraceptive (OC) as it decreases the effectiveness. Another unique feature is the onset of action is delayed; it requires up to 12 weeks of use before attaining the maximum therapeutic level.

- Pioglitazone (Actos), rosiglitazone (Avandia)

In November 2007, the FDA added a box warning for heart-related risks, especially heart attacks in patients taking Avandia. The FDA recommends that patients with type 2 diabetes who have underlying heart disease or who are at high risk of heart attack should talk with their health care provider about the revised warning as they evaluate treatment options. FDA advises health care providers to closely monitor patients who take Avandia for cardiovascular risks. In August 2007, the FDA warned that Avandia may also worsen heart failure in some patients as well [41].

- Alpha-glucosidase inhibitors delay the intestinal carbohydrate absorption by reducing postprandial digestion of starches via enzyme action inhibitions, and it helps the dumping effect of carbohydrates. Therefore, the risk of developing hyperglycemia after meals is reduced since the intestinal absorption and digestion of carbohydrates and/or is reduced. The anticipated reduction in the HbA1c is 0.3 to 0.9 percent. Hypoglycemia is rare unless administered with a SU or insulin. Acarbose (Precose), miglitol (Glycet)

Before the primary care provider chooses an appropriate oral agent, the patient’s history, age, blood sugar levels, HbA1c levels and costs are considered to ensure the patient will be able to comply with the medication regimen. If the primary care provider is considering the cost alone, SUs are the least expensive, taken once a day and have few side effects [19].

Byetta is an injectable drug that was approved by the FDA in 2005 as adjunctive therapy to improve blood sugar control in patients with type 2 diabetes who have not achieved adequate control on Metformin and/or a SU. However, since 2007, Byetta has been on the FDA list and has received black box warnings. Starting in 2007, FDA reviewed 30 postmarketing reports of acute pancreatitis in patients taking Byetta. At that time, the FDA encouraged health care professionals to educate patients taking Byetta to seek prompt medical care if they experience unexplained persistent severe abdominal pain, which may or may not be accompanied by vomiting. If pancreatitis is suspected, Byetta should be discontinued. If pancreatitis is confirmed, Byetta should not be restarted unless an alternative etiology is identified. In October 2007, the FDA received reports of six cases of hemorrhagic or necrotizing pancreatitis in patients taking Byetta [43].

Treatment of gestational diabetes

Any woman with diabetes contemplating a pregnancy should ideally discuss it with her health care provider before conception. The woman with type 1 diabetes will continue on her insulin, while the type 2 diabetic may discontinue her oral antidiabetic agents or begin taking insulin throughout the pregnancy [77]. A pregnant woman with diabetes requires prompt, adequate treatment to normalize her maternal blood glucose levels and to avoid complications for the infant. The fetal risks are the same for women with all forms of diabetes (type 1, type 2 and GDM); however maternal risks are greater in women with type 1 diabetes [77]. This is because Type 1 creates erratic blood sugar control because of the absolute lack of insulin production and because women are more prone to have vascular, retinal or renal complications. Therefore, to prevent morbidity of the women and fetus, very aggressive treatment is necessary [48].

Although maternal and fetal morbidity and mortality rates have significantly decreased over the years, the risks of developing complications still exist. Research has demonstrated the most common complications that occur [27, 77]:

1. Maternal

- Poor glycemic control around the time of conception and in the early weeks of pregnancy may be associated with an increased incidence of early pregnancy loss in women with a history of diabetes.

- Pre-eclampsia or eclampsia is exacerbated (four times) in women with diabetes.

- Hypertensive disorders, such as pre-eclampsia or eclampsia, occur more frequently in women with a prior history of diabetes, especially if she has coinciding renal dysfunction.

- Hydramnios (polyhydramnios) (increased amniotic fluid, greater than 2000 milliliters) (ml) occurs more frequently in diabetic patients, causing an overdistention of the uterus. The overdistention of the uterus leads to additional risks, such as increases in the compression of the maternal abdominal blood vessels (vena cava and aorta), leading to hypotension while in the supine position; premature rupture of membranes (PROM); preterm labor; and postpartum hemorrhage.

- Infections are exacerbated due to disorders of carbohydrate metabolism that alters the body’s normal resistance to infection. Although infections are prevalent with any form of diabetes, it is increased due to the pregnancy. It is important for nurses to educate the pregnant woman about the risks of infections and other problems that lead to further complications:

- During the pregnancy, urinary tract infections (UTI) increase the risk of pre-term labor.

- After the pregnancy, postpartum infections.

- Ketoacidosis typically occurs more frequently in the second and third trimesters when the diabetogenic effect is the greatest. If the pregnant woman has coinciding risks, such as stress or infection, the risk for DKA is exacerbated.
2. Infant/neonatal

- **Congenital anomalies** (occurs in 6 to 10 percent of deliveries) of infants; typically cardiac defects are the most common.
- **Macrosomia** (large infant). Although the pancreas is working overtime to produce more insulin, it is not lowering the blood glucose levels in the woman’s body, and all of the extra blood glucose is being transported through the blood brain barrier into the placenta for the baby. The baby is unable to metabolize or excrete the extra blood glucose; thus the mom and nurses caring for the baby can expect the baby will continue to get larger (macrosomia). Macrosomia infants tend to have disproportionate increases in the shoulder and trunk, leading to another consequence: shoulder dystocia. Poor glycemic control in the later portion of the pregnancy, especially in women with a history of coinciding vascular disease, increases the risk of macrosomia. Macrosomia occurs in 25-40 percent of diabetic pregnancies. In addition, at birth, the nurse can expect the following:
  - Baby will develop hypoglycemia because its little body is used to the extra glucose.
  - Difficulty breathing due to the increase weight.
  - Other problems that cause neonatal morbidity includes:
    - Spontaneous abortion (two times the risk) in diabetic women.
    - Macrosomia.
    - Hypoglycemia.
    - Respiratory distress syndrome (RDS).
    - Polycythemia (increased hematocrit level).
    - Hyperbilirubinemia (jaundice).

To prevent the potential risks and complications, the nurse needs to educate the woman and her partner about her diabetes (including the disease process, prevention, treatment and possible complications). During the first and second trimesters of pregnancy, the diabetic woman should see her provider every one to two weeks, rather than monthly as for a nondiabetic woman. It is important to establish and convey the importance of collaborating together to recognize early signs of any potential problems to avoid complications. The overall goal is to achieve and maintain euglycemia for a pregnant diabetic woman in the range of 60 to 120 mg/dl [77].

In order to maintain euglycemia, the diabetic woman needs to comply with the combination therapy of checking the blood glucose levels, diet, insulin and exercise throughout her pregnancy [77]:

- **Blood glucose measurements** are completed frequently to assess compliance of the medical regimen throughout the day, such as before breakfast, lunch and dinner. Typically in a woman with true gestational diabetes, fasting blood glucose levels will be normal, while the postprandial blood glucose levels are elevated [27]. The rationale behind this concept is related to the metabolism of large carbohydrate boluses rather than carbohydrate intolerances at the baseline levels [27].

- **Diet** is individualized to the patient based on the blood (not urine) to allow for increased fetal and metabolic requirements.
  - Energy needs are based upon 30-35 calories per kilogram of the ideal body weight with an average of 2,200 calories (first trimester) to 2,500 calories (second and third trimesters).
  - Carbohydrates, protein and fat are important to balance with approximately:
    - 50 to 60 percent of the total calories being carbohydrates (minimum of 250 g per day). Limit simple carbohydrates and encourage complex carbohydrates that are high in fiber to regulate the blood glucose level by releasing more glucose. It may be easier for the pregnant woman to count carbohydrates at meals, educating her to ingest 30 to 45 grams of carbohydrates at breakfast, 45 to 60 grams at lunch and dinner, then 15 grams for snacks [27].
    - 12 to 20 percent should be protein.
    - 20 to 30 percent from fat, with less than 10 percent from saturated fats.
  - **Exercise** regimens should be individualized to the patient with the exact protocol per the physician. However, most encourage walking for 15 to 30 minutes four to six times a week about 30 to 40 minutes after eating to enhance the postprandial blood sugar levels [27].
    - A woman with vasculopathy should be encouraged to do only mild exercise to prevent the risk of injury to the placenta.

- **Medications**
  Since 2002, the American College of Gynecology (ACOG) and the AAFP has recommended that women with GDM be treated initially with an adequate, nutritious diet designed to achieve normal glycemic levels and to avoid ketoadiastasis [71]. There are various perspectives about treating a woman with GDM with insulin or oral agents. However, in January 2009, a meta-analysis was published in Obstetrics and Gynecology based on research conducted over the previous years that did not demonstrate any significant differences in maternal glycemic control, infant birth weight, neonatal hypoglycemia or congenital malformations [73].

1. **Insulin** is imperative to maintain euglycemia and proper metabolism of glucose. In addition, if the previous medical regimen in the type 1 and type 2 diabetic changes, the patient requires adequate education to avoid confusion and potential frustration for the pregnant woman. The following insulins are recommended [77]:
   - The woman will be started on short-acting insulin (Humalog/Lispro or Novolog) in combination with intermediate-acting insulin (NPH) in the morning to cover breakfast and lunch; then short-acting insulin at dinner (Humalog/Lispro or Novolog) [27]. Humalog is ideal for GDM patients to better control the postprandial blood sugar levels with less risk of hypoglycemia developing [27].
   - Several trials have demonstrated a reduced risk of fetal macrosomia if the mother is treated with insulin during the pregnancy. Although insulin treatment is commonly prescribed in GDM, only 9 to 40 percent of treated mothers benefit. Treatment aims to achieve glucose levels of 130 mg per dL one hour postprandial. [27].

2. **Oral hypoglycemic agents may be administered** if the glucose levels are lower. In one study, Glyburide provided outcomes comparable to those achieved with insulin in patients with GDM who had failed to achieve adequate glycemic control with diet alone [71]. After pregnancy the woman should continue to adhere to eating healthy, exercising and controlling her weight because research has demonstrated that 5 to 10 percent of women with gestational diabetes are found to have type 2 diabetes. In addition, women who have had gestational diabetes have a 20 to 50 percent chance of developing diabetes in the next five to 10 years [48, 75].

**Surgical treatment options for diabetic patients**

Many nurses may not be aware of the surgical treatment modalities that are available for the diabetic patient as there is little discussion of surgical modalities in recent, published nursing textbooks. However there are various sites available online on recent research studies conducted over the past few years that are bringing hope and promise for the future for patients with diabetes.

According to the Science Daily (March 2008), growing evidence shows that surgery may effectively cure Type 2 diabetes based upon research conducted recently [65]. Since 2005, a study published in Diabetes Care (2005), compared laparoscopic adjustable gastric banding (LAGB) and conventional diet (no-LAGB) in the prevention and remission of type 2 diabetes, hypertension and obesity over a four-year period [18, 61]. In the study, there were 122 patients, and 73 chose to have the LAGB surgery. The results were as follows [18, 61]:

   - In the primary intervention study, body weight, A1C, and systolic and diastolic blood
pressure significantly decreased in the LAGB but not in the no-LAGB group.

- In the secondary intervention study, body weight, A1C, and systolic and diastolic blood pressure significantly decreased in the LAGB group but not in the no-LAGB group. Remission occurred in 45 percent of the LAGB patients and 4 percent of the no-LAGB patients. In addition, remission of arterial hypertension occurred in 51 percent of LAGB patients and 4 percent of no-LAGB patients.

Since 2005, the ADA also has information in regards to a research study published in the Journal of Clinical Endocrinology and Metabolism (2005), focusing on the satiety after achieving the LAGB surgery for 23 patients. The results were as follows [39]:

- Of 23 LAGB patients who attempted the protocol, 17 completed two breakfast tests. Five patients were excluded for failing to consume the meal adequately, three due to regurgitation of food and two due to delayed consumption. These patients were presumably too restricted by their bands to allow passage of the test meal.
- All of the patients became increasingly hungry preprandially, experienced maximal satiation immediately after the meal, and experienced decreasing satiety thereafter.

In 2008, the Journal of American Medical Association (JAMA) conducted a two-year study on patients recently diagnosed as a type 2 diabetic with a BMI of 30 to 40. The patients were randomly assigned to receive conventional medical/behavioral therapy (medical therapy and a focus on weight loss through lifestyle modification) or LAGB, plus conventional medical/behavioral therapy. The results were amazing [33]:

- Complete remission of diabetes was achieved in 73 percent of the type 2 diabetics who underwent the LAGB due to more weight loss (20.7 verses 1.7 in the medical/behavioral group). The percentage of weight loss generally required for diabetes resolution was 10 percent, which was achieved in 86 percent of the surgical patients but in only 1 percent in the medical group.
- Complete remission of diabetes was only 13 percent of those in the medical/behavioral therapy group.
- No serious surgical complications were reported.

Although the research studies exemplify promising news for the future of diabetes, especially for the morbidly obese and/or patients with co-existing hypertension, as the ADA indicates, there are limitations to the studies. The majority of the research conducted is based on a limited number of patients, and further research needs to be conducted [18].

According to the American Society for Bariatric Surgery, LAGB is a relatively safe procedure that has been around for almost 30 years. Over the past three decades, the procedure has been enhanced [23]:

- Currently, the LAGB consists of an inflatable balloon that is connected to a silicone band. The surgeon controls the amount and degree of inflation or deflation of the balloon, which can always be adjusted as needed. Inflation of the balloon functionally tightens the band and thereby increases weight loss, while deflation of the balloon loosens the band and reduces weight loss. These bands can be inserted laparoscopically, thereby reducing the complications and discomfort of an open procedure.
- LAGB is a procedure that induces weight loss solely by the patient restricting the amount of food. Typically, 28 to 65 percent of patients lose excessive weight within two years, and 54 percent at five years. However, in order for the surgery to be effective, the patient needs to be compliant with the strict diet and frequent follow-up appointments for band adjustments. Another unique feature is LAGB is a reversible procedure that does not carry the risks of nutritional and mineral deficiencies of other bariatric procedures.

According to the American Society for Bariatric Surgery, remission of diabetes with LAGB is seen in 64-66 percent of patients at one year. At this time, long-term results comparing LAGB with the traditional gastric bypass surgery (surgical incision in the abdomen to make the stomach smaller by creating a small pouch at the top of the stomach using surgical staples or a plastic band) are not yet available. The sleeve gastrectomy is another potential surgical procedure, similar to the LAGB and gastric bypass surgery. During this procedure, the surgeon creates a small, sleeve-shaped stomach that is larger than the stomach pouch created during the Roux-en-Y bypass (traditional gastric bypass surgery) and is about the size of a banana. Sleeve gastrectomy is typically considered as a treatment option for bariatric surgery patients with a BMI of 60 or higher [26].

There are other surgical procedures and transplants that have been implemented to potentially improve the quality of life for the diabetic patient.

Whole pancreas transplantation can be performed in one of the following manners [49]:

- Transplant of the pancreas alone (PTA).
- Transplant of the pancreas and kidney (PAK).
- Simultaneous pancreas and kidney transplant (SPK), ideal for diabetic patients with uremia.

According to the ADA, whole pancreas transplantation is ideal for type 1 diabetic patients with the HLA genetic composition, because it “tricks” the body into accepting the donor organ recipient. Patients with a transplanted organ must take immunosuppressive drugs in order to prevent the immune system from fighting the new organ, and the side effects of these drugs may be worse than the problems caused by diabetes; the operation itself is serious. According to the ADA, one to two people in 10 die within a year of getting a pancreas transplant [17]. On a positive note, if the transplantation works and the body accepts the organ, the patient no longer has diabetes and is unlikely to get it again. Therefore, the patient does not require insulin shots and frequent blood glucose testing. The ADA has suggested that euglycemia levels may prevent further complications or any current comorbidities from worsening, although many more studies are needed.

Unfortunately, there are not enough cadaveric pancreases to go around because not enough people sign up to be organ donors, and each pancreas must meet strict guidelines. When a whole cadaveric pancreas is not available, a person can receive a portion of a pancreas from a living relative.

Anytime a patient with diabetes is receiving a kidney transplant from a living relative, it is usually beneficial to perform a partial pancreas transplant at the same time. Since the transplanted kidney will become damaged by diabetes over time, transplanting a partial pancreas from the same donor will help control blood glucose levels and protect the new kidney from further damage. Transplant success seems higher when patients and donors are matched for HLA types, and a pancreas transplanted along with a kidney is less likely to fail than a pancreas transplanted alone.

The ADA website mentions a recent study conducted by JAMA (2003) indicating patients with functioning kidneys who therefore decline the PAK option have survival rates that are worse than those of patients who manage their diabetes with conventional therapy (insulin, diet, etc.). Therefore, the decision to have a pancreas-only transplant should be very carefully considered by both the patient and physician. Because of the lower survival rates seen with pancreas-only transplants and because a pancreas transplanted along with a kidney is less likely to fail than a pancreas transplanted alone, pancreas transplants are nearly always done only in people with type 1 diabetes who are getting or already have a transplanted kidney. Remember that pancreas transplants work only for people with type 1 diabetes. The major problem in people with type 2 diabetes is not a failing pancreas, but the body’s inability to respond to insulin in the right way.

It is important to realize there are many options for the patient, but there also are precise risk factors and history to consider before pursuing any options. The nurse should encourage the patient to discuss the most feasible with his or her primary care provider and consulting surgeon.

**Hyperglycemia and diabetes**

All diabetic patients are at risk of developing acute complications related to their diabetes. However, each realistic, potential acute complication is treatable and preventable with appropriate education and knowledge.
Typically, patients will experience hyperglycemia with any of the following occurrences [75]:
- Caloric intake exceeds their daily allowance (1500 to 2000 calories/day).
- Missing a dose of insulin and/or oral antidiabetic agents.
- Stress and illness causes the release of hormones, such as epinephrine, cortisol, growth hormones and glucagon. The diabetic patient is unable to compensate for the fluctuation and changes in the various hormones being released.
- The symptoms of hyperglycemia include the “three polys,” blurred vision, headache, lethargy, abdominal pain, ketonuria (if type 1 diabetic) and/or a coma. It is imperative that nurses educate their patients about hyperglycemia to ensure the patient is aware of how to prevent, recognize and treat the problem. However, anytime a patient has hyperglycemia, it is always important to consider two other potential life-threatening conditions, DKA, typically found in type 1 diabetics, and hyperglycemic-hyperosmolar nonketotic syndrome (HHNS), typically found in type 2 diabetics. Although hyperglycemia, DKA and HHNS all have hyperglycemia in common, always remember the following:
  - Hyperglycemia can occur without DKA or HHNS.
  - DKA will have a blood glucose greater than 300 mg/dl and positive urine ketones.
  - HHNS will have higher blood glucose, typically greater than 600 mg/dl, and no urine ketones.

DKA will be elaborated upon with hyperglycemia since the treatment modalities are similar, and then HHNS will be discussed.

1. Diabetic Ketoacidosis (DKA) is a complication of hyperglycemia that develops when there is an absolute deficiency of insulin and an increase in the insulin counterregulatory hormones specific to patients with type 1 diabetes during physical or emotional stress despite continued insulin therapy [51]. DKA is a common and potentially life-threatening condition that occurs primarily in children (20 to 40 percent) [25]. Research has demonstrated that the most common causes of DKA include incorrect or missed insulin doses, inaccurate way of administering the insulin, illness, trauma or surgery [25].

DKA (insulin deficiency) is accompanied by an increase in hormones, such as epinephrine, norepinephrine, cortisol, growth hormones and glucagon that are released when there is not enough glucose delivered into the cells [25]. DKA occurs due to the muscle cells breaking down protein into amino acids that are converted to glucose by the liver, leading to hyperglycemia. The increase in adipose tissue releases fatty acids that are transformed by the liver into ketone bodies [49, 51, 75].

