applied sciences

MDPI

Perspective

The Critical Link in the Successful Application of Advanced Clinical Decision Making—Revisiting the Physician–Patient Relationship from a Practical and Pragmatic Perspective

Franco Musio

Department of Medicine, University of Virginia School of Medicine—Inova Fairfax Campus, Falls Church, VA 22033, USA; frmusio@gmail.com

Abstract: Advanced clinical decision making has been rapidly evolving, primarily due to the ever-expanding field of healthcare technologies. Moreover, the physician–patient relationship has taken on new complexions, particularly in the realm of shared decision making, which champions patient autonomy, leading to contemporary "personalized medicine". Models currently studied and employed in clinical decision making and the bonds between physician and patient will be explored to include their intricate interrelationships. Furthermore, both clinical decision making and the physician–patient relationship demonstrate dynamic reciprocal associations with each other in a synergistic fashion. Novel schematics will be highlighted for the elucidation of these labyrinthine processes, and real-life clinical examples will be shared. A strong bond between physicians and patients, particularly through the exercise of shared decision making, is inherent and necessary for the effectuation of clinical decisions and treatment plans. The vital ingredients of trust, empathy, and communication will be elaborated upon as underpinning the goals of thorough and meticulous patient care. Ultimately, the physician–patient relationship acts as a "filter" through which the processes of decision making must pass in order to be implemented. As such, the strength of this alliance is critical in today's complex era of advanced healthcare technologies.

Keywords: clinical decision making; physician–patient relationship; healthcare; communication; trust; problem solving

Academic Editor: Roger Narayan

Received: 19 October 2024
Revised: 16 December 2024
Accepted: 21 February 2025
Published: 25 February 2025

Citation: Musio, F. The Critical Link in the Successful Application of Advanced Clinical Decision Making—Revisiting the Physician–Patient Relationship from a Practical and Pragmatic Perspective. *Appl. Sci.* **2025**, *15*, 2446. https://doi.org/10.3390/app15052446

1. Introduction

Advanced clinical decision making is entering into a new ever-complex era due to rapidly developing health care technologies spearheaded by accelerating artificial intelligence. In 2023, 17.6% of the gross domestic product (GDP) of the United States was spent on healthcare (4.8 trillion dollars), with the greatest percentage based on clinical decisions by physicians [1]. The importance of this is also reflected in contentions that erroneous decision making is now one of the top three causes of death in the US and likely around