The onset of DKA is typically sudden, and the patient will initially exhibit signs of dehydration (polyuria, polydipsia), that will exacerbate the hyperosmolality process by producing symptoms of anorexia, nausea and vomiting (metabolic acidosis) [25, 53]. The patient will also have positive ketones excreted in the urine. The increased amount of ketones circulating will cause the patient to blow off a “fruity” smell from the mouth. Other characteristic signs that typically occur later include include dehydration (including warm/dry skin with poor turgor, soft eyeballs, dry mucous membranes, oliguria, malaise, rapid but weak pulse and hypotension), abdominal pain, tachycardia, flushed ears and cheeks, Kussmaul respirations and altered level of consciousness [49, 51]. In addition, children typically exhibit complaints of abdominal or chest pain, nausea and vomiting due to the metabolic acidosis [25]. A patient left untreated will go into a coma, the vascular system will collapse and the patient will go into renal failure, especially when the blood glucose increases between 300 and 800 mg/dl [40].

Although there are a vast array of symptoms that may be exhibited by the patient, it should be noted that the initial symptoms may be a diabetic coma as the other signs may have been masked or pacified by the patient. The patient’s level of consciousness varies based upon the degree of the hyperosmolality [53]:
- If insulin deficiency develops slowly and the patient is able to maintain an adequate intake, the patient will remain alert and the physical symptoms may be minimal.
- In contrast, if the patient is vomiting in response to the ketoacidosis process, the body will begin to compensate to the dehydration, further exacerbating the serum osmolality, less than 320-330 milli-osmole per kilogram (mOsm/kg). Essentially, the body is depleted and unable to maintain homeostasis, inducing the patient to be in a stupor or coma.

The initial diagnostic testing of hyperglycemia begins with the following laboratory findings, especially if DKA is speculated [40, 49, 51]:
- Blood glucose level greater than 250 mg/dl.
- Serum laboratory values:
  - Sodium (may be hypo, normal or hypernatremia).
  - Potassium (initially hyper with acidosis, but hypokalemia with dehydration).
  - Phosphate (low).
  - Bicarbonate (low, typically less than 15 mEq/L).
  - Osmolarity (variable).
  - Elevated BUN and creatinine due to dehydration.
  - Serum ketones (positive).
  - Plasma pH less than 7.35.
  - Presence of urine ketones and glucose.

The treatment of hyperglycemia or DKA includes all of the following, pending the severity of symptoms. If the patient is at home, the nurse should instruct the patient to understand the risks and then recognize the potential signs and symptoms of hyperglycemia. If the patient feels different or recognizes any of the signs and symptoms, they should check their blood glucose level. If the level is greater than 300 mg/dl, they should check the urine for ketones and increase their fluid intake [75]. The patient should contact the health care professional who is monitoring their diabetes if their blood glucose is greater than 200 mg/dl for two days or if they are ill or vomiting.
- If the patient is in the hospital, the nurse should always assess the airway, level of consciousness, hydration status, electrolytes (if available) and blood glucose levels depending on the severity of the hyperglycemia and the patient’s condition [49]. The nurse should adhere to the hospital’s protocol in regards to verifying a high blood glucose level with a serum laboratory test. Additional actions of the nurse may include the following, depending upon the hospital protocol, patient’s status and the physician’s orders [49]:
  1. Assess the patient’s vital signs (blood pressure, heart rate and respirations every 15 minutes).
  2. Record intake and output, temperature and mental status every hour.
  3. Assess the patient’s fluid status. The primary goal is to restore volume and maintain perfusion to the patient’s heart, brain and kidneys. Typically the physician will order one liter of an isotonic saline solution over 30 to 60 minutes. Another goal in replacing fluid therapy is to replace the total body fluid loss by administering a slow, 0.45 percent of normal saline; then when the patient’s blood glucose levels reaches 250 mg/dl, add 5 percent of dextrose to the 0.45 percent of normal saline to prevent hypoglycemia when the serum osmolality declines rapidly.
  4. In order to lower the serum glucose, the nurse may administer an intramuscular (IM) or intravenous (IV) bolus of regular insulin. Typically, it is administered in an initial IV bolus of 0.1 units/kilogram, followed by an IV drip of 0.1 units/kilogram/hour. Most physicians will prescribe a continuous infusion because of the four-minute half life of IV insulin.
  5. If the patient has any significant changes in potassium and symptoms (fatigue, malaise, confusion,
muscle weakness, shallow respirations, hypotension and weak pulse), the patient may have an electrocardiogram (ECG). In hypokalemia, the nurse can anticipate seeing ST-segment depression, flat or inverted T waves and increased U waves on the ECG [51]. Prior to administering an IV bolus potassium, make sure the patient has voided at least 30 ml/hr to prevent developing hyperkalemia.

It is important to assess and monitor for hypokalemia anytime a patient is hyperglycemic because it is a significant cause of death in the treatment of DKA [49].

2. Hyperosmolar hyperglycemic nonketotic syndrome (HHNK), also known as hyperosmolar hyperglycemic state (HHNS), occurs in type 2 diabetics, especially in the older adult who may not even be aware that he or she has diabetes [49]. HHNS is a significantly dangerous, life-threatening complication with a high risk of mortality due to severe dehydration from prolonged hyperglycemia. Older adults are more prone to mortality, as high as 40 to 70 percent [52]. The development of HHNS rather than DKA is related to residual insulin secretion. In HHNS, the patient is able to secrete insulin to prevent the serum and urine ketones, but not enough to prevent hyperglycemia [49]. HHG is precipitated by one of the following conditions, although infection is the most prevalent cause [51]:

- **Therapeutic agents.**
  - Glucocorticoids.
  - Diuretics.
  - Beta-adrenergic blocking agents.
  - Chlorpromazine.
  - Diazoxide.

- **Acute illnesses.**
  - Infection.
  - Gangrene.
  - Urinary tract infection.
  - Burns.
  - Gastrointestinal bleeding.
  - Myocardial infarction.
  - Pancreatitis.
  - Stroke.

- **Therapeutic procedures.**
  - Peritoneal dialysis.
  - Hemodialysis.
  - Hyperosmolar alimentation (oral or parental).
  - Surgery.

- **Chronic illnesses.**
  - Renal disease.
  - Cardiac disease, including congestive heart failure (CHF).
  - Hypertension.
  - Previous stroke.
  - Alcoholism.

The patient with HHS may present with subtle, insidious symptoms. However, after the nurse collects the history, it will be noted there has been a decreased consumption of fluids with polyuria, polydipsia and weakness. If the patient presents with the initial symptoms, the patient may not be lethargic, confused or in a coma state as it presents with a serum osmolality greater than 310 mOsm/kg [40, 51].

The patient with HHNS will be diagnosed by exhibiting the following findings [40]:

- Severe hyperglycemia (typically greater than 600 mg/dl in the absence of serum and urine ketones. Severe hyperglycemia occurs due to the coinciding severe hyperglycemia and the glucose is not filtered into the urine [49].
- Severe hyperosmolarity (310 mOsm/L).
- Dehydration (the patient may lose up to 15 to 25 percent of his or her body fluid) [49].
- Hypokalemia and/or hyponatremia.
- Altered levels of consciousness.

The nurses’ role in treating HHS includes recognizing the signs, symptoms and diagnostic findings, replacing fluids and restoring normal blood glucose levels within 36 to 72 hours, correcting insulin and electrolyte imbalances, assessing urine output and vital signs [40, 49]:

- The first treatment is providing adequate fluid replacement to increase the fluid volume. If the patient is in shock or has severe hypotension, administer a hypotonic intravenous fluid (0.45 percent normal saline). However, if the patient has hypovolemia, then an isotonic solution (0.9 percent normal saline) is required. The patient will typically receive four to six liters of fluid over eight to 10 hours. Ideally, the nurse should expect to see a slow but steady improvement in the central nervous system function.
- The nurse should assess the patient hourly for signs of cerebral edema, abrupt changes in the mental status, abnormal neurological signs and coma. If the symptoms continue, it indicates that the patient is not getting the correct volume of fluid replacement or a rapid reduction in plasma osmolarity.
- Administer IV insulin at 1 unit/hour to reduce the blood glucose levels. Once the patient’s blood glucose maintains 250mg/dl, the physician should be notified to change the intravenous fluids to 5 percent Dextrose and 0.45 percent or 0.9 percent normal saline solution.
- Hyponatremia and hypokalemia replacements as needed.
- Ensure urine output is 50 mg/hour or more.

**Hypoglycemia and diabetes**

Another common, acute complication of diabetes is hypoglycemia (low blood glucose, less than 70 mg/dl), which occurs when there is not enough glucose available in relation to the circulating insulin [75]. Normal insulin secretion decreases when the blood glucose levels drop to approximately 83 mg/dl and the “counterregulatory” hormones (glucagon and epinephrine) are activated at about 68 mg/dl [49]. It is important to educate the patient to prevent hypoglycemia as it may cause neurological damage because the brain starves for glucose [75]. Hypoglycemia can be very dangerous for a type 1 diabetic because [49]:

- After one to five years of diagnosis, the regulation of circulating insulin dissipates because the patient is administering an injection, rather than the pancreas supplying the insulin as needed.
- Another problem is with long-standing hypoglycemia, the patient no longer has warning signs of the impending hypoglycemia. Unfortunately, this occurs in about 25 percent of all patients, and about 50 percent of patients who have had type 1 diabetes for 30 years or more.

Hypoglycemia typically occurs if the patient undertakes (skip a meal), administered too much insulin/oral antidiabetic agents and/or exacerbated during exercise. If a nurse is caring for a pregnant woman, it is important to note that she is more likely to develop hypoglycemia because her ideal glucose control is lower (60 to 120 mg/dl) [77].

The most common symptoms of hypoglycemia include hunger, sweating, tremor, blurred vision, headache, irritability, confusion, seizures and coma [49, 77]. If the patient should experience any of the symptoms (which typically occur around 50 mg/dl) or a family member finds the patient in a stupor or coma, confirm the blood glucose level with a SMBG (if at home). If a nurse is caring for the patient in the hospital, he/ she should check the accu-check machine and then notify the hospital laboratory to confirm. However, if the nurse is working in the hospital, he/she should not sit around and wait for the laboratory department, and should treat the patient to prevent further lowering of the glucose level.

If the patient is at home or in the hospital setting with a mild case (patient remains alert, hungry, irritable, shaky, weak, headache and a blood glucose less than 60 mg/dl) of hypoglycemia, then treat the patient with a 10 to 15 gram carbohydrate snack, such as [49, 77]:

- Glucose tablets or gel.
- 4 ounces of orange juice.
- 6 ounces of regular soda.
- Miniature box of raisins.
- Six to eight Life Savers.
- Three graham crackers.

If the patient is at home or in the hospital with a moderate hypoglycemia event (cold, clammy skin, pale, rapid pulse, shallow respirations, marked change in mood, drowsiness and a blood glucose less than 40 mg/dl), then [49]:

- Treat symptoms with 15 to 30 grams of rapidly absorbed carbohydrates.
- Ingest additional foods, such as a low-fat milk or cheese, after 10 to 15 minutes.
If the patient is at home with a severe case of hypoglycemia (unable to swallow, unconscious, convulsions or blood glucose less than 20 mg/dl) [49]:
- The family member should administer 1 mg of Glucagon as an intramuscular (IM) or subcutaneous (SQ) injection.
- Administer a second dose in 10 minutes if the patient remains unconscious.
- Notify the physician immediately.

If the patient is in the hospital with a severe case of hypoglycemia, the nurse should [49]:
- Administer Glucagon IM or SQ and 50 percent of dextrose intravenous (IV). The nurse should always be cautious when administering Glucagon, as it may cause aspiration, thus inducing a vomit.
- Once the patient awakens, give a simple sugar, then a small snack or meal.

The blood glucose level should be rechecked every 15 minutes; avoid overtreating as it may cause hyperglycemia and rebound hypoglycemia [75, 77]. The nurse’s role in treating DKA includes recognizing the signs and symptoms, collaborating with the treating provider to correct the dehydration process, normalize the electrolytes and correct the acidosis. Throughout the treatment, the nurse will monitor the patient’s blood glucose levels, amounts of insulin being administered, urine volume, vital signs and serum chemistries. Once the DKA has been corrected, the nurse needs to educate the patient and family explicitly about the importance of insulin and providing guidelines for “sick” days to prevent future occurrences.

**Long-term complications of diabetes**

Failure to properly identify or control any form of diabetes will increase the risk of developing severe, multisystem complications. Over time, uncontrolled hyperglycemia will lead to the following complications [53]:
- **Cardiovascular disease** is the leading cause of death from type 2 diabetes [28]. Heart disease occurs due to changes in the macrovascular (large blood vessels) and microvascular (small blood vessels) to compensate for the increased flow leading to atherosclerosis, abnormal platelets, red blood cells, clotting factors and changes in the arterial walls [28, 49, 51]. Each of the cardiovascular compensatory mechanisms is exacerbated if hypertension, hyperlipidemia, smoking and/or obesity are coinciding with the diabetes. The macrovascular complications include the following [49]:
  - Coronary artery disease (CAD) is the most common cause of death among diabetic patients; accounting for 40 to 60 percent of deaths. CAD is also a major risk factor in the development of a myocardial infarction (MI), especially in type 2 diabetes.
  - Most diabetic patients will die from a massive MI due to their extensive CAD, cardiomyopathy and abnormal blood clotting factors [49].

- **Heart failure occurs in approximately 50 percent of all patients after an MI** [49].
- **Hypertension** (greater than 130/80 if diabetic) affects 20 to 60 percent of all people with diabetes, leading to microvascular complications, such as retinopathy and nephropathy. From 2003 to 2004, 75 percent of adults with self-reported diabetes had blood pressure greater than or equal to 130/80 millimeters of mercury (mm Hg) or used prescription medications for hypertension [58]. The overall goal is to maintain the blood pressure at less than 130/80, according to the seventh report of the JNC 7 [45].
- **Hyperlipidemia** (abnormal blood lipids). The overall goal is to maintain the LDL less than 100mg/dl (may be less than 70mg/dl), TG less than 150mg/dl and HDL greater than 40mg/dl. Therefore the ADA recommends that the patient should have at least an annual lipid profile, then every two years if the patient has a low risk. Interestingly, although the patient is typically prescribed a statin(s) to maintain a lower lipid profile, the ADA does not recommend routine monitoring of liver and muscle enzymes in asymptomatic patients, unless the baseline enzymes were abnormal or the patient is taking drugs that interact with statins [45].
- **Cerebrovascular disease**
  - Stroke is increased two to six times among older adults with type 2 diabetes because of the risk factors and elevated blood glucose levels. A patient who maintains a high HgbA1c due to elevated blood glucose levels at the time of the stroke could have a greater brain injury and higher mortality [49].
  - **Peripheral vascular disease of the lower extremities.**

According to the National Diabetes Information Clearinghouse (NDIC) (2008) [58]:
- In 2004, heart disease was noted on 68 percent of diabetes-related death certificates among people aged 65 years or older.
- In 2004, stroke was noted on 16 percent of diabetes-related death certificates among people aged 65 years or older.
- Adults with diabetes have heart disease death rates about two to four times higher than adults without diabetes.

The microvascular complications include retinopathy, nephropathy and neuropathy.
- **Diabetic retinopathy** is the leading cause of new-onset blindness among adults’ ages 20 to 74 years. Diabetic retinopathy occurs due to the alterations in the blood flow to the eyes, eventually leading to retinal ischemia. Interestingly, almost all patients with type 1 diabetes and 60 percent of patients with type 2 diabetes will have some degree of retinopathy. Diabetic retinopathy causes 12,000 to 24,000 new cases of blindness each year [58]. Retinopathy has been linked to fasting blood glucose levels above 129 mg/dl [49]. The overall goal is to prevent vision loss; therefore the diabetic patient should be encouraged to have dilated eye exams or 7-field 30-degree fundus photography by an ophthalmologist annually. In addition, it is important to maintain the blood glucose levels and blood pressure [45]. Other eye complications related to diabetes include [49]:
  - Retinal hemorrhages, detachments and venous bleeding due to microaneurysms (small capillary wall dilations formed in the retinal vessels, leading to poor circulation).
  - Macular degeneration.
  - Double vision.
  - Open angle glaucoma.
- **Diabetic nephropathy** is the leading cause of renal failure requiring dialysis or a transplant in the U.S. The condition occurs in about 20 to 40 percent of all diabetic patients. Diabetes is the leading cause of kidney failure, accounting for 44 percent of new cases in 2005. In 2005, 46,739 people with diabetes began treatment for end-stage kidney disease in the United States and Puerto Rico. In 2005, a total of 178,689 people with end-stage kidney disease due to diabetes were living on chronic dialysis or with a kidney transplant in the United States and Puerto Rico [58]. The exact pathologic origin is unknown, but thickening of the basement of the glomeruli eventually impairs renal function. The first indication of nephropathy is the presence of albumin (microalbuminuria) in the urine. The overall goal is to prevent renal failure. Therefore the blood glucose and blood pressure should be controlled, the serum creatinine and microalbuminuria should be screened annually, there should be an annual GFR calculation and the patient should be instructed to limit the protein intake to 0.8 g/kg in patients with any degree of chronic kidney disease (CKD) [45].
  - If the patient tests positive for microalbuminuria, the ADA recommends the patient be started on the following medications [45]:
    - Type 1 diabetic should be on an ACE inhibitor.
    - Type 2 diabetes with hypertension should be on an ACE or ARB.
  - In addition, patients should maintain their blood pressure at less than 130/80 and limit protein to 10 percent of their dietary intake. The patient should be referred to a urologist.
- **Peripheral neuropathies** (somatic neuropathies) initially appear in the toes and feet, then progress upward into the fingers and hands. The diabetic patient will complain of numbness or tingling and pain that are described as “aching,” “burning” or “shooting,” and feelings of coldness in the feet. About 60 to 70 percent of people
Foot injuries are one of the most common complications of diabetes leading to hospitalizations related to sensory neuropathies, ischemia and infections [49]. Diabetes is the leading cause of amputations worldwide, approximately 60 percent. In 2004, about 71,000 nontraumatic lower-limb amputations were performed in people with diabetes [58]. The five-year mortality rate after a leg or foot amputation ranges from 39 to 68 percent [49].

- Claw toe is a deformity that causes the toes to hyperextend, resulting in ulceration [49]. Health care professionals, therefore, should visually inspect patients’ feet at every visit, and patients should be instructed to inspect their own feet daily with a mirror and have an annual foot exam by a podiatrist.

Other complications include any of the following [45]:

- **Visceral neuropathies** (autonomic neuropathies) that involves various entities:
  - Sweating dysfunction with an absence of sweating (anhidrosis) of the hands and feet.
  - Abnormal papillary function (constricted pupils that dilate slowly in the dark).
  - Cardiovascular dysfunction with a fixed cardiac rate that does not change with exercise, postural hypotension.
  - Gastrointestinal dysfunction, including upper gastric motility (gastroparesis) that results in constipation, dysphagia, anorexia, heartburn, nausea, vomiting and altered blood glucose control.
  - Genitourinary dysfunction, resulting in changes in bladder (inability to empty completely or a sensation of fullness) and sexual function (decreased libido, failure to ejaculate or no vaginal lubrication).

- **Periodontal disease.** Periodontal, or gum, disease is more common in people with diabetes. Among young adults, those with diabetes have about twice the risk of those without diabetes. Persons with poorly controlled diabetes (A1C greater than 9 percent) were nearly three times more likely to have severe periodontitis than those without diabetes. Almost one-third of people with diabetes have severe periodontal disease with loss of attachment of the gums to the teeth measuring 5 millimeters (mm) or more [58].

- **Male erectile dysfunction (ED)** occurs at an earlier age in men with diabetes (10 to 15 years earlier). Half of all diabetic men experience ED. ED is related to poor glucose control, obesity, hypertension, heavy smoking and other chronic micro and macrovascular conditions [49].

- **Increased susceptibility to infections.** There are a vast array of complications that can occur in diabetic patients, so nurses must properly assess their patients’ overall condition, risk factors, sensory deficits, access to health care and willingness to comply with the medical regimen to prevent injury or an early death.

**Diabetes and cultural considerations**

Nurses in a diverse America may be challenged whenever they encounter patients who have different beliefs, values and cultures from their own. It is important to be sensitive and respectful to the patient and family and come to know them as individuals. In order to be most effective and respectful toward each patient that we care for, it is imperative for nurses to be culturally competent (learning, understanding and respecting the values and beliefs of others) [44].

Upon admission to a hospital facility, the nurse is required to ask the patient if they have any religious or cultural considerations that may affect their health care. It is important to truly ask the patient and respect their response. In addition, nurses should convey the patient’s concerns to the appropriate disciplinarians and other nurses responsible for the care of the patient. If nurses are working in an outpatient facility, there are no set for health care professionals to ask their patients about their religious or cultural considerations. However, if a nurse works in an outpatient facility, it should be considered and asked of all patients.

The purpose of this section is to familiarize nurses on how to consider patient’s cultural and religious beliefs. If you are caring for a patient, learn about their personal concerns to ensure you customize their care toward things the patient will be most apt to abide by to reduce their risk of developing diabetes and/or complications of diabetes. In addition, always inquire with the individual patient because he or she may not adhere to all of the recommendations of their religious or culture. Although there is a vast array of knowledge to be learned about various cultures, some of the major cultural and religious considerations are listed as follows [44].

- **Diet**
  - Islam prohibits followers from eating from sunrise to sunset during the month of Ramadan.
  - Judaism requires individuals to fast from sundown to sundown during Yom Kippur and the Day of Atonement.
  - Orthodox Jews are forbidden to eat port, shellfish, and nonkosher red meat and poultry.
  - Hindus and Seventh Day Adventists are forbidden to eat meat.

- **Philippines enjoy eating rice with every meal and may feel deprived without it.**
- **Japanese prefer small amounts of beef or chicken mixed with vegetables and rice or noodles.**

Mexican Americans, African Americans and Asian Indians have a high prevalence of developing diabetes in their lives, so it is important to understand the typical food choices that may be a factor contributing to their risk:

- **Mexican Americans** enjoy eating lots of salt and fats in their cooking, which may be a contributing factor for their high development of type 2 diabetes. Therefore, the nurse should consider diabetes treatment and prevention programs for Mexican-Americans to include the following [50]:
  - Foods found in their traditional diet. Traditionally, Mexican-Americans tend to eat diets that are low-fat and high-fiber, which is certainly beneficial.
  - Assess the level of acculturation to American eating practices.
  - Ascertain the integration of folk medicine in consideration of their foods, hot and cold in regards to healing.

- **African Americans** enjoy eating “soul food,” such as food that is breaded and fried, especially in the summer months [50]. Their food choices are based on the following:
  - Health beliefs passed down each generation: “the soul food.”
  - Socioeconomic statuses along with education level.
  - Physical and financial limitation also plays an important role in terms of planning a meal and nutrition education for African-American patients.

A research study conducted by a diabetes clinic in Atlanta, Ga, the Grady Memorial Hospital, concluded that unfamiliar food options was the main reason African Americans did not adhere to low fat, low cholesterol diet recommendations. Therefore, it is critical that patients fully understand and realize the significance of their new diet; otherwise they may very well not follow it, which could lead to serious consequences, such as diabetes, obesity and/or hypertension [50].

- **Asian Indians** living in the U.S. are composed of a very diverse culture that will vary from each family based upon their religion. Although there is a vast array of religions practiced amongst Asian Indians, the most prevalent is Hinduism. A survey among 73 Asian Indians adults residing in New York City and
Pregnancy
It is important to note that many Asian and Hispanic cultures practice a system of hot and cold body balance. During pregnancy, the woman is considered to be in a “hot” condition and she will avoid “hot” foods such as protein. Therefore, it is important for the nurse to inquire during pregnancy for a woman who believes in a hot and cold practice if they are eating protein-rich foods. In addition, many Hispanic women avoid iron supplements and prenatal vitamins because they are considered “hot.”

Nurses caring for patients should always consider nutrition-related cultural variations by asking the patients about their specific food habits. Collaborating with the individual patient and family will provide a wealth of information for the nurse to provide appropriate suggestions for the patient to modify their traditional eating patterns to prevent and treat type 2 diabetes [50]. In addition, always discuss and refer the patient and family to a RD to ensure individual diets can be customized.

Paying for Diabetes
In April 2007, the ADA recognized that there were millions of American children and adults living with diabetes without insurance or limited access to obtaining the supplies, medications and education necessary to successfully manage the disease and prevent diabetes-related complications [6]. Currently, in 2009, the problem is compounded and expected to exacerbate due to the economic hardships encountered by many Americans. The nurse needs to be empathetic, respectful and conscious about the initial costs of the SMBG machines, monthly costs of the supplies (lancets, alcohol wipes, syringes), medications (oral and/or insulin), choosing healthy nutritious foods and any other expenses that may incur. Nurses should never assume that a patient and/or family is “noncompliant” in their health care regimen, but instead take the time to assess the patient and to find out the reasoning.

Throughout the U.S., each state has recognized the major effects diabetes plays and the impact on patients and society. As of January 2009, 46 states and the District of Columbia require mandated health insurance coverage for diabetes treatment. At this time, the laws in Mississippi, Missouri and Washington require only that insurers offer coverage, but not necessarily include the coverage in all active policies. The majority of the states require coverage for both direct treatment and for diabetes equipment and supplies that are often used by the patient at home. The four states that do not have a mandate or insurance requirement are Alabama, Idaho, North Dakota and Ohio [54]. Eleven percent of diagnosed diabetics under the age of 65 were uninsured and most likely to be from low income backgrounds [54]. The other 6 percent of diabetic patients are unaccounted, for according to the National Conference of State Legislatures.

However to date, private health insurance companies are not congruent in the costs and coverage, as it varies in each state. The majority of patients diagnosed with diabetes are either covered by a private insurance company (39 percent) or Medicare (44 percent). Medicare is the leader in providing the most coverage for diabetic patients.

Even with health insurance, Medicare and/or Medicaid, patients may not receive all of their required treatment modalities, such glucose monitors, test strips, lancets, emergency kits and medications. Therefore, it is imperative for physicians, nurses and educators to assess the community resources and programs within their community to find other potential coverage options. For example, Wal-Mart provides 54 prescriptions on various medications; on Wal-Mart’s main web site (2009), the following oral anti-diabetic agents are offered in a 30-day supply for $4 [72]:

- Chlorpropamide 100mg tablets.
- Glibenclamide 1mg, 2mg and 4mg tablets.
- Glimepiride 2 and 4mg tablets.
- Glipizide 5mg and 10mg tablets.
- Glyburide 2.5mg, 5 mg and micronized 3mg and 6mg tablets.
- Metformin 500mg, 850mg and 1000mg tablets.
- Metformin 500mg extended release tablet.

However, what happens to people who have coverage but then lose their job? The cost of Consolidated Omnibus Budget Reconciliation Act (COBRA) insurance is very pricey, especially for a family or individual who recently lost a job. The NDIC and the ADA recognized in 2004 that a person with diabetes spends an average of $13,243 a year on health care expenses [56]. Therefore, if a patient is not eligible for Medicare, Medicaid, or private health insurance, there are other potential programs available according to the NDIC, that the nurse can recommend for the patient and family dealing with diabetes (2004) [56]:

- **State Children’s Health Insurance Program**, supported by the U.S. Department of Health and Human Services, established the State Children’s Health Insurance Program (SCHIP) to help children without health insurance. SCHIP provides health coverage for children whose families earn too much to qualify for Medicaid but too little to afford private health insurance.

- **Health care services.** The Bureau of Primary Health Care, a service of the Health Resources and Services Administration, offers health care for people regardless of their insurance status or ability to pay. Encourage the patient to find a local health center by calling 1-800-400-2742 or visit the bureau’s website at www.bphc.hrsa.gov on the Internet.

- **Hospital care** is provided to patients who are uninsured and require hospital care. In 1946, Congress passed the Hospital Survey and Construction Act, which was sponsored by Sens. Lister Hill and Harold Burton and is now known as the Hill-Burton Act. Although the program originally provided hospitals with Federal grants for modernization, today it provides free or reduced-charge medical services to low-income people. The program is administered by the Department of Health and Human Services. For more information, call 1-800-638-0742 or visit www.hrsa.gov/hillburton/default.htm on the Internet.

- **Food and nutrition.** Food, nutrition education and access to health care services are also available through the U.S. Department of Agriculture’s WIC (Women, Infants, and Children) program. Pregnant women who meet residential, financial need and nutrition risk criteria are eligible for assistance. GDM is considered a medically based nutrition risk and would qualify a woman for assistance through the WIC program if she meets the financial need requirements and has lived in a particular state the required amount of time. WIC Phone: 703-305-2746, Internet: www.fns.usda.gov/wic.
Local resources that may be available, include:
• Lions Clubs help with vision care.
• Rotary Clubs help with humanitarian and educational assistance.
• Elks Clubs provides charitable activities for youth and veterans.
• Shriners offer need-based treatment for children at Shriner’s hospitals throughout the U.S.

Dialysis and transplantation. In 1972, Congress passed legislation making people of any age with permanent kidney failure eligible for Medicare. To qualify, a patient must need regular dialysis or have had a kidney transplant, and must have worked under Social Security, the Railroad Retirement Board or a government employee (or be the child or spouse of someone who has), or must already be receiving Social Security or Railroad Retirement benefits. Every American needing dialysis for chronic kidney failure is eligible for dialysis assistance. For more information, call the Centers for Medicare & Medicaid Services at 1-800-MEDICARE (633-4227) to request the booklet Medicare Coverage of Kidney Dialysis and Kidney Transplant Services. This booklet is also available on the Internet at www.medicare.gov under “Publications.”
• For information on financing an organ transplant, contact the following organization: United Network for Organ Sharing (UNOS) by calling: 1-888-894-6361 or visit the Internet at: www.unos.org

Prosthetic care. If a patient has had an amputation and is paying for compounding rehabilitation expenses, one of the following organizations provides financial assistance or information about locating financial resources for people who need prosthetic care:
• Amputee Coalition of America
Phone: 1-888-AMP-KNOW (267-5669)
Internet: www.amputee-coalition.org
• Easter Seals
Phone: 1-800-221-6827
Internet: www.easterseals.com
• Prosthetics for Diabetics Foundation
Phone: 770-267-0019
Internet: www.expation.com/page/pdffoundation

The future for diabetics
Researchers, scientists and physicians have been diligently attempting to control and cure diabetes for decades. One of the most intriguing developments was presented in April 2009 in Japan with the Diabetes Research Institute. For the first time, scientists discussed a hopeful development on how transplanted insulin-secreting cells called “islets” function when they are inside a living organism, or in vivo. In the past, researchers could only view the islets in a laboratory, or in vitro [38]. In addition, the Diabetes Research Institute and scientists in Stockholm, Sweden, are transplanting human islets into diabetic mice. In a paper, The Anterior Chamber of the Eye Allows Studying Human Islet Cell Biology in Vivo, researchers report the following [38]:
• After transplantation of 500 islet equivalents per eye, recipient mice achieved and maintained normal blood sugar levels for over 150 days.
• Within one month of the transplant, new blood vessels formed around the islet cells to deliver necessary nutrients (a process called “neovascularization”).
• As more blood vessels grew around the islet cells, the mouse’s diabetes gradually reversed.

However, according to the ADA, islet cell transplants were being conducted with great success in laboratory mice in the 1970s [16]. But the excitement that those experiments generated soon turned to frustration, as initial attempts to reproduce that success in humans were largely disappointing. For many years, progress was slow and few transplant recipients were able to stay diabetes-free for more than a few months before the transplanted islet cells failed. However, in recent years, scientists have begun to make rapid advances in transplant technology, and some of the most exciting new research comes from researchers at the University of Alberta in Edmonton, Canada. The scientists there have used a new procedure called the Edmonton Protocol to treat patients with type 1 diabetes, which is elaborated upon in the following [16]:

In this procedure, researchers use specialized enzymes to remove islets from the pancreas of a deceased donor. For an average-size person (70 kg), a typical transplant requires about 1 million islets, equal to two donor organs. Since the islet cells are extremely fragile, transplantation occurs immediately after they are removed. The transplant itself is easy and takes less than an hour to complete. The surgeon uses ultrasound to guide placement of a small plastic catheter through the upper abdomen and into the liver. The islets are then injected through the catheter into the liver. It takes some time for the cells to attach to new blood vessels and begin releasing insulin. The doctor will order many tests to check blood glucose levels after the transplant, and insulin may be needed until control is achieved.

According to Science Daily (2007), reporting in the proceedings of the National Academy of Sciences, that has greatly boosted the number of immune T-cells able to shield transplanted pancreatic islet cells from attack by the immune system [64]. In addition, over the nine-week study of islet transplantation in diabetic mice, no pharmacologic immunosuppression therapy was administered, and the transplanted islet cells stayed healthy and produced insulin throughout the study. This is promising data that may allow physicians to perform islet cell transplants in type 1 diabetics, especially if immunosuppressant therapy is not required because at this time, once a patient has received any type of a transplant, they need immunosuppressant therapy for the rest of their life to prevent their body from rejecting the donor cells.

According to the ADA, pancreatic transplants may treat type 1 diabetics if scientists can develop safe immunosuppressants that always work for the patient. Until safe immunosuppressants are fabricated and delivered, many doctors believe islet cell transplants are a better option.

Islets are clusters of cells that make up 1 to 2 percent of the total pancreas that make insulin. In the patient with type 1 diabetes, islet cells are destroyed. With pancreatic islet transplantation, cells are taken from a donor pancreas and transferred into another person. Once implanted, the new islets begin to make and release insulin. Researchers hope that islet transplantation will help people with type 1 diabetes live without daily injections of insulin.

According to the National Institutes of Health (2009), there are different methods to obtain islet cells depending on whether it is fetal, adult or embryonic tissue [66]:

Fetal tissue as source for islet cells. Several groups of researchers are investigating the use of fetal tissue as a potential source of islet progenitor cells. For example, using mice, researchers have compared the insulin content of implants from several sources of stem cells – fresh human fetal pancreatic tissue, purified human islets and cultured islet tissue – and they have found that insulin content was initially higher in the fresh tissue and purified islets. However, with time, insulin concentration decreased in the whole tissue grafts, while it remained the same in the purified islet grafts. When cultured islets were implanted, however, their insulin content increased over the course of three months. The researchers concluded that precursor cells within the cultured islets were able to proliferate (continue to replicate) and differentiate (specialize) into functioning islet tissue, but that the purified islet cells (already differentiated) could not further proliferate when grafted. Importantly, the researchers found, however, that it was also difficult to expand cultures of fetal islet progenitor cells in culture.

Adult tissue as source for islet cells. Many researchers have focused on culturing islet cells from human adult cadavers for use in developing transplantable material. Although differentiated beta cells are difficult to proliferate and culture, some researchers have had success in engineering such cells to do this.

Fred Levine and his colleagues at the University of California, San Diego, have engineered islet cells isolated from human cadavers by adding to the cells’ deoxyribonucleic acid (DNA) special genes that stimulate cell proliferation. However, because once such cell lines that can proliferate in
culture are established, they no longer produce insulin. The cell lines are further engineered to express the beta islet cell gene, Pdx1 (pancreatic and duodenal homeobox 1), also known as insulin promoter factor 1 (PDX-1), which stimulates the expression of the insulin gene. The specific cell lines have been shown to propagate in culture and can be induced to differentiate to cells, which produce insulin. When transplanted into immune-deficient mice, the cells secrete insulin in response to glucose. The researchers are currently investigating whether these cells will reverse diabetes in an experimental diabetes model in mice.

The investigators report that these cells do not produce as much insulin as normal islets, but it is within an order of magnitude. The major problem in dealing with these cells is maintaining the delicate balance between growth and differentiation. Cells that proliferate well do not produce insulin efficiently, and those that do produce insulin do not proliferate well. According to the researchers, the major issue is developing the technology to be able to grow large numbers of these cells that will reproducibly produce normal amounts of insulin.

Another promising source of islet progenitor cells lies in the cells that line the pancreatic ducts. Some researchers believe that multipotent (capable of forming cells from more than one germ layer) stem cells are intermingled with mature, differentiated duct cells, while others believe that the duct cells themselves can undergo a differentiation, or a reversal to a less mature type of cell, which can then differentiate into an insulin-producing islet cell.

Susan Bonner-Weir and her colleagues reported in 2008 that when ductal cells isolated from adult human pancreatic tissue were cultured, they could be induced to differentiate into clusters that contained both ductal and endocrine cells. Over the course of three to four weeks in culture, the cells secreted low amounts of insulin when exposed to low concentrations of glucose, and higher amounts of insulin when exposed to higher glucose content. The researchers have determined by immunohistochemistry and ultra structural analysis that these clusters contain all of the endocrine cells of the islets.

**Embryonic stem cells.** The discovery of methods to isolate and grow human embryonic stem cells in 1998 renewed the hopes for doctors, researchers and diabetic patients and their families that a cure for type 1 diabetes and perhaps type 2 diabetes as well, may be within striking distance. In theory, embryonic stem cells could be cultivated and coaxed into developing into the insulin-producing islet cells of the pancreas. With a ready supply of cultured stem cells at hand, the theory is that a line of embryonic stem cells could be grown up as needed for anyone requiring a transplant. The cells could be engineered to avoid immune rejection. Before transplantation, they could be placed into nonimmunogenic material so that they would not be rejected and the patient would avoid the devastating effects of immunosuppressant drugs. There is also some evidence that differentiated cells derived from embryonic stem cells might be less likely to cause immune rejection. Although having a replenishable supply of insulin-producing cells for transplant into humans may be a long way off, researchers have been making remarkable progress in their quest for it. While some researchers have pursued the research on embryonic stem cells, other researchers have focused on insulin-producing precursor cells that occur naturally in adult and fetal tissues.

In 2001, several teams of researchers continued the initial embryonic research, continuing to believe the possibility that human embryonic stem cells could be developed as a therapy for treating diabetes. Recent studies in mice show that embryonic stem cells can be coaxed into differentiating into insulin-producing beta cells, and new reports indicate that this strategy may be possible using human embryonic cells as well. Last year, researchers in Spain reported using mouse embryonic stem cells that were engineered to allow researchers to select for cells that were differentiating into insulin-producing cells.

Bernat Soria and his colleagues at the Universidad Miguel Hernandez in San Juan, Alicante, Spain, added DNA containing part of the insulin gene to embryonic cells from mice. The insulin gene was linked to another gene that rendered the mice resistant to an antibiotic drug. By growing the cells in the presence of an antibiotic, only those cells that were activating the insulin promoter were able to survive. The cells were cloned and then cultured under varying conditions. Cells cultured in the presence of low concentrations of glucose differentiated and were able to respond to changes in glucose concentration by increasing insulin secretion nearly sevenfold. The researchers then implanted the cells into the spleens of diabetic mice and found that symptoms of diabetes were reversed.

Another researcher, Manfred Ruediger of Cardion Inc. in Erkrath, Germany, use the approach developed by Soria and his colleagues to develop insulin-producing human cells derived from embryonic stem cells. By using this method, the noninsulin-producing cells would be killed off and only insulin-producing cells should survive. This is important in ensuring that undifferentiated cells are not implanted that could give rise to tumors.

Utilizing stem cell research is intriguing and provides a lot of hope for diabetic patients. However, at this time is important for researchers to define the protocols, exact mechanisms and potential need for immunosuppressive therapy. Ultimately, type 1 diabetes may prove to be especially difficult to cure, because the cells are destroyed when the body’s own immune system attacks and destroys them. The autoimmunity must be overcome if researchers intend to use transplanted cells to replace the damaged ones. Many researchers believe that at least initially, immunosuppressive therapy similar to that used in the Edmonton protocol will be beneficial. A potential advantage of embryonic cells is that, in theory, they could be engineered to express the appropriate genes that would allow them to escape or reduce detection by the immune system. Others have suggested that a technology should be developed to encapsulate or embed islet cells derived from islet stem or progenitor cells in a material that would allow small molecules such as insulin to pass through freely, but would not allow interactions between the islet cells and cells of the immune system. Such encapsulated cells could secrete insulin into the bloodstream, but remain inaccessible to the immune system.

Before any cell-based therapy to treat diabetes makes it to the clinic, many safety issues must be addressed. A major consideration is whether any precursor or stem-like cells transplanted into the body might revert to a more pluripotent state and induce the formation of tumors. These risks would seemingly be lessened if fully differentiated cells are used in transplantation. However, before any kind of human islet-precursor cells can be used therapeutically, a renewable source of human stem cells must be developed. Although many progenitor cells have been identified in adult tissue, few of these cells can be cultured for multiple generations. Embryonic stem cells show the greatest promise for generating cell lines that will be free of contaminants and that can self renew. However, most researchers agree that until a therapeutically useful source of human islet cells is developed, all avenues of research should be exhaustively investigated, including both adult and embryonic sources of tissue [66].

**Closing**

Although diabetes remains a prevalent chronic disease process, nurses can make an enormous difference in the life of the patient and family dealing with it. According to the American College of Physicians (ACP) (2006), many times physicians do not have the time, resources and appropriate levels of patient participation
to effectively treat diabetes. Therefore, patients end up struggling with the understanding and complexity of the disease [4]. The ACP and the American College of Physicians Foundation (ACPFP) are concerned about the dangers and enormous cost to America, so in 2006 they collaborated to pursue a three-year project engaging both physicians and patients to improve diabetes care in the United States [4]. In 2010, one can hope to analyze their investigation in hope of finding more educational options for patients and their families when they are encountering diabetes. In the meantime, it is important to understand there are enormous treatment modalities and options available for the patient. It is just imperative that the patient realize the significant role diabetes plays on the body and the complications that arise over time by not adhering to the recommendations. In addition, although the patient may realize the importance, they need to assess whether the patient is eager and capable of making the changes.

References

Page 25
1. Diabetes has reached epic proportions worldwide, making it the seventh leading cause of death in the United States (U.S.).
   True    False

2. There are about 25.8 million children and adults (8.3% of the total United States population) living with diabetes.
   True    False

3. Insulin is a hormone that increases the blood glucose levels any time the blood sugar is low.
   True    False

4. Type 1 diabetes is a multifactorial disease caused by an autoimmune destruction of insulin-producing pancreatic beta cells.
   True    False

5. Type 2 diabetes accounts for 10 percent of all cases.
   True    False

6. Impaired fasting glucose (IFG) is a condition in which the fasting blood sugar level is 100 to 125 milligrams per deciliter (mg/dL) after an overnight fast.
   True    False

7. The classic signs and symptoms of diabetes in general include the “three polys” (polyuria, polydipsia, and polyphagia).
   True    False

8. Diabetes is diagnosed by a fasting blood glucose level greater than 126 mg/dl on two or more occasions.
   True    False

9. The first line treatment of all diabetic patients is insulin.
   True    False

10. The ADA recommends that all diabetics maintain their daily blood glucose levels as follows: Preprandial, 70 to 130 mg/dl; postprandial, less than 180 mg/dl.
    True    False

CHAPTER 2
HIGH SCHOOL AND COLLEGE ATHLETES: THE DANGERS OF SUDDEN CARDIAC EVENTS AND CONCUSSIONS
(2 Contact Hours)

Learning objectives
- Discuss reasons that cardiac events and concussions are not reported.
- Describe the pathophysiology of sudden cardiac events.
- Explain interventions for the prevention of sudden cardiac events.
- Discuss the pathophysiology of concussion.
- Identify the effects of concussion on student athletes.
- Discuss interventions to deal with and prevent concussion in student athletes.

Introduction
Todd is the “star” of his high school’s nationally ranked basketball team. As a junior he is generating interest among college scouts and is expected to earn a full athletic scholarship to a prestigious university. During a recent game, Todd is not quite himself. He tires quickly and has trouble catching his breath after running down the court. Todd signals his coach that he needs a time out. As he makes his way to the bench Todd suddenly collapses. Despite the best efforts of on-site emergency personnel and a swift transfer to the emergency department, Todd is pronounced dead within 20 minutes of his collapse. The cause of death is determined to be sudden cardiac arrest due to a congenital abnormality of the aortic valve.

Brian is the starting senior quarterback for his university’s football team. He has been approached by scouts from several National Football League (NFL) teams about the possibility of a career in football. Brian suffered a concussion in his junior year in high school and one in his sophomore year in college. During last week’s game Brian struck his head on the ground when he was tackled by a member of the opposing team. It was not a particularly hard blow, and no one thought a great deal about it. However, since this incident, Brian has been having severe headaches and some double vision. Brian says nothing to anyone, however, since he doesn’t want to miss playing in any games this season.

Stephanie is 13 years old and an avid soccer player. She has played the sport since she was six years old and is highly competitive. All members of her family play some type of sport. Her mother and father both received athletic scholarships to college, and her older brother and sister play basketball and soccer on their respective high school teams. Stephanie expects to excel at soccer, an expectation shared by her family as well. Her team is in a semi-final playoff this week and Stephanie is determined to “get even” with a girl from the rival team who, she believes, deliberately tripped her during their last meeting. During the semi-final Stephanie manages to trip her rival, who falls to the ground, hitting her head, and sustains a concussion.

These scenarios are all too common among athletes of all ages. The dangers of concussion and sudden cardiac events have begun to receive national and international attention. Lawsuits have been filed by professional athletes who believe that their respective professional organizations did not adequately protect them from consequences of injury. Television and radio talk show hosts and guests debate the pros and cons of participating in sports. The Internet is a source of discussion as well.

There are many questions surrounding these types of sports injuries. Arguably, the two most critical questions are, “Why are events such as concussions not reported?” and “What can be done to prevent problems such as cardiac events and concussion?”

Why are events such as concussions not reported?
There are many reasons that affect the reporting of sports injuries, especially concussions. The most common reason for not reporting a concussion, for example, is that the injured player simply did not think he or she was seriously hurt. Coaches and parents may also fail to recognize the seriousness, or potential seriousness, of an injury. Failure to recognize injury and/or failing to understand the potential for serious consequences requires more vigorous efforts to educate athletes, coaches, teachers, parents and other family members, and friends on the subjects. Equally, if not more important, is the need to recognize the potential for injury or warning signs of potential events (such as sudden cardiac events). Prevention of injury is the truly the best “treatment.”

But lack of knowledge is certainly not the only reason for failure to report injuries. Here is a summary of some common reasons that athletic injuries are not reported.

- Recognition: Those who excel at sports, particularly prominent sports during the school year, often receive special recognition at school and in college. Athletes are often popular leaders who receive particular attention from peers, teachers, professors, and others. An injury or condition that could limit or even prevent them from playing sports is viewed as a disaster to be avoided.
- Finances: Those who excel at sports may hope to receive athletic scholarships to prestigious universities. They may also hope to reap the financial benefits bestowed on some professional athletes. Young athletes (as well as professional athletes) may not want to risk what they believe to be an impressive financial future by admitting that they have been injured.
- Fear of Failure: Athletes may perceive that anything that prevents them from participating in their sports renders them susceptible to failure. Failure to achieve recognition, failure to achieve scholarships or other financial rewards, failure to help his/her team excel, and failure to meet the expectations of family and friends are all types of failure that make athletes reluctant to acknowledge injuries or other health problems.
- Promotion of School and Family: Athletics can be a big source of recognition in high school and a source of financial gain and recruitment for universities. Athletes may feel, or be pressured to feel, that their sports performance is of significant importance to their schools and universities.
- Parental, Coach, and Peer Pressure: Parents, coaches, and peers may place significant pressure on athletes to succeed. Parents may have been successful athletes themselves and expect their children to be equally successful. Or they may have longed to excel at sports but were not able to do so. Thus they want their children to succeed where they did not. Parents may also enjoy the attention they get from being the parents of the “stars” on various teams. Coaches, whose jobs depend on the successful performance of their athletes, may want to win. Coaches and parents may also place pressure on athletes to perform. They want their school and university teams to win. Winning is highly prized in society!

Need to win at all costs: As previously mentioned, winning is important to athletes, parents, coaches, and fans! Anyone who has attended a sporting event has witnessed the enthusiasm of fans as they root for their respective teams. Sometimes this enthusiasm takes the form of negative comments and even fights with fans of the opposing teams. These kinds of behaviors can be seen even among fans of the very young athletes. Such behaviors seem to become worse as the children age and the “need” to win becomes more intense.

Although some of the preceding reasons may seem petty compared to the potential for serious injury, life-long effects, or even death, the persons whose behaviors contribute to failure to report may not even be aware of their impact. It is unlikely that parents, fans, and coaches, would deliberately risk an athlete’s life and well-being. However, because of the reasons, whether they are financial, the need for prestige, the need for recognition, or the need to win, rational behavior is sometimes compromised.

But the word “rationale” may have a different meaning to different people. The parent or coach who encourages an athlete to “tough it out” when suffering from a sprained ankle or dramatic fall to the ground is not generally being abusive, or behaving in a callous manner. These people are “encouraging” athletes to deal with what is often believed to be an inevitable consequence of
participating in sports; dealing with some type of injury. The danger occurs when athletes and the people who should be most concerned with their safety (parents and coaches) ignore injuries or fail to implement safety interventions to prevent, as much as possible, injuries. Education is not enough. It is an actual change in values that must take place among many athletes, coaches, parents, and fans.

Much of the attention regarding injury prevention has been focused on high school and university students as well as professional athletes. But if this failure to prevent and/or recognize injury or illness among athletes is to be corrected, interventions must begin when the athletes are very young. In fact, education for children, parents, coaches, and fans should begin with the youngest athletes. If these issues are not addressed until high school, the behaviors and beliefs about sports are already firmly established.

Anyone whose child is a participant in a sport or who coaches a team should be taught to recognize and act to prevent injuries and the adverse effects of illnesses. The athletes must also be taught recognition and prevention. Education should not stop there, however. Fans, friends, and peers of athletes also need education. Everyone’s priority should be the health and wellness of the athletes.

Sudden cardiac events

David, a sophomore at a large, Division I basketball university, is making quite a name for himself on the basketball team. He is the point guard for his team and outscored most of his peers at every game. David’s endurance is legendary and he never seems to tire. Due to the complexity of athletic health screening for heart problems. Detecting potentially serious, and even fatal, heart problems in young, seemingly healthy children, teen-agers, and young adults is a challenge. Many of these conditions do not produce signs or symptoms and are not detected during normal physical exams or even on electrocardiograms (ECGs).6

According to the American Academy of Pediatrics an estimated 2,000 individuals under the age of 25 experience sudden cardiac death annually in the United States. The NCAA notes that approximately one in every 40,000 student athletes is “affected by sudden cardiac death.”6

What can be done to stop this alarming phenomenon? Research is needed regarding the cause of sudden cardiac deaths and early identification of heart conditions that contribute to such deaths. Automated external defibrillators (AEDs) must be readily available at all sports events and practice areas. Coaches and parents should be taught to use these devices. Also important is a system of checking the proper functioning of the AED on a regular basis, including assessing if the batteries are still operative. Cases of deaths have been reported when the AED relied upon to save a life malfunctioned or had dead batteries.6

Legislation is one way to ensure that key personnel involved in sports receive education regarding sudden cardiac events. In August, 2012 Pennsylvania became the first state to pass the Sudden Cardiac Arrest Prevention Act. This law went into effect prior to the start of the 2012-2013 school year.14

Education is critical to this law, which requires schools to provide informational sheets to parents of student athletes concerning symptoms of sudden cardiac arrest. Other components of the law include:1,14

- Student may not play in any school sport unless they have obtained their parents’ or guardians’ written authorization.
- Should students display any signs of impending cardiac events (e.g. dizziness, chest pain, difficulty breathing, fainting, feelings of a “racing” heart) before, during, or after sports activity, they must receive medical clearance before resuming participation in sports.
- Coaches must complete an annual training course on sudden cardiac arrest. They must go online, read the provided educational materials, and certify that they have done so. They must not coach sports activities until this education is completed.

Clinical Alert! Family history of sudden cardiac arrest before the age of 50 increases risk for the problem in athletes.2

The Children’s Hospital of Pittsburgh’s cardiology experts have developed an algorithm for licensed healthcare practitioners, including primary care physicians (PCPs), to use when evaluating student athletes.14

For patients with prior symptoms, defined as having occurred in the past and been resolved, the following actions are recommended.14

- **Symptoms at rest:** ECG may be performed and/or cardiology consultation initiated.
- **Symptoms with exercise:** The PCP should evaluate and triage the patient as appropriate.
- **Patients with symptoms that are not attributed to other diagnoses:** These patients should be referred for consultation with a cardiologist.

For patients with acute symptoms or symptoms during a recent sporting event (those patients who are waiting for clearance to return to competitive sports), the following actions are recommended.14

- **For emergency situations:** Call 911 or refer patients to the nearest emergency departments.
- **For non-emergency situations:** Patients whose symptoms cannot be attributed to other diagnoses should be referred for a cardiology consultation.

Clinical Alert! The Children’s Hospital of Pittsburgh notes that the preceding algorithm is offered for educational purposes only and should be used in conjunction with patients’ physicians’ clinical judgment. Additionally, the algorithm is not intended as patient-specific medical advice or legal advice.14

The changes ongoing, vigorous athlete training can make in the heart of the athletes are receiving considerable attention as the sports and healthcare communities investigate sudden cardiac events. “Athlete’s heart” is usually regarded as a benign increase in cardiac mass due to the physiologic stress of exercise and training.5,13 When athletes stop training, the heart generally returns to a normal size.13

The physiology of “athlete’s heart” mimics that of heart diseases such as hypertrophic cardiomyopathy. “Athlete’s heart” causes the heart muscle to grow in response to the extra demands placed upon it by exercise, training, and participation in sports.

As the heart responds to athletic training the muscular walls of the heart thicken, there are alterations in the electrical conduction system of the heart, and the volume of blood ejected with each beat of the heart increases. Thus the heart rate at rest in athletes is less than the normal resting rate of non-athletes.15

However, there is some concern that an enlarged heart in athletes may be dismissed as “normal” when, in fact, there is an existing heart condition that is causing the enlargement. It is important that all instances of heart enlargement be evaluated.5,13

There is also some concern that not enough is known about the actual impact of prolonged athletic conditioning on the heart. Not enough research has been conducted to determine if negative consequences are possible. To date,
there is no evidence that the condition of “athlete’s heart” damages the athlete’s cardiac status, but such consequences cannot be excluded with assurance. More research is needed to determine the long-term impact of “athlete’s heart.”

In summary, preventing serious consequences of sudden cardiac events is the responsibility of athletes, parents, coaches, friends, fans, and the healthcare community. A great deal of focus is on education, which is, of course, important, even essential. However, education alone is not enough. Changing the mind-set of those most intimately involved is equally important. Unless society stops rewarding the “win at any cost” philosophy it is unlikely that altering the behavior of athletes, coaches, parents, and friends will be an easy task. The priority must be the safety, health, and well-being of the athletes.

Concussion
Emily is the reigning star of her high school basketball team. About to begin her senior year, Emily has accepted a full scholarship to a Division I university. This summer, Emily participates in a number of vigorous practice games with teammates. During one of these workouts Emily falls and hits her head hard on the gym floor. She immediately rejoins the game and denies any injury. Despite this denial Emily suspects that she may have sustained another concussion. Previous concussions occurred during her Freshman and Sophomore years. Emily is fearful that admitting to another possible concussion will curtail her ability to play basketball during her final year in high school as well as endanger her scholarship. Almost two years later, during a championship game at college, Emily becomes dizzy and faints. She is experiencing some long-term effects of multiple concussions.

The problem of concussion in student athletes is an extremely serious one. It is estimated that 300,000 sports related traumatic brain injuries, mostly concussions, take place annually in the United States. In fact, sports are second only to motor vehicle accidents as the leading cause of traumatic brain injury (TBI) in people aged 15 to 24 years of age. As participation in sports increases, it is likely that the incidence of concussion will also increase. More than seven million high school students participated in sports in 2005-2006, and nearly 385,000 college students participated in sports during the same time period.

It is a matter of ongoing concern that as the numbers of student athletes’ increase, and education about concussion increases, the number of concussions occurring has remained stable. For example the NCAA reports that the rate of football related concussions has remained stable over an eight year period even though education and attention to the problem has increased.

Pathophysiology of concussion
Concussion is the most common traumatic brain injury caused by a blow to the head that leads to a transient interruption in brain activity. Acceleration-deceleration of the brain occurs with the blow that is usually sudden and forceful. This type of injury leads to temporary neural dysfunction as the brain strikes the skull, but the blow is not hard enough to cause a cerebral contusion. Concussion occurs when the head hits a stationary object such as the ground or a basketball court or when a moving object hits the head such as a punch to the head in a boxing match.

Concussions are classified based on the severity of symptoms:
- **Mild**: Temporary neurological dysfunction without loss of consciousness or memory.
- **Moderate or Classic**: Temporary neurologic dysfunction, unconsciousness, and memory loss.

The quality Standards Subcommittee for the American Academy of Neurology classifies the severity of concussion according to symptoms associated with three grades:
- **Grade 1**: Transient confusion, no loss of consciousness, and mental status abnormalities resolve within 15 minutes.
- **Grade 2**: Transient confusion, no loss of consciousness, signs and symptoms last more than 15 minutes.
- **Grade 3**: Any length of loss of consciousness whether it is for a matter of seconds or extended.

Signs and symptoms associated with concussion include:
- Anxiety.
- Difficulty concentrating.
- Difficulty remembering events that led up to the blow to the head.
- Difficulty remembering new information.
- Dizziness.
- Drowsiness.
- Fatigue.
- Headache.
- Irritability.
- Loss of consciousness.
- Nausea.
- Photophobia.
- Problems with coordination and balance.
- Vomiting.
- Visual disturbances.

Post-concussion syndrome, headaches, dizziness, nausea, vertigo, fatigue, and anxiety, may persist for weeks or even months after the injury.

Research indicates that there is a potential for prolonged effects from concussion in athletes. For example, in addition to post-concussion syndrome, there is evidence that repeated concussions can lead to long-term debilitating problems. One such problem is chronic traumatic encephalopathy (CTE), a progressive degenerative disease.

CTE is characterized by concentrations of tau proteins in the brain. The disease has been identified in persons as young as 18 years of age who have had repeated brain trauma. The severity of the disease is believed to correlate with the length of time the patient has been involved in sports and the number of traumatic brain injuries.

Current research shows that children and adolescents are more susceptible to concussion and its prolonged effects than adults. Why is this so? Children and adolescents are growing and their central nervous systems are surrounded and protected by musculature that is still under development. Thus, the head is not as well-supported as that of an adult. Additionally, the myelin sheath has not yet reached maximum maturity, which affects central nervous system impulse conduction. The cranial bones have not yet reached maximum thickness, so their protective effects are not as good as those found in adults.

A study conducted by Moser, Schatz, and Jordan on the prolonged effects of concussion in high school athletes showed that:
- Athletes with recent concussions performed significantly worse on measures of attention and concentration than those with no history of concussion.
- Athletes who were free of symptoms but had a history of two or more concussions performed similarly on testing to athletes who had just experienced a recent concussion.
- Cumulative academic grade point averages were significantly lower for athletes with two or more previous concussions and for those who experienced recent concussions. This indicates that those athletes with lower grade point averages may be more vulnerable to concussion.
- Study results suggest that there are slight but significant prolonged neuropsychological effects in high school athletes with a history of two or more previous concussions.

Diagnosis
Diagnosis of concussion is based on a neurologic examination including:
- Coordination and balance.
- Cranial nerve.
- Event leading up to the trauma.
- Level of consciousness (LOC) assessment at the time of injury and as time goes by.
- Mental status.
- Motor function.
- Orientation to person, place, and time.
- Signs and symptoms.

If minimal or no abnormalities are identified, and a severe head injury is ruled out, the patient is observed for any evidence of more severe brain trauma. Initial examination provides the baseline for comparison and identifying any deterioration of cerebral status.

In the event that signs and symptoms are severe or if a severe head injury is suspected, a computed tomography (CT) scan or magnetic resonance imaging (MRI) is performed to rule out fractures and more serious injuries. If there...
is evidence of fractures or more severe injuries a
eurosurgical consult is indicated.4

Assessment at the time of injury is critical to
diagnosis. Most sports programs have initiated
some type of baseline assessment prior to
participation in any sports activity. Then, if and
when an injury occurs, results from the baseline
are compared to the results post injury. A number
of computer-generated tests have been developed
for just this purpose.

One such test is the ImPACT test. ImPACT
stands for Immediate, Post-Concussion
Assessment and Cognitive Testing. ImPACT
was developed in the early 1990’s by Drs. Mark
Lovell and Joseph Maroon for professional
athletes, but is now in common use in school-
related and collegiate sports programs. ImPACT
or other tests are administered to identify a
baseline level of brain function before athletes
begin their sports seasons. If an athlete is
suspected of sustaining a concussion a second
test is given and results are compared with the
first (baseline) test.9,20

Clinical Alert! ImPACT testing is just one
component of the evaluation process. It should
never be used alone.19

Administration of the ImPACT test takes about
20 minutes. It measures cognitive skills such
as attention span, working memory, sustained
and selective attention time, non-verbal problem
solving, and reaction time.19,20

ImPACT is designed to be administered by
athletic trainers, nurses, athletic directors,
team doctors, or psychologists as long as
they have completed training in ImPACT
test administration. Concussion care and
management should be handled only by trained
healthcare professionals.20

Features of the test include:19,20

- Measurement of player symptoms.
- Measurement of verbal and visual memory.
- Measurement of speed and reaction time.
- Measurement of reaction time to 1/100th of
  a second.
- Provision of reliable baseline test
  information.
- Administration of testing online for
  individuals and groups in formats compatible
  with PC and MAC.
- Provision of a comprehensive report of test
  results.
- Provision of results as a PDF file that can be
e-mailed.
- Stores data automatically from repeat testing.

Clinical Alert! Although ImPACT has become
the standard for concussion evaluation there are
other tests available for use. These include the
CogSport and the Automated Neuropsychological
Assessment Metrics (ANAM).4

Interventions to deal with or prevent
concussion

Acute Treatment

Treatment of concussion varies based on the
severity and type of injury. Supportive care
interventions include:3,18

- Application of ice pack to the injured area.
- Administration of mild analgesics for
  headache.
- Administration of anti-nausea and anti-
  vertigo medications.
- Suturing lacerations.

If there are neurologic abnormalities present vital
signs, level of consciousness (LOC) checks, and
pupil checks are done every 15 minutes. If the
injured patient’s condition remains stable after
observation for four or more hours, discharge
from the emergency department is acceptable,
and the patient is discharged under the
supervision of a responsible adult.4

After discharge the patient is monitored for
changes in LOC, mental status, and orientation.
It may be necessary to awaken the patient every
few hours at night for observation. The adult
responsible for monitoring the patient should
be provided with a head injury instruction
sheet and told to also observe for vomiting,
headache exacerbation, bleeding from the ear,
cerebrospinal fluid leak from ears or nose, all of
which may indicate deterioration of the patient’s
condition.4,18

Monitoring should continue for at least three
days. Part of post-concussion care includes
avoiding a second blow to the head, which can
result in second-impact syndrome. A second
blow to the head before the first concussion
has been resolved may cause potentially fatal
swelling of the brain.4,18

Legislative efforts

Legislative efforts have also been made to deal
with the problem of sports related concussions.
These efforts were spurred by estimates of
incidence that range as high as 3.8 million
annually, which suggests an average rate of about
10 percent of athletes sustaining a concussion
during any season, whether during practice or
play.21

As of 2011, 31 states and the District of
Columbia have passed bills related to concussion
management into law or were awaiting the
signatures of their respective governors. Some
states, however, have not been as successful.
Six states have yet to introduce legislation and
five states had bills introduced that were
unsuccessful.21

There have been some recurrent concepts in the
wording of legislation pertaining to sports related
concussions. Recurrent themes include the
following issues.21

- Coaches and trainers must participate in
  education pertaining to the management of
  concussions. Such education must include
  signs and symptoms of concussion and how
  to follow return-to-play protocols that include
  gradually progressive levels of activity.
- Coaches and trainers must review such
  education annually and periodically recertify
  skills in the area of concussion management.

- Athletes and their parents/guardians must
  receive information pertaining to concussion
  signs and symptoms before the beginning of
each sports season.
- Parents/guardians must sign informed
  consent allowing the student to participate in
  sports.
- Athletes who suffer a concussion must not
  return to play in the same game.
- Athletes who suffer a concussion must receive
  written clearance from a physician or
  other licensed healthcare professional before
  returning to play or practice.

There are some limitations to many of the laws
enacted. For example, many do not mandate
athletes to complete a baseline assessment of
cognitive functioning prior to participating in
practice or actual games.21 Additionally, not all
legislation mandates education pertaining to the
preventing of concussions.

Fact sheets

There are a number of sources that provide
concussion fact sheets for parents, athletes, and
coaches for minimal fees or, in some cases, free
of charge.3,10,11,12 Common themes in all fact
sheets include:

- Definition of concussion.
- Signs and symptoms of a concussion.
- Prevention of a concussion.
- Steps to take if a concussion has been
  suffered.

However, fact sheets are not sufficient. There
needs to be frank discussion regarding prevailing
attitudes that make athletes, parents, and coaches
fail to recognize the seriousness of the problem.

The role of the healthcare professional in
concussion prevention, identification, and
education

The Institute of Medicine (IOM) recently
published a report that included recommendations
for nurses to function as health coaches.9 The
same could be said of all healthcare professionals,
particularly those that work in schools, sports
medicine, emergency departments, and office
settings.

All healthcare professionals should be aware of
the signs and symptoms of concussion. Nurses
should be able to conduct patient assessments
that help in the medical diagnosis of concussion.
Included in this assessment should be pupil
assessment, which should be part of the baseline
information collected when ImPACT or other
testing is performed.9

Assessment skills, education of parents, students,
and coaches, distribution of fact sheets, and
following laws and regulations are all important.
But how do we change the mind-set that
contributes to concussion or failure to recognize
concussion?

As previously noted, the most common reason for
not reporting a concussion is that the seriousness
of the injury was not recognized. In other words,
the player or those around him/her simply did
not believe that the injury was serious enough
to require medical assessment. Education regarding the effects of concussion and its signs and symptoms should help to reduce the occurrence of this particular reason for failure to report.

But changing values is more difficult. Young athletes don’t want to let their teammates, schools, coaches, fans, and parents down. This is an understandable dilemma. In order to encourage these athletes to report injury they need to be told, quite frankly, of the dangers they are subjecting themselves to by failing to report an injury. Simultaneously, it needs to be made clear to fans, coaches, and parents that long-term disability, gradual deterioration of mental acuity, and/or even death are all possibilities when athletes experience brain injury, especially in the form of multiple concussions.

Financial pressure can be a powerful motivator to continue to play despite injury. Those students who are hoping for a scholarship or a career in professional sports and the accompanying financial gains are among those who may be most reluctant to report injuries. How do we argue with the desire for scholarships or financially lucrative careers?

Again, it comes down to blunt explanations of what might happen if injuries are ignored. One possible education strategy is to ask athletes who have experienced concussions or other sports related injuries or illnesses to come to speak to various teams and/or the student body as a whole. Coaches and parents should be invited to these kinds of events. Talking to someone who has lived through such disastrous events, or listening to him/her speak may be the “trigger” that is needed to help students, parents, coaches, and fans work harder to prevent and/or admit injury.

Long-term effects may not be overt for a number of years. Some athletes do not experience serious consequences until they reach their late thirties or enter their forties or even later. To young people, this sounds like old age. They may make comments such as, “Why should I care what happens when I am old?” In cases such as these we need to reach out to persons who are actively involved in injury prevention, and, as just mentioned, to those who are dealing with the effects of repeated concussions.

There are many coaches, fans, and parents who already take the possibility of injury very seriously and actively participate in efforts to reduce the problem. Such individuals may be willing to speak to groups of athletes, parents, coaches, etc. to reinforce the need for education and training in concussion prevention and management.

Fans must not be forgotten when education is provided. Fans may simply be people who are alumni of schools and colleges and enjoy rooting for those teams. Fans are also among the most vocal persons when teams lose or a player leaves the game after an injury. Since some may not be involved with the players themselves, they may be less interested in recognizing the potential for injury and its consequences. Their behavior may indirectly influence players and coaches. Fans who behave inappropriately should be removed from the game site.

In summary, injury prevention is the responsibility of everyone in the healthcare community and everyone who is involved in sports related activities whether they are athletes, coaches, loved ones, or fans. Good assessment skills and recognition of appropriate interventions for illness or injury are essential. Just as essential are steps to take to prevent injuries and illnesses. State legislators should be contacted and encouraged to support legislation designed to prevent serious sports related illness and injury. Education and training should be developed that help enhance the health and well-being of all persons involved, in any way, with athletic activities.

Resources for concussion evaluation and education

- American Speech-Language Hearing Association
  www.asha.org
- Centers for Disease Control and Prevention (CDC)
  www.cdc.gov/concussion
- ImPACT
  www.impacttest.com
- Safe Concussion Outcome Recovery & Education Program (SCORE)
  www.childrensnational.org/score/
- Sports concussion assessment tool from the Consensus Statement in Sports, 3rd International Conference on Concussion in Sport
  www.scat2.org
- Sports Legacy Institute Community Educators (SLICE)
  http://sportslegacy.org/sports-legacy-institute-concussion-education-programs/slice/
- U. S. Department of Health and Human Services
  www.hhs.gov

References

1. The most common reason for not reporting a concussion is that the injured player simply did not think he or she was seriously hurt.
   True  False

2. Personal values seldom have an impact on reporting sports related illnesses or injuries.
   True  False

3. In order to reduce the incidence of sports related concussion it is important to change some values and beliefs of athletes, fans, coaches, and parents.
   True  False

4. Family history of sudden cardiac arrest before the age of 50 increases risk for the problem in athletes.
   True  False

5. Dizziness and racing heart rate are normal in athletes.
   True  False

6. As the heart responds to athletic training the muscular walls of the heart thicken, there are alterations in the electrical conduction system of the heart, and the volume of blood ejected with each beat of the heart increases.
   True  False

7. The leading cause of traumatic brain injury in people aged 15 to 24 years of age is sports.
   True  False

8. Concussion causes acceleration-deceleration of the brain from a blow to the head that is usually sudden and forceful.
   True  False

9. Chronic traumatic encephalopathy can be a consequence of repeated concussions.
   True  False

10. ImPACT testing alone is sufficient for the evaluation and identification of concussion.
    True  False

Learning objectives

- Describe the phenomenon of horizontal violence.
- Discuss the incidence and prevalence of horizontal violence.
- Discuss how horizontal violence victims are chosen by their abusers.
- Identify the characteristics of persons who commit horizontal violence.
- Explain the causes of horizontal violence.
- Analyze the impact of horizontal violence.
- Implement strategies to reduce and prevent horizontal violence.

Introduction

What first comes to mind when health care employees hear the words “violence” and “workplace”?

Many might say they think of an out-of-control emergency department patient under the influence of drugs or alcohol who attempts to harm staff members. Others may remember a confused, frightened patient who tried to strike them. Still others may think about an angry visitor who verbally abused them.

These scenarios are not uncommon and are understandable. In fact, a 2011 U.S. Department of Justice special report published findings that showed workplace violence in this country is responsible for about 900 deaths and 1.7 million nonfatal assaults annually. 21 In the hospital setting, research shows that 35 percent to 80 percent of hospital staff members have been physically assaulted at least once during their careers.

However, there is another type of violence, commonly referred to as horizontal violence, which also has far-reaching, serious consequences. These consequences affect recruitment and retention, can increase the risk of errors, decrease patient outcomes, and adversely affect the health and well-being of its victims.2,19 Horizontal violence, also known as HV, is aggression against peers, co-workers who are on the same hierarchical level of an organization.2,20 And some researchers believe that this type of violence has reached epidemic proportions.

HV is sometimes referred to as lateral violence, and it causes more harm than any other type of aggression in the workplace, including bullying of nurses and other health care professionals by physicians, supervisors and subordinates.2,3

The phenomenon of horizontal violence

Jackie is the nurse manager for two surgical units in a 500-bed medical center. She has been a manager for nearly three years and has been able to initiate unit-based councils on both of her units. Jackie is grooming her staff to become more autonomous, assume more responsibility for identifying goals and objectives to advance patient outcomes, and to initiate and participate in nursing research.

Members of her nursing staff excel at their jobs and have worked with the medical center's nurse researchers on studies that have strengthened evidence-based practice and led to improved patient outcomes. When vacancies are posted for Jackie's units, she receives numerous applications from nurses already employed at the medical center who want to transfer to her units.

However, Jackie has noticed that the more her nurses grow professionally and patient outcomes improve, the more she feels isolated from and ostracized by her fellow nurse managers. If she passes fellow managers in the hallway or in elevators, they do not speak to her and avoid eye contact. During management meetings her comments or ideas are either ignored or ridiculed.

Jackie approaches one of her colleagues who was once a good friend and asks why she is being treated in this fashion. The former friend replies, "How do you expect us to act? You with all of your new ideas showing us up when we've been managers a lot longer than you have! You're either with us or against us, and it seems to me that you're more concerned with making yourself look good than in being one of us! And you're stealing nurses from other units. You better stop this stuff, or you're going to be sorry you ever took a management job!"

Adam is a physical therapist. He works at a prestigious rehabilitation hospital where he specializes in the therapy of patients who have suffered neurological impairment caused by spinal cord injury, brain injury and stroke. Adam is respected by his colleagues and his manager as a hard worker who is progressive in his ideas and innovative in developing plans of patient care.

He is very interested in clinical research and evidence-based practice. Because of his interest in research and his Innovative clinical skills, Adam is asked to serve as the physical therapy representative on the interdisciplinary neurologic research committee. Adam is eager to learn more about clinical research and participate in clinical research investigations.

At first, his co-workers share Adam's enthusiasm. However, once a month Adam attends a research committee meeting, during which time his patients are covered by another therapist. As part of his duties as a member of the research committee, Adam must also, in conjunction with his manager and co-workers, schedule time to teach peers about research and participate in research projects. His peers begin to resent the time Adam is "given" for such projects, even though his new responsibilities require significant work on Adam’s part.

Adam’s peers begin to complain about him, making comments that he is not “pulling his weight” as a patient-care provider. They start to avoid Adam and often fail to include him in off-duty social activities. Adam attempts to discuss these problems with his peers, but they only comment that they are tired of doing his work. One of them explains, “You’re so into this research thing that you are forgetting that you are just a therapist like the rest of us. You think you’re better than we are.”

Adam is shocked and asks his manager for guidance. The manager replies, “Just try not to take it personally. They’ll get over it after some time has passed and they have more chances to participate in research. Just don’t let it get to you.” Adam is upset, however, and begins to have trouble concentrating on his work.

Bernadette is a newly licensed RN. She is thrilled to have been hired to work on a large inpatient pediatric unit. Bernadette is assigned to work with Christine, an RN with 10 years of experience as a pediatric nurse, who will be her preceptor. Christine is an excellent clinician and has the respect of her co-workers. The nurse manager of the unit often refers to Christine as “my best nurse.”

However, as Bernadette’s orientation progresses, she finds that her co-workers not only respect Christine’s clinical knowledge but are intimidated by her as well. Christine has a reputation for criticizing her peers and subordinates in front of others if she feels that they are “asking stupid questions” or “just don’t know as much as they should.”

Christine constantly criticizes Bernadette as well, making negative comments in front of patients and telling co-workers that “I have my work cut out for me with this new nurse. They come out of school with all these fancy ideas but can’t carry a full patient load for weeks.” One of her colleagues tells Bernadette, “We’re sorry you’re going through this, but that’s just Christine. If we try to help you, she’ll turn on us, too.”

Bernadette makes an effort to talk to Christine privately about these kinds of comments. But Christine walks away from her and stops the nurse manager in the hallway. Rolling her eyes and laughing, Christine says, “I guess I’m in trouble. Our new little nurse has hurt feelings!”

Bernadette has had enough and quietly walks up to Christine and her manager. “I am willing to work hard and learn. However, Christine’s actions are interfering with my ability to learn and provide my best patient care. If these behaviors do not stop immediately, I expect to be assigned another preceptor. If this does not happen, I will file a grievance.”

Christine is astonished. No one has ever had the courage to confront her like this. The manager looks embarrassed and says that perhaps assigning another preceptor would be best.

The preceding scenarios illustrate some of the behaviors associated with HV. Horizontal
violence, as already noted, is aggressive behavior directed toward one’s peers. Such behavior can involve verbal abuse, interfering with ability to work effectively, attempts to embarrass a peer, derogatory facial expressions, and attempts to undermine a peer.2,20

The following definitions help to clarify HV and just how destructive the phenomenon can be. Some of these behaviors occur in other types of workplace violence, but for the purpose of this program, these definitions are written within the context of HV. Note that some behaviors can overlap and may fall under more than one category.

- **Assigning unrealistic patient assignments:** This involves assigning certain nurses to the most difficult patients on an ongoing basis or to an unfair workload and then refusing to help when needed.20
- **Backstabbing:** Backstabbing occurs when someone complains about a peer to others instead of speaking directly to that person about a concern or problem. This type of behavior undermines trust and confidence.19
- **Bullying:** Bullying is a set of behaviors designed to make a victim feel threatened, humiliated, insulted and helpless. These behaviors can be verbal, suggest the threat of physical harm, or even be physical actions designed to intimidate or cause physical harm. Bullying is not an isolated event. It is usually persistent, ongoing and systemic.2,19
- **Covert behaviors:** The word covert means something that is concealed or disguised. As it relates to HV, covert behaviors refer to those behaviors that are not obviously aggressive or threatening.2 Examples include being “too busy” to show a new employee where supplies are kept, excluding a colleague from social gatherings, and “forgetting” to tell a colleague about a schedule change. These kinds of behaviors can be especially hard to pinpoint because they can often easily be explained as innocent oversights. The victim of covert HV may have a hard time convincing a manager that he/she is experiencing HV if the majority of the behaviors are covert.
- **Disruptive behaviors:** Disruptive behaviors are designed to interfere with a peer’s job performance, which can increase the risk for errors and patient harm.19 Disruptive behaviors can include all types of verbal and physical aggression and threaten the safety of both its victims and patients alike.16
- **Overt behaviors:** Overt behaviors are those actions that are obviously aggressive and can be seen or heard. Overt behaviors include disgusted facial expressions, rolling of eyes, shouting, laughing at someone, criticism, fault-finding, gossiping, ridiculing and arguing.2,3,16
- **Sabotage:** Sabotage is behavior designed to deliberately undermine or prevent someone else from succeeding.2,18
- **The silent treatment:** Refusing to speak to a colleague, speaking abruptly, and withholding information are all behaviors that fall under the umbrella of the silent treatment.20
- **Taking the credit:** Taking credit occurs when the perpetrator of HV takes credit for someone else’s work.20
- **Verbal abuse:** Verbal abuse consists of spoken words that are meant to be unkind, belittling or humiliating. Verbal abuse is meant to cause distress, embarrassment and suffering.2

Consider how these various behaviors are presented in the scenarios at the beginning of this section. Jackie, the nurse manager, is an innovative leader whose actions have helped to establish a work environment in which her staff thrives and patient outcomes are achieved. These accomplishments have angered her peers to the point that they instigate a number of behaviors that qualify as HV.

They avoid speaking to her and avoid making eye contact. Such behaviors may be classified as covert because it can be difficult to prove that they are deliberately not speaking to her and avoiding eye contact. However, some of their other actions verge on verbal threats and intimidation. They ridicule her ideas, accuse her of “stealing” their staff nurses, and come close to overtly threatening her with the statement, “You better stop this stuff or you’re going to be sorry you ever took a management job!”

Some staff members may not realize that managers are also victims of HV. They may assume that the phenomenon only exists at the staff level. Sadly, HV occurs at all levels of the organization. Jackie’s peers may be jealous, fearful that her success threatens their own jobs, or simply resentful of change.

Whatever the reason or reasons, Jackie is dealing with HV at its worst. If she appeases her peers, it is likely that patient outcomes and job performance may be compromised. If she continues to fulfill her management role as she believes best, her peers may make it difficult for her to continue working within this organization.

Now evaluate the situation that Adam, the physical therapist interested in clinical research, finds himself facing. At first, his colleagues are supportive and share his enthusiasm for the research process. Then, as workload increases related to research participation, his peers begin to resent Adam, claiming that he now thinks he is “better” than the rest of them.

Adam’s manager seems to want to ignore the problem, telling him, “Just don’t let it get to you.” This type of managerial response is one reason that HV exists and a reason that victims fail to report it. Because of the HV, Adam is starting to have trouble concentrating on his work, which increases the possibility of error. What began as an exciting career opportunity has turned into a frustrating barrier to job satisfaction and the potential for compromised patient care.

Finally, review the scenario that describes the problems a newly licensed nurse had to deal with during her orientation. HV committed by a preceptor and other, more experienced colleagues, is one of the most common occurrences of HV. An experienced nurse, reported to be an excellent clinician, is acting as the preceptor for a new nurse. This preceptor intimidates her co-workers, and probably her nurse manager as well.

Bernadette, the new nurse, confronts the preceptor and the manager about the HV. Bernadette took action that all too few victims of HV have the courage to do: She confronted the perpetrator and the manager who seems to be willing to ignore the HV and the impact it has.

The preceding examples show just a few of the many ways that HV is committed. Note that persons who witness or know about HV and fail to do anything to stop it are just as responsible for the continuance of the problem as are those who directly commit HV.

### Incidence and prevalence of horizontal violence

**Diana and her husband have recently relocated across the country so that her husband can take advantage of a work-related promotion. She is a social worker with several years of experience in the acute hospital setting. Diana interviews for a position in a large community hospital, hoping to continue working with intensive care unit (ICU) patients and their families. She has heard rumors that the social workers who work in the ICU are a close-knit group who do not necessarily welcome newcomers.**

During her interview with the director of the department, Diana asks about the orientation process and the hospital’s policies relating to HV.

The department director laughs and says, “That’s a problem pretty much confined to nursing. You don’t see it in other departments.” Diana wonders if the director is naïve or just reluctant to address the issue.

***

**Edward is an information technology (IT) specialist in a large urban medical center. He notices that one of his colleagues seems to make it especially tough on new employees. Frank is one of the best IT specialists Edward has ever worked with, but he has the reputation of being a bully, and more than one employee has resigned because of his intimidating manner.**

Edward discusses the issue with his wife, a nurse, who tells him that Frank is committing HV and needs to be stopped. Edward admits that he never thought much about the effects of Frank’s behavior until now. He always thought it was just Frank’s personality, but now wonders if it’s a lot more serious than that.

HV is not a new phenomenon, and as the preceding examples show, it can affect any and all health care professions. In fact, its occurrence and negative impact seems to be growing.2 It is difficult to objectively determine whether this
growth indicates an actual increase in occurrence or an increase in reporting by victims.

What research has been conducted on the phenomenon of HV? To date, the majority of published findings deals with research conducted on nurses, and much of that research was initiated in the United Kingdom and Australia. However, American experts such as Kathleen Bartholomew 2,3 are swiftly becoming well known and have published articles and books that deal with incidence and prevalence of HV, why it occurs, and what can be done to stop it.

The following information on incidence and prevalence of HV and other types of bullying was obtained from nursing investigations. As of this writing, Internet searches regarding HV and other health care professions produced only a few articles on the topic, and those dealt primarily with how to deal with its occurrence. 7,8

The staff of the professional journal 9 published articles and books that deal with HV and other types of bullying. The following information on incidence and prevalence of HV, why it occurs, and what can be done to stop it.

Researchers have identified certain factors that may make someone more vulnerable to HV. These include being: 2,3,7,8

- A new graduate or newly hired staff member.
- Someone who has received a promotion or honor that causes resentment or envy among co-workers.
- A person who has problems working well with others or who has trouble acquiring new skills.
- Someone who receives special attention or recognition from supervisors or physicians.
- Someone who appears to lack confidence.

**Choosing victims**

How does one become a victim of HV? How are victims chosen by those who commit HV? Consciously or unconsciously, victims are usually carefully selected by their perpetrators. Victims are usually among the most vulnerable of staff members. They may be newly licensed professionals or newly hired colleagues who lack confidence and are without power or workplace friends who could help them adjust to their new environment or protect them from those who commit HV. 9

Researchers have identified certain factors that may make someone more vulnerable to HV. These include being: 2,3,7,8

- Estimates of HV in the nursing workplace range from 46 percent-100 percent.1
- Results from one nursing study showed that one-third of the nurse respondents perceived that they experienced emotional abuse during the last five shifts they worked.3
- International studies indicate that one in three nurses intends to leave her present position because of HV.1
- The results of a United Kingdom study of 4,500 nurses showed that one in six had experienced what was described as “workplace mistreatment,” and 33 percent planned to resign from their present jobs because of being verbally abused.5
- A survey of 1,100 nurses employed by a National Health Service Community Trust in England reported that 30 percent of those nurses reported being victims of HV on a daily or near daily basis.7
- A study of emergency department nurses indicated that about 27 percent of participants had experienced workplace bullying within the last six months.3
- The staff of the professional journal Nursing 2011 conducted a survey of 950 nurses, asking them to identify the frequency with which nurses experience or witness HV. Eighty-two percent of respondents reported experiencing or witnessing at least one type of HV on a weekly or daily basis.6

Despite the growing incidence and prevalence of HV or lateral violence, some administrators, managers, and even staff members fail to recognize or acknowledge it as a serious problem. Amazingly, even some perpetrators do not realize that their behaviors are actually a form of workplace violence. This lack of recognition makes it even more difficult to control HV. As Bartholomew, one of the experts in this field, points out, “Bullying behaviors are like gangrene – when tolerated from a few physicians or nurses with strong personalities, the behaviors spread and infect the entire team – and eventually, the patient.”2,3

**Characteristics of persons who commit horizontal violence**

**Roseanne** is a pediatric nurse who has extensive knowledge and expertise in this specialty. She has a reputation for being “hard” on her colleagues. She is quick to criticize her colleagues, and the new nurses she helps to orient often resign before completing orientation.

Roseanne does not see herself as intimidating. She sincerely believes that she is acting in the best interest of the patients by “protecting” them from nurses who are not as “smart” as she is.

When Roseanne arrives at work, the nurse manager asks to speak to her in private. He tells Roseanne that she has been named in a grievance filed by one of her colleagues who recently requested transfer to another unit. Both the manager and Roseanne have been named in the grievance as committing HV. Roseanne for her HV behaviors and the manager for failing to stop the behaviors even after the nurse brought them to his attention.

Roseanne is outraged. “I’m only doing my job! I haven’t done anything wrong!”

Most people, especially victims of HV, assume that those who commit HV know exactly what they are doing when they bully and intimidate others. However, many of those perpetrators of HV do not acknowledge their behaviors as damaging or do not see themselves as bullies. 20 In fact, many abusive, disruptive actions are committed without awareness; persons committing HV often do so without awareness. 8

Consider the many causes of HV discussed earlier in this program. These reasons give clues to the characteristics of those who commit HV.

**A need for power and control.** Persons who have power and control at work are often willing to behave disruptively in order to maintain them. Persons who aspire to have power and control may likewise use aggressive tactics to acquire them.

**Belief that patients need protecting.** Some persons believe that they are the only ones who know how to take proper care of patients. Their actions, in their minds, are justified because they are acting in what they see as the best interests of the patients.

**Fear.** Persons who are fearful of being overshadowed by younger, less experienced colleagues may target these colleagues to secure their own places within an organization.

**Unhappiness at work or at home.** Persons who are unhappy at work or at home may treat others badly. Without knowing it, they may be trying to make others as unhappy as they are.

**Inability to see the effects of their behaviors.** Perpetrators of HV often refuse to see that their behavior has a negative impact on co-workers, patient outcomes and the work environment.

The preceding characteristics are not all-inclusive. They do, however, offer some awareness of the types of persons who are likely to commit HV.

Possible causes of horizontal violence

There are numerous possible causes of HV. They vary depending on the person committing the violence and the workplace environment. There may be more than one trigger of HV. In fact, it is usual to have several factors that come together to instigate HV.

**Envy.** Lisa is a highly skilled critical care nurse. She is accustomed to being seen as the “expert” by her colleagues. About two years ago, Lisa helped to orient Sophie, a nurse who is now referred to as “one of the best nurses” by colleagues, the manager and physicians alike. Lisa liked Sophie when she was a new nurse who was in awe of Lisa and her clinical skills. Now Lisa is afraid that Sophie is taking her place as the clinical leader on the intensive care unit. The two women are assigned to work on developing a research proposal. The day the proposal is to be presented to the institutional review board (IRB), Sophie is sick. Lisa presents the proposal as entirely her own work and implies that Sophie did nothing to help with its development.

The preceding example illustrates one possible cause of HV: envy. Envy or jealousy is an attitude that is usually accompanied by bitterness and resentfulness. 20 Envy may be related, as in Lisa’s case, to jealousy of a colleague’s clinical skills and the fear that the role of acknowledged clinical expert is going to be lost. Other work-related reasons for
envy that leads to HV may include jealousy of persons who seem to have developed professional friendships with managers or other administrative personnel, jealousy of persons who have received promotions or other career advancement opportunities, and jealousy of persons who have the opportunity to pursue education opportunities such as graduate education.

But envy does not have to be limited to jealousy of work-related issues. Perpetrators of HV may be jealous of a peer's personal life. They may envy someone who has a loving spouse or significant other, children, or a close circle of friends. This envy may cause them to retaliate by committing HV against those whom they envy.

Control and power

Jason is the manager of a physical therapy department in a small rural hospital. He has been the manager for more than 15 years and has more managerial experience than most of the managers of other departments. Seniority and experience are greatly valued in this hospital, and the chief executive officer (CEO) supports Jason as one of the key decision-makers of the organization. Jason is confident in his ability and in the professional rapport he has established with the CEO. Jason gets a lot of satisfaction knowing that his experience is valued.

He controls his department strictly and is rather autocratic in his management style. Jason discourages change and innovation, and most of the other managers would rather agree with him than “get on his bad side.” He believes that his way is best because his department has a record of achieving patient outcomes, the respect of the physicians, and a low incidence of adverse occurrences.

Turnover is low, and Jason knows it is likely to remain low because his hospital is the only one in the immediate geographic area. However, things start to change when the CEO retires and a new administrator assumes responsibility for fulfilling a mandate from the board of directors:

- The need for power and control often goes hand-in-hand. Jason has lost sight of the goals of the organization. He commits HV in order to try to maintain his sense of control and power over others, which, if left unchecked, can become the defining characteristic of his organization. 2,3,4,5

Fear

JoAnne is an RN who has an associate degree. She has been a nurse for five years and consistently receives excellent performance evaluations. Recently, the health care system for which she works has announced that beginning immediately, RN vacancies will be filled only with nurses who have BSNs. Nurses who do not have BSNs will not be terminated, but they will not be eligible for promotion to certain levels of staff nurse, nor will they be eligible to apply for managerial positions. The health care system offers tuition reimbursement, and some college courses will be offered at the hospital in an effort to facilitate nurses’ ability to obtain their BSN degrees.

JoAnne is very angry. She does not want to go back to school and is afraid that her job will eventually be in jeopardy. As her resentment grows, she starts to encourage other nurses who do not have BSNs to avoid colleagues who do. She instigates a campaign of “silent treatment” toward these colleagues, and as nurses with BSN degrees are hired, JoAnne makes sure to spread gossip about their lack of knowledge and skill.

Fear is a powerful motivator. Fear of change, fear of loss of respect, and, as in JoAnne’s case, fear of job loss all contribute to fear as a cause of HV.2,3,4,5 Fear is closely aligned with envy and a need for control. Some perpetrators of HV commit aggressive acts in an effort to gain or maintain control over situations that they perceive to be threatening or harmful.

The need to belong

Henry is an occupational therapist who works in a large spinal cord injury center. He is a member of an interdisciplinary team that has a national reputation for excellence. The work is hard but rewarding, and there are multiple applicants for every vacancy that is posted.

When Henry was hired almost two years ago, he had to struggle long and hard to be accepted by the team. He experienced a variety of HV actions committed by members from the occupational therapy, physical therapy and nursing departments. He tries to convince himself that his colleagues’ behaviors made him a better therapist because he had to excel to prove himself to be a competent member of the team. Henry is relieved that after nearly two years, he is an accepted member of the team.

Recently, a new occupational therapist joined the organization, and Henry observes that many of the colleagues who were “hard” on him are bullying and intimidating the new therapist. Henry would like to help his new colleague but is afraid that if he does, he will lose the acceptance he worked so hard to gain. He tells himself that his new colleague will survive and that this is just something all new hires must go through. But he feels guilty and a bit ashamed of his own failure to try to put a stop to the aggressive actions of others.

The need to belong is powerful and, as in Henry’s situation, it is often accompanied by fear. This can be fear of loss of friendship, fear of not being “part of the team,” and fear of retaliation. If Henry would try to help his new colleague, would he once again become a victim of HV?

Some former victims of HV may participate in it in an effort to appease the person or persons who commit HV. Persons like Henry may ignore or go along with HV in an effort to avoid becoming victims again.2,20

Blaming the victim for the occurrence of horizontal violence

Stephanie is a critical care nurse who works in a large trauma center emergency room. The work is extremely challenging, and only those nurses with excellent trauma skills and stamina survive the hectic pace and demanding work schedule.

Stephanie is assigned to participate in the orientation of most newly hired nurses. She criticizes them in public and ridicules them for asking “too many questions.” She also criticizes even her experienced peers in this manner. The turnover rate is quite high and many of those who resign mention that Stephanie’s behavior was a major factor in their decision to leave.

Stephanie’s manager asks to speak to her in private. The manager shows Stephanie documentation that links her behavior to the resignation of 10 highly qualified nurses during the past 12 months. Stephanie responds by rolling her eyes and saying “If they can’t stand the pressure and a little honest criticism, then they don’t belong here. They deserved what they got. I’m not here to babysit new nurses!”
This scenario is a good example of blaming the victim, a justification sometimes used by those who commit HV. In other words, it’s the victim’s fault that he or she was subjected to HV.\textsuperscript{2,5,17} Persons who commit HV may justify their behavior with excuses such as:

- These people who are complaining that they are poorly treated are just looking for ways to excuse the fact that they can’t do the jobs they were hired for.
- Some people just can’t take criticism.
- I was just kidding around. They can’t take a joke.
- If they can’t take the pressure of working here, then they should just leave. It’s their fault if they can’t work up to my standards.

In the minds of these perpetrators, their victims were “asking for it.” They truly believe that the victims, not the persons who commit HV, are at fault. In other words, “they brought it on themselves.”

- **Initiation or rite of passage**

  **Sarah** is a new social worker. She works in an outpatient oncology clinic. After another hard day at work during which she was assigned the most difficult patients, ignored by her co-workers, and asked to work on Saturday even though this should have been her weekend off, Sarah thinks, “I feel as though I’m back at college and going through ‘hazing’ week in order to be initiated into my sorority. I didn’t think people acted like this in the real world.”

  Initiation or rite of passage as an excuse for HV may seem, as Sarah thinks, like going through the hazing process conducted by college fraternities and sororities. Viewed by some who commit HV as “paying your dues,” this concept justifies HV as something that every employee must go through to prove they are worthy of the responsibilities assigned to them and that they “have what it takes” to work on a particular unit, in a certain department or for a specific organization.

  Persons who use rite of passage or initiation as an excuse to commit HV have probably had to go through a similar “initiation” themselves. Therefore, in their minds, because they were once treated poorly, everyone who follows them must also be treated poorly.\textsuperscript{2,5,17}

- **Opposition to change**

  **Louis** is a respiratory therapist. He has worked at a large, long-term care facility for several years. Louis enjoys his job and likes having the chance to get to know patients and families as opposed to the hectic pace of acute care.

  When he arrives at work one morning, his manager tells him that the owners of the facility have decided to build an addition to the building. This addition will be the location of a new program that will offer short-term stays for patients needing rehabilitation after suffering a stroke and other debilitating conditions. Louis is told that he and the other therapists will need to “rotate” through this unit to provide respiratory care to these short-term patients. Louis is annoyed and immediately begins to wonder whether this change will lead to more change and more “problems.” He worries that his job responsibilities will change and that he may not be able to deal with acute patient rehabilitation needs. How will these changes affect his work schedule? Will his job be in jeopardy?

  Several of Louis’ colleagues are enthusiastic about the new rehabilitation program and talk about taking some continuing education courses to prepare for the new patient population. Now Louis begins to worry that these colleagues will outshine him when the new program is implemented. Louis begins to ridicule his colleagues’ enthusiasm. He opposes their ideas in staff meetings and complains to his manager that they are so busy preparing for new types of patients that they are neglecting their current job responsibilities. Louis’ fear of change is triggering HV.

  The workplace literature is filled with references on change and how much opposition change triggers. Change often triggers worry and fear.\textsuperscript{2,3,17} The preceding scenario shows that people like Louis react to change (and their own fears and concerns) by lashing out at co-workers and committing HV.

  **Generational differences**

  The term “generation gap” has been around for a very long time. Conflicts among generations come from differences in upbringing, education and experiences of world events. For example, older adults remember a time when homes and cars could safely remain unlocked, while young colleagues can’t imagine a world in which not only homes and cars must be secured but even school buildings as well.

  Baby boomers entered a workplace in which employees saw themselves in terms of the organizations for which they worked. Succeeding generations who saw their parents downsized, sometimes after years of working for one organization, developed a loyalty to themselves, not to their places of employment. They are usually accustomed to change and consider it the norm, not the exception.

  Professionally, they see themselves in terms of their professions, not in terms of their employers. The newest members of the workforce expect flexibility in work hours and a work environment that offers time for “fun” as well as time for serious discussion. They are accustomed to conducting life at breakneck speed, thanks to the instant means of communication (e.g., Internet, texting, iPads and so on) and learning opportunities now available.\textsuperscript{1}

  No matter what generation an employee represents, there are certain principles that apply to everyone when it comes to a healthy work environment and to the reduction of HV. Here are some guidelines to help bridge the generation gap.\textsuperscript{1}

  - Remember not to generalize about people because of their age, education or work experience. For example, don’t assume that an older colleague is computer illiterate.
  - He or she may thrive on technology. Don’t assume that younger colleagues automatically adapt well to change. They may be significantly opposed to change!
  - All adults, no matter their age or professional experience, bring an abundance of life experiences with them to the work setting. These experiences usually enhance an adult’s ability to fulfill their role responsibilities.
  - All adults, no matter their age, background or professional experience, deserve to be treated with respect.
  - HV is not limited to an older colleague victimizing a younger colleague. HV can be committed by a member of any generation against members of any other generation, including their own generational peers.

  **HV warning!** Don’t assume that the cause of HV is due solely to generational conflicts. There is seldom one single cause of HV. Generally, several factors come together to trigger this phenomenon.

  **Oppression theory**

  Oppression theory is based on the belief that whenever two or more groups co-exist and one group has more power than another, a power imbalance exists. This imbalance leads to the development of a dominant group and a subordinate group. When the values of the subordinate group are ignored, ridiculed or repressed, oppression occurs.\textsuperscript{2}

  Experts in the field of HV often apply oppression theory to HV in the nursing profession. Why is this so? Some believe that from its conception, the members of the nursing profession were told to assume a subordinate position, which almost automatically predisposed them to oppression.\textsuperscript{2}

  Some experts believe that academic education may be ineffectual in preparing nurses to deal with bullying at all levels. It is imperative that, as part of their basic education preparation, nurses be taught to project confidence and deal with conflict effectively.\textsuperscript{20} Without this preparation, nurses are in danger of completing their entry level education feeling uncertain and dependent. When nursing was initially established as a profession, all or nearly all of its practitioners were women at a time when women had few, if any, legal rights. In most countries they could not vote, own property, or in some cases, even inherit money or property. Women were not
expected to work unless absolutely necessary, and work opportunities were limited to domestic service, teaching and other jobs that were deemed “acceptable” for women. Nursing offered another opportunity for women to earn their own livings, but, again, in order to be considered respectable, nursing was advertised as a “calling” or a desire to do “God’s work.”

Such beliefs led to the image of nurses as: 2
1. Always caring and compassionate.
2. Being “angels of mercy.”
3. Willing to work long hours without reward.
5. Fulfilling a subordinate role.

Although the preceding beliefs, thanks to advancements in nursing education and training, are beginning to fade, research shows that some people, even health care colleagues in other disciplines, continue to uphold these beliefs. This prolongs what is sometimes referred to as the culture of oppression in nursing.2

Persons who believe that they are members of a subordinate group may feel that they are oppressed and powerless. According to oppression theorists, these feelings lead to hostility, anger and the desire for control. One way of gaining control is to oppress others, whether it be out of frustration, anger or simply the desire to subordinate others as a way of responding to subordination that HV perpetrators are experiencing themselves.2

It is wrong to assume, however, that other disciplines do not experience oppression. It is also wrong to assume that male nurses do not experience oppression. This phenomenon can affect anyone depending on the work environment and other factors that contribute to the development of HV. It has been suggested that one reason for a lack of HV research in professions other than nursing is a failure to admit that HV exists. Sadly, some health care managers and staff members ignore the problem, try to hide its existence, or simply refuse to believe that HV behaviors are harmful. Consider just how powerful this failure can be as a trigger for HV.

Failure to admit that HV exists

Paula is an RN who has worked on various oncology units for the last seven years. She recently relocated from a small city to a large urban area. She interviews at several hospitals. Two questions Paula routinely asks the manager and staff members are “How do you deal with horizontal violence? And “What hospital policies and procedures are in place to discourage workplace violence, including HV?” If either a manager or his/her staff members deny that HV exists, Paula knows that she does not want to work for their organizations. She knows that HV exists, to varying degrees, in all organizations. Paula expects an honest appraisal of the problem and information about hospital policies and procedures pertaining to HV. Having experienced HV in the past, Paula has learned to evaluate how potential employers work to reduce or eliminate the problem.

There are many reasons that HV is not recognized or acknowledged and even some excuses for its occurrence. Here are some managerial reasons and excuses for allowing the problem to continue. 2,5,10,20

Managers may be reluctant to implement policies and procedures on HV because they are afraid that their departments may acquire a reputation for unpleasant working conditions, which may interfere with recruitment efforts.

Managers may ignore or downplay the problem of HV for fear of offending the perpetrators. Persons who commit HV may be some of the most experienced clinicians. Some managers are willing to put up with bullies who instigate HV if they are valued by management for their clinical expertise or other job-related skills.

Managers may fail to acknowledge HV for fear that their supervisors and administrative staff will believe that they cannot deal with personnel problems.

Managers may believe that a certain amount of bullying is necessary to identify employees who lack confidence and assertiveness.

Managers may be unaware of the adverse effects of HV and assume that it is not a serious problem.

Managers may actually believe that employees must go through a rite of passage to work in their departments.

The preceding are a few examples of reasons management staff may give for failure to admit that HV exists. Here are some reasons staff members and peers may give for failing to admit that HV is a significant problem. 2,5,19,20

Claiming that HV exists is just an excuse for weak or ineffectual staff members to make trouble. As previously noted, persons most vulnerable to HV are those who are new to the organization, lack confidence or seem unsure of themselves.

Having to deal with HV is just part of the job. “If people can’t deal with criticism, then they don’t belong here!”

“I had to go through it, and so should everybody else.” This idea correlates with the belief that bullying is part of the initiation process new employees must go through.

“I feel bad when I see new people getting abused. But if I say something, I’m afraid they’ll go after me too.” Fear is a powerful motivator for ignoring HV.

Finally, one reason for ignoring the problem of HV or dismissing it as unimportant may be that managers and staff members alike do not realize the serious impact HV can have on its victims, patients and the organization.

The impact of horizontal violence

The impact of HV is toxic to patients, victims and the organization in which it takes place.3 HV takes a toll on the physical and mental health of its victims, puts patients’ safety at risk by increasing the potential for error, and costs the organization thousands upon thousands of dollars. 3,20 Any plan to reduce and prevent the occurrence of HV must begin with an analysis of the impact of HV.

Impact on patients

Veronica is a physical therapist with several years of experience in acute care settings. She has worked with orthopedic patients for several years but has always been especially interested in the physical rehabilitation of stroke patients. She works in a large health system that consists of a large acute care hospital, several outpatient clinic, and a rehabilitation hospital.

A vacancy in the rehabilitation hospital would allow her the opportunity to work with stroke patients and expand her knowledge of neurologic physical therapy. She applies for and is hired to fill the position in the rehabilitation hospital. However, her new colleagues are less than welcoming. She receives little orientation to her new duties, and her co-workers are always “too busy” to help her adjust to her new job. She overhears them complaining about her. Apparently, they wanted another candidate to fill the vacancy for which Veronica was hired. She hears them conspire to make things difficult for her so that she will “go back to orthopedics where she belongs.”

Part of making things difficult includes failing to communicate some essential patient information about one of Veronica’s patients. This patient began a new medication that may cause him to have trouble concentrating until he adapts to its effects. Not knowing about the medication, Veronica continues to teach the patient how to transfer from wheelchair to toilet. The patient is unable to concentrate and loses his balance. Veronica is able to stop him from falling, and as she attempts to lower him back to his wheelchair she calls out for help. Her colleagues take their time coming to her assistance, and when they arrive, they find both Veronica and the patient on the floor. The patient has a laceration of the forehead and Veronica suffers muscle damage to her lower back.

HV interferes with effective communication among colleagues. Experts agree that inadequate communication interferes with the exchange of information critical to the safety and well-being of patients. 2,3,5,10 The potential for errors increases, and if errors occur, patients can be injured and desired outcomes compromised. The preceding scenario may seem extreme, but, unfortunately, similar situations have been known to take place. It is doubtful that Veronica’s colleagues wanted to see either her or her patient suffer injury. But sometimes those who commit HV are so intent on intimidating their victims, they fail to consider just how serious the consequences of HV can be.

The Joint Commission has made references about the impact of HV on patient care and safety. The blog The Joint Commission Journal on Quality and Patient Safety noted that “Whether conflicts openly threaten a major disruption of hospital operations or whether unresolved conflicts
lurk beneath the surface of daily interactions, unaddressed conflict can undermine a hospital’s efforts to ensure safe, high-quality patient care. 2,10

Communication breakdown is not the only factor that can lead to patient harm. If victims of HV are flustered, uncertain and experience a decrease in confidence, they are more likely to make mistakes. HV perpetrators may not want their victims to succeed at work. However, what they often fail to understand is that setting up a peer for failure can also set up a patient for serious harm.

The point is, HV violence creates a workplace environment that is dangerous to victims and patients alike. In fact, HV victims may experience damage to their physical and mental health and well-being. 2,3,10

Impact on physical health

Leslie is an occupational therapist who works in a large medical center. The occupational therapy (OT) department is divided into units, and each unit is responsible for specific specialty areas. Leslie was just promoted to the position of manager of OT for the spinal cord center. She is excited about this new career opportunity. However, her managerial peers are less than welcoming, and she becomes a victim of their HV.

Leslie becomes anxious and stressed, and in her words, “I seem to catch every cold and virus that is going around.” One of her peers comments that “Leslie sure takes a lot of sick time. And when she is at work, she always seems to have a cold or a sore throat or something. I don’t even like to be around someone who is sick all of the time!”

Tim is a nurse on the pediatric unit. He has five years of experience in the specialty, and his performance evaluations are consistently excellent. However, one of his peers, Kathy, a nurse with 30 years of experience as a pediatric nurse, dislikes Tim. She believes that it is “unnatural” for a man to want to work in pediatrics but is careful not to say so at work. She rolls her eyes when he speaks during staff meetings and goes out of her way to make sarcastic “jokes” about him to their peers.

Tim has attempted to discuss her behavior with her, but she claims she isn’t doing anything wrong. Their nurse manager tells Tim that unless Kathy does something that can be proven as HV, there is nothing that can be done. Tim begins to avoid Kathy as much as possible.

He notices that he is experiencing a rapid heart rate and some “skipped beats” that he attributes to caffeine intake, even though he rarely drinks caffeinated beverages. His wife encourages him to see his physician. Tim reluctantly does so. After a thorough physical exam, his physician begins to suspect that Tim’s rapid heart rate and minor arrhythmia are stress related.

The preceding scenarios show that HV has a physical impact on those who experience it. HV causes stress and anxiety. The health care literature is filled with references to stress and its impact on the body. The stress triggered by HV can have detrimental effects on physical health. 2,3

A review of the literature shows that the following physical effects are found in many victims of HV: 2,3

- Decrease in effectiveness of the immune system. When the immune system is compromised, the body’s resistance to infection is decreased, and the affected person is more vulnerable to illness.
- Increased likelihood of accidents and injury. Stress interferes with a person’s ability to concentrate and focus on tasks. Lack of focus and concentration makes a person more likely to make mistakes, have accidents and suffer injury.
- Increase in the incidence of cardiac arrhythmias. Stress can have an adverse effect on the cardiovascular system, causing problems such as elevating blood pressure and heart rate and causing arrhythmias.
- Increase in sick days taken. The negative impact on the immune system and the cardiovascular system as well as the increased likelihood of accidents and injury all contribute to an increase in the number of sick days taken from work.

**HV Warning!** Sick days not only have an impact on the person who is ill but on the organization as well. Sick days cost the organization a considerable amount of money, and research suggests that this amount could run into many thousands of dollars annually. Results from an Australian study show that 34 percent of nurses who experience HV take more than 50 sick days per year! 2

Impact on psychosocial health

Jay is a neuropsychologist who works in a prestigious medical center in a large American city. The work environment is quite competitive, and the incidence of HV is high as Jay and his colleagues compete for career advancement. Jay, the youngest member of the staff, is often subjected to HV by his older colleagues who resent their younger, highly skilled colleague.

Jay finds himself becoming quite irritable and is increasingly short-tempered with his wife and children. One evening Jay’s 5-year-old son forgets to put his toys away as he has been learning to do. Jay shouts at the boy and tells him that as a punishment he is going to give away the boy’s new tricycle. The boy bursts into tears and runs to his room. Jay’s wife is furious and tells him, “I’ve had enough! It’s the horrible people at work who are giving you trouble, not me or the kids! Either figure out a way to solve the problem or you can find somewhere else to live!”

Wendy is a nurse practitioner who works in a large outpatient clinic. She excels at her job and has the respect of her supervisors and peers.

Five years ago, Wendy was the victim of HV so severe that she filed a lawsuit against her former employer. Wendy still has nightmares about the HV and sometimes finds herself suffering from periods of severe anxiety when she remembers the abuse she suffered.

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Raymond is an RN working in a neurologic intensive care unit. The work environment is quite stressful. There is little trust among members of the nursing staff, who always seem ready to discredit a colleague in an attempt to gain the attention of the physicians and nurse manager.

Raymond usually has a couple of glasses of scotch every evening to “relax” after work. Lately, his friends notice that instead of “a couple” of drinks, Raymond has taken to drinking so much that he has to be driven home because he is too drunk to safely drive.

HV can cause serious psychosocial problems as well as physical illness. These problems can range from slight anxiety to major depression, substance abuse and damage to interpersonal relationships. The following psychosocial effects have been reported by some victims of HV: 2,3,10

- Feelings of anger, irritability and aggression. Victims of HV often find themselves experiencing and displaying anger and irritability to an unusual degree. Aggressive behaviors such as road rage and arguing with friends and family over trivialities to an excessive degree may also occur. The first scenario in this section describes how Jay’s anger and frustration are being taken out on his family at home.
- Damage to interpersonal relationships. The first scenario also shows that Jay’s aggressive behaviors at home are having a damaging impact on his relationships with his wife and children. This kind of damage does not have to be limited to spouse and children. All types of interpersonal relationships can suffer, including those with a significant other, friends, parents and siblings.
- Depression. Clinical depression may also occur as a result of HV. Depression can impact all facets of a person’s life. Depression can become so severe that the person loses interest in work, leisure activities and interpersonal relationships. Suicidal thoughts may even occur.
- Decreased self-esteem and self-worth. Feelings of worthlessness may occur. The victim of HV may begin to believe that he or she is unable to live a productive life. Confidence is destroyed. These kinds of feelings are also symptomatic of depression.
- Feelings of loss of control over many aspects of life. These feelings may begin with a loss of control over their work environment as the perpetrators of HV assume toxic control over the workplace. These feelings may spread into the victim’s personal life as well.
- Decrease in motivation. The victim of HV may lose interest in work. He or she believes
that the workplace is so toxic that there is no point in trying to do a good job. This lack of motivation may also affect the victim’s personal life. Family and friends may notice that the affected individual has no interest in home and family or in the pursuit of leisure activities. He or she may seem lethargic and apathetic and have no interest in their normal activities. These feelings and behaviors can also be symptomatic of depression.

- **Substance abuse.** Raymond, in the preceding third scenario, has begun to use alcohol to relax and forget about his problems at work. There are a variety of substances that can be abused. In addition to alcohol, prescription drugs and illegal drugs may also be abused. Food is another substance that can be abused. Over-eating may be a coping mechanism when trying to deal with the effects of HV.

Post-traumatic stress disorder (PTSD) is a mental health disorder that can develop as a result of experiencing a traumatic event such as HV. PTSD is characterized by ongoing anxiety, panic attacks, aggressive outbursts, having nightmares about the traumatic event, having “flashbacks” during which the event is relived, and avoiding situations and activities that remind the person of the stressful event. To qualify as PTSD, these symptoms must last for at least one month following the traumatic event.  

**HV Warning! As in the case of Wendy in the second scenario at the beginning of this section, PTSD can continue to affect people for years after experiencing the traumatic event that triggered the disorder:** Some researcher shows that 50 percent of persons who experienced HV suffer from stress and PTSD for as long as five years after the event. 

**Impact on the organization**

Cheryl is a nurse manager who has been having trouble managing her unit’s budget. She is summoned to the director of nursing’s office. The director tells her that her unit is significantly over budget. Turnover is high, and the unit is developing a reputation for conflict among staff members. It is estimated that Cheryl spends as much as 30 percent of her time dealing with conflict and that this is costing many tens of thousands of dollars.

The preceding scenario is, unfortunately, not fictitious. A study conducted by the American Management Association on the cost of conflict in the workplace estimates that managers spend about 20 percent to 50 percent of their time dealing with conflict in the work place. This translates to hundreds of thousands to even a million dollars annually depending on the work place and the extent of conflict.

Costs are associated with many factors of management and organizational effectiveness. Here are some of the factors that seem most closely associated with HV.

- **Recruitment and retention**

**Amanda is a newly licensed RN who is interviewing for her first job as a registered nurse. During the interview she asks questions about turnover and the policies and procedures that are in place to deal with HV. The human resources director and nurse manager are surprised. They are not prepared to answer questions about these sensitive issues.**

Health care organizations can quickly acquire a reputation for having a dysfunctional work environment. Word of mouth and social networking sites all contribute to the ease with which information about an organization can spread.

Health care professionals are becoming more knowledgeable about asking questions concerning work environment, including the occurrence of workplace violence. If managers and human resources personnel deny the problem exists or are unable to explain the policies and procedures that govern the problem, candidates may very well choose to work elsewhere.

As of this writing, information regarding recruitment and retention and HV was found only in the nursing literature. Here are some statistics from the nursing literature pertaining to recruitment and retention and HV:

- The turnover rate for clinical practicing nurses is between 33 percent and 37 percent in the United States.
- The turnover rate for newly licensed RNs in the United States ranges from 55 percent to 61 percent.
- It is estimated that about 60 percent of newly licensed nurses in the United States resign from their first positions within the first six months of employment because of some type of HV.
- Job dissatisfaction contributes to both turnover and HV. A study of 43,329 nurses from Canada, England, Germany, Scotland and the United States showed that job dissatisfaction was high in all countries represented except for Germany.

The preceding statistics indicate that turnover related to HV is a significant problem. The costs associated with recruiting, orienting and retaining health care professionals can range from tens of thousands to hundreds of thousands depending on the organization. Additional costs include paying staff members overtime to ensure adequate staffing, advertising job openings, and interviewing and selecting candidates to fill vacancies. All of these add up to huge budgetary expenses that can force an organization to cut spending throughout the organization.

- **Sick time**

As previously noted, HV has an adverse effect on physical and mental health.

Deterioration of physical and mental health leads to illness and an increased number of sick days. The organization must not only pay sick time but also pay overtime for employees who must cover until the employee who is ill can return to work.

**HV Warning! If the employee can show a link between his or her illness and HV, there may be legal consequences for the organization.**

- **Quality and appropriateness of patient care**

Research shows that the effects of HV interfere with concentration and focus as well as communication among staff members. These issues contribute to an unsafe environment for staff members and patients alike. Research also shows that in this type of environment there are increases in adverse occurrences, such as medication errors and patient complaints, and a decrease in desired patient outcomes.2, 19

- **Legal ramifications**

HV also makes an organization more vulnerable to malpractice lawsuits. If there is an increase in errors, patient dissatisfaction and patient injury, there also may be a corresponding increase in malpractice lawsuits. Lawsuits or the threat of lawsuits increase employee stress and increase the financial burdens that face health care organizations.

Employees who are victims of HV and commit errors that result in patient harm may try to establish a link between their maltreatment and the committing of errors. For example, suppose organizational policies and procedures pertaining to HV exist but are not followed. This failure to follow organizational mandates may increase the risk for legal action against an organization and its administrators and managers.

Victims of HV may attempt to show that HV contributed directly to any errors that were made, and that the organization failed to follow its own mandates.

As of this writing, few laws specific to bullying exist, although there are laws against harassment. However, as the public becomes more and more aware of the effects of HV, interest in legal protection grows. Some states’ legislators are proposing laws that would allow workers to sue for physical, psychological or economic injury from abusive treatment at work.20

Managers and administrators have a legal and ethical duty to their employees. Consider how the four elements of malpractice might be applied to a situation in which HV exists. In the clinical setting, elements of malpractice for health care professionals include duty to the patient, breach of duty owed to the patient, injury or harm to the patient, and causation, meaning that there is a direct
link between the breach of duty and the injury or harm experienced by the patient. Consider how these elements may apply to administrators and managers in relation to their employees.

- **Duty to the employee**: An organization, via its administrators and managers, assumes a duty and responsibility for employees. Part of this duty and responsibility is an obligation to provide a workplace environment that is safe and appropriate.

- **Breach of duty to the employee**: A breach of duty might exist if an employer fails to provide a safe and appropriate work environment. An example of such a failure might be a failure to follow policies and procedures related to HV.

- **Harm or injury to the employee**: A victim of HV may experience physical or mental illness or injury.

- **Causation**: Causation indicates an ability to demonstrate a direct link between the harm or injury experienced by the employee, the occurrence of HV, and the organization’s failure to follow policies and procedures established to stop the occurrence of HV.

**LEGAL WARNING: THIS EDUCATION PROGRAM IS NOT INTENDED TO SERVE AS LEGAL ADVICE OR COUNSEL. QUESTIONS CONCERNING THE LEGAL RAMIFICATIONS OF HV SHOULD BE DISCUSSED WITH QUALIFIED LEGAL COUNSELORS. AS OF THIS WRITING, LEGISLATION SPECIFIC TO HV HAS NOT BEEN ENACTED.**

**Strategies to reduce or prevent horizontal violence**

**Communication tips**

Ellen is just completing her first year of employment as an RN. She is a rather shy person and has been subjected to HV throughout this first year. HV behaviors consisted mostly of criticism in front of co-workers and gossip behind her back.

Ellen recently enrolled in an assertiveness training course. Instead of quietly trying to ignore the behaviors of her peers, Ellen now confronts them. She stands erect and maintains eye contact. She speaks clearly in a firm tone of voice. Ellen tells colleagues who are criticizing her that she is as willing to learn as anyone but will not tolerate being embarrassed in front of others. When she learns of the gossip being spread about her, she confronts those who are responsible. Her peers are surprised at her newfound confidence and the HV begins to stop.

Earlier in this education program, information about who were the most likely targets of HV was offered. It is important to project an air of confidence. How one communicates with others has a lot to do with stopping or preventing HV. But communicating assertively is not the only means of communication designed to stop HV. Active listening is also an important part of reducing this type of workplace violence. Here are some suggestions for projecting both an attitude of confidence and willingness to listen to what others have to say.

- **Posture**: Stand or sit erect with arms at your sides. Avoid crossing your arms or clenching your fists. These actions give the impression of anger and being closed to the ideas of others.
- **Eye contact**: Maintain eye contact as culturally appropriate. For most Americans, eye contact indicates an interest in what the other person is saying.
- **Tone of voice**: Speak clearly. Speak loudly enough and slowly enough to be understood easily. Don’t speak too rapidly.
- **Facial expressions**: Don’t frown or roll your eyes. Maintain a pleasant expression. Avoid showing amusement unless the person with whom you are communicating is genuinely trying to be funny. Laughing at someone is never appropriate.
- **Self-analysis**: Be aware of your communication style. Do you cross your arms without being aware of doing so? Are you maintaining eye contact? What about tone of voice? Record yourself speaking and really listen to what you sound like. Do you speak too quickly? Too softly? Too loudly?
- **Personal space**: Personal space varies among countries and cultures. In the U.S., personal space is usually about three feet. Be aware of how closely you sit or stand next to someone.
- **Active listening**: In addition to maintaining eye contact, respond to what someone else is saying. Nodding your head, asking for clarification and making comments such as, “I understand that you are concerned about the work schedule,” or “I am interested in your ideas about purchasing new IV pumps,” show that you are really listening to the concerns and ideas of others. Never appear to be bored or in a hurry. Don’t tap your foot, glance at your wristwatch or stand with one hand on the doorknob when talking to someone else.
- **Willingness to learn**: Always show that you are willing to learn. No one knows all there is to know about a particular profession. The fact that you are willing to learn (and say you are willing to learn) will go a long way to enhancing professional rapport with colleagues.
- **Willingness to help**: Help a colleague whenever possible. In general, peers will remember who came to their rescue on a bad day and will reciprocate when needed.

The preceding tips are good suggestions for projecting confidence as well as a desire to listen to what others have to say. Good communication does help to reduce the incidence of HV. However, there are always colleagues, for whatever reason, who seem to be the primary instigators of HV. It is important to be prepared to deal directly with those who commit HV.

**Dealing directly with persons who commit HV**

Sarah is an RN who works on one of several medical/surgical units in a large community hospital. This morning she is asked to “float” to another medical/surgical unit that is short-staffed. As soon as she arrives, she asks for a brief orientation to the unit and a report on the patients she will care for. An older, more experienced colleague, Norma, rolls her eyes and complains that if Sarah doesn’t know what she’s doing, “she might as well go back to her own unit.”

The nurse manager intervenes and tells Norma to provide Sarah with the information she needs. Norma does so, but reluctantly. She tells a patient that Sarah “doesn’t usually work on this unit, but I guess she’ll know how to take care of you.” Norma walks out of the room and Sarah overhears her tell other nurses that “This nurse they sent us is really a pain. She expects to be treated like royalty.”

Sarah finishes providing care to the patient and leaves the room. She asks to speak to Norma privately. Norma rolls her eyes and steps into the nurses’ lounge. “Hurry up, I don’t have all day.” Sarah responds by saying, “I am more than willing to help take care of patients since you are short-staffed. However, I will not tolerate the comments you are making about me in front of patients and to other nurses. This must stop now.”

It is not easy to talk to the person who is committing HV. The encounter will be difficult and, most likely, emotional. It is important that a victim of HV remain calm and address the problem without shouting or crying. If you are a victim of HV, it may be helpful to practice what you will say and how you will say it.

The most important strategy to combat HV is to deal with the problem the first time it occurs. Do not ignore it. Ignoring the problem will only make the perpetrator believe that he or she can get away with it, and the problem will probably escalate. It is critically important that the victim of HV makes it clear that this behavior will not be tolerated. In the preceding scenario, Sarah confronts Norma as soon as possible.

Here are some suggestions when confronting persons who commit HV.

- **Stay calm**: If you become angry, defensive or cry, the persons committing HV will assume that you can’t defend yourself. In this case, the HV will more than likely continue.
- **Confront the perpetrator in private**: Don’t address the issue in front of an audience. If the person committing HV refuses to speak to you in a private location, you may need to speak to him or her in a more public setting, but NEVER in front of patients. Refusing to speak in a private setting may be a bully’s way of avoiding having to deal with the problem. If forced to confront the person in a hallway, do so as quietly as possible.
- **Deal with the situation as soon as possible**: Obviously, patients cannot be left unattended in order to confront a bully. But do not allow an entire shift or longer to go by. The longer the perpetrator gets away with it, the longer
and more virulent the HV will become. HV often continues because its instigators are so seldom confronted about it.

- **Set boundaries.** Sarah, in the preceding scenario, calmly explains what will not be tolerated. Notice that it is best to start by indicating an appropriate action. Sarah starts by saying she is willing to help during a period of short staffing. A new orientee might start by saying that he or she is willing and eager to learn. The next sentence should be a calm, definite statement that the HV will not be tolerated. Be specific. For instance, Sarah states that she will not tolerate the negative statements being made in front of patients. In some circumstances, it may be necessary to say what steps will be taken if the behaviors do not stop. For instance, a new employee may say that if behaviors do not stop, she/he will request a new preceptor. Don’t threaten. Start by saying what behaviors have occurred and that they will not be tolerated. If they continue, another confrontation will be necessary, and at that time, you should indicate what the next step will be (e.g., ask for a new preceptor, file a grievance).

- **Focus on behaviors, not personalities.** When setting boundaries, talk about the behaviors that are not acceptable. Avoid “you” statements, such as “you are making fun of me,” or “you are criticizing me in front of other nurses.” Instead, give examples, such as “Comments that I don’t know what I am doing in front of patients upset the patients and embarrass me. I will not tolerate these comments.” It’s never easy to have these types of conversations. But the person instigating the HV must be confronted as soon as possible after it occurs.

**Documentation**

Persons who experience HV should keep a documentation record of the events. These are personal records, and HV should not be documented in a patient’s medical record. Note the date, time and location of the event. Document what was said or done and who was responsible for the HV behaviors.

It is important to be objective. For example, don’t document that on “July 1, 2012, at 10 a.m. my preceptor embarrassed me in front of a patient.” Instead, document that on “July 1, 2012, at 10 a.m. in room 228, I was changing a sterile dressing, under the supervision of my preceptor, Karen Saunders, on Ms. Evans, a patient who had undergone an abdominal hysterectomy. During the procedure, Ms. Saunders rolled her eyes and commented, ‘I guess we’ll be here all day since you’re so slow.’ She then addressed Ms. Evans directly and stated, ‘You have to understand that these new nurses just don’t know as much as they should.’” By being objective and specific an accurate account is recorded. This type of personal record may be needed if it becomes necessary to approach a nurse manager or to file a grievance in accordance with organizational policies and procedures.

**Zero tolerance HV policies and procedures**

It is important that all employees, including managers and administrators, be aware of policies and procedures that deal with HV and other types of workplace violence. If someone is a victim of HV and confronting the abusers directly fails to stop the abuse, it is important that policies and procedures be followed. In many cases, the next step (if confronting the perpetrator does not put an end to the problem) is for the victim to meet with his or her immediate supervisor. When doing so, it is probably helpful to bring the written record of the HV to the meeting. This helps to keep the meeting objective and prevent displays of emotion, such as anger or tears, that may interfere with coming to a satisfactory conclusion on how to stop the problem.

The Joint Commission has published guidelines for the prevention of disruptive workplace behaviors. These guidelines include the following recommendations:

- All employees should receive education about disruptive behaviors to be avoided as well as those appropriate behaviors that foster respect and professionalism in the workplace.
- It should be made clear, as part of written standards such as policies and procedures, that all employees and others who work within the organization are accountable and responsible for their own behavior.
- There should be written policies and procedures that guarantee zero tolerance for behaviors that are disruptive or intimidating and adversely affect the organization.
- Persons who report disruptive or intimidating behaviors must not be reprimanded or subjected to any form of retaliation for doing so.
- Organizational leaders must be trained and educated to recognize disruptive, intimidating behaviors, to stop such behaviors, and to uphold standards of acceptable behavior.
- Organizational leaders must establish a system for dealing with disruptive, intimidating behaviors. This system must include a process for monitoring and reporting such behaviors.
- Any and all actions taken to stop disruptive, intimidating behaviors must be documented.
- A code of conduct must be written. This code must define what are considered to be acceptable behaviors and what behaviors are disruptive and intimidating.

**Conflict management styles**

It is important that all employees be helped to recognize the various conflicting management styles and what styles are appropriate under what conditions. Here are examples of some of the most common styles.

Thomas is a member of an interdisciplinary research committee. He is one of the committee’s newest members. The group is discussing sample selection for a research project. Thomas respectfully questions the proposal for sample selection currently under review. He believes that it lacks objectivity and may have an adverse impact on the reliability of the results of the research. However, the person who proposed the selection is a colleague who has served on the committee for many years and has the respect of the group. There is significant support for the proposal as it is currently written. Thomas apologizes and agrees to go along with the group’s recommendations even though he believes the proposal will hamper effective research.

This is an example of accommodation. Accommodation exists when one person or group gives in to the demands of another person or group. “Giving in” may compromise patient care, organizational standards, or other important factors. Accommodation is appropriate only if the person who gives in realizes that he/she has made an error. Giving in to avoid conflict may be seen as weak and ineffective by others.

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**Stella and Maureen** are senior physical therapists. They have a friendly rivalry for the respect and attention of their less experienced colleagues. During a staff meeting, they take opposite sides of a discussion pertaining to a new scheduling format. Neither is willing to discuss or listen to the other’s viewpoint.

This is an example of competition. This is a negative approach to resolving conflict. With competition, neither involved party is concerned with achieving the best possible outcome. The only concern is winning. In completion, there is always a winner and always a loser.

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**Arlene** is the nurse manager of several medical units. She knows that there is conflict among the units about staffing and the budgetary allotment for unit resources. Staff members have asked for a multi-unit staff meeting to resolve the issues. Arlene is reluctant to schedule a meeting that she fears will further disrupt professional rapport. She hopes that eventually each unit will determine a way to deal with the resources they have.

This is an example of avoidance. Avoidance means that the conflict is being completely ignored in the hope that it will eventually resolve itself or even disappear entirely. But ignoring conflict seldom, if ever, results in a happy ending. Avoiding conflict usually prolongs it and often causes it to escalate.

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**Linda and Victor** are social workers whose patient population is primarily elderly persons who have had strokes or other debilitating conditions. Linda believes that Mrs. Burns, a stroke patient, should be taken in by one of her many children after discharge. Victor believes that her care is so extensive that she should be discharged to a long-term care facility. They cannot come to an agreement, and family
members are arguing among themselves about what to do. Linda and Victor decide to present the option that each of the children take turns having Mrs. Burns in their homes on a trial basis. If none of them are able to care for her, she will then go to a long-term care facility. Neither social worker is happy with this option.

This scenario is an example of compromise, which means that all parties involved in the conflict give up something in order to resolve it. Since neither party is really comfortable with the outcome, compromise is usually only a temporary resolution of the problem and conflict still exists to some extent.

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The nurses who work on a busy surgical unit are forming a unit-based council. One of their first projects is to initiate self-scheduling. It is a difficult process, but all agree that the first consideration must be adequate staffing. After discussing, sometimes forcibly, a variety of options, the group comes up with a way of scheduling that allows nurses to work only one weekend a month as well as a system that has each nurse taking her turn to work overtime or additional shifts when needed without scrambling at the last minute to find coverage.

This scenario is an example of collaboration. It is also referred to as negotiation and results in a win-win situation. Collaboration means that a solution that is satisfactory to everyone involved is found. When working with diverse groups of colleagues, it is helpful to identify one’s personal conflict management style. In this way, collaboration, rather than styles that often escalate conflict, can be implemented.

Education

Education is essential to the reduction and elimination of HV. All employees, including administrators and managers, must participate in education and training about HV. Remember that this phenomenon occurs in all departments, not just those whose staff members are direct patient care providers, and at every level in the hierarchy. Work with the organization’s professional development department (also known as staff development or education) to plan, implement and evaluate such education.

Before education can take place, effective policies and procedures must be written with a statement that there is zero tolerance for disruptive behaviors, including HV. (See the recommendations for these policies and procedures above). Every employee should be required to read these documents, agree to uphold their standards, and sign a documentation record that they have done so.

What should HV education consist of? How should it be presented? Everyone is busy and finds it hard to leave their departments to attend education. But attendance should be facilitated and should also be mandatory. Remember that all such education and training does not have to be done entirely in a classroom. Computer-based learning, staff meeting presentations and distribution of case studies can all be used so that the actual time in the classroom is limited to manageable amounts.

Information to be presented should include: 2,5,6,10

- An explanation of what HV is and what it is not. Role play, case studies and actual examples, preferably from situations that have been witnessed within an organization, are good ways of making the HV “real” and not just a theory. But be sure that scenarios used as examples do not include names, specific units or other items that would specifically identify the victims or those who commit it. This will embarrass some and make others angry and only escalate the problem.

- An overview of the organization’s policies and procedures that deal with disruptive behaviors.

- How to deal with HV. Use a variety of strategies to show how to deal with HV. Don’t just have people listen to a lecture or read a policy. Role play and case studies should show effective and non-effective ways of dealing with the problem. This type of contrast can show what works and what does not.

- Presentation of organizational data related to HV. This could include statistics about turnover, the effects of HV, and the cost of the problem to the organization. On a department level, actual data showing how HV has impacted patient care, recruitment and retention could be presented. HV must be made “real” to the employees, especially those who don’t believe it exists.

- How to recognize HV when it is seen or when it is committed. Remember that earlier in this program it was mentioned that some people don’t even realize that their behaviors constitute workplace violence. Every employee should have to perform a self-analysis of his/her own behavior.

These are just some ideas to “kick off” an education campaign to stop HV. But a one-time education session is not enough. HV education must be ongoing and occur during various points in employees’ careers, such as, during:

- Orientation: The topic of HV should be addressed during orientation of all new staff members and include information as described above. Some may argue that this will scare new employees and give them a bad impression of the organization. On the contrary, knowing about HV and what to do about it only empowers a new employee. It also shows that the organization has a commitment to put a stop to disruptive behaviors.

- Mandatory training: All health care organizations have some type of mandatory training. Updates on HV, how to recognize it and how to stop it should be part of every employee’s annual mandatory training.

- Continuing education: Ongoing information about HV and other types of workplace violence should be part of every organization’s continuing education endeavors. Education could include updates from the literature, information based on analysis of the organization’s own efforts to stop HV and other forms of workplace violence, and how successful the organization has been in stopping HV.

HV warning! Ask employees for input on the kind of education they need about HV. Do they want more opportunities for role play and discussion? Is there interest in conducting research about HV? What is it, from their viewpoints, that should be done to help stop HV and to help employees deal with it when it does occur?

Conclusion

HV is not a new phenomenon, but it is one that is becoming more well-known and more openly acknowledged by accrediting bodies. All persons who work within the health care field must take responsibility for putting a stop to HV. To provide a safe work environment for employees and an environment that is conducive to the best possible patient care, HV must be recognized and a zero tolerance for its occurrence be upheld by administration, management and staff.

Education is a critical part of developing and maintaining such an environment, and education must be mandatory for everyone who works in health care. It is essential that the leadership of the organization serve as role models for appropriate behavior, and that those who commit HV, no matter what their role in the organization, be held accountable for their actions.

References

### Horizontal Violence in Health Care Organizations: Why Peers Bully Peers

**Final Examination Questions**

Choose True or False for questions 1 through 10 and check your answers at the bottom of the page.

You do not need to submit this self-evaluation exercise with your participant sheet.

<table>
<thead>
<tr>
<th>Question</th>
<th>True</th>
<th>False</th>
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</thead>
<tbody>
<tr>
<td>1. Horizontal violence is generally committed by managers against their subordinates.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>2. Estimates of HV in the nursing workplace range from 46-100 percent.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>3. Among the most vulnerable to HV are those who are older workers with many years of experience.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>4. The need to belong to a certain group or team can be a cause of HV.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>5. Persons who ignore HV are just as guilty of aggression as those who actually commit this type of aggression.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>6. Oppression theory as a cause of HV is most often linked to the discipline of physical therapy.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>7. Persons who experience HV often experience a decrease in the effectiveness of their immune systems.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>8. If a person experiences PTSD as a result of HV, the symptoms of PTSD end as soon as the victim finds another job.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>9. When confronting someone who is committing HV, it is best to avoid eye contact.</td>
<td>True</td>
<td>False</td>
</tr>
</tbody>
</table>

10. The most important strategy to combat HV is to deal with the problem the first time it occurs.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
</tr>
</thead>
</table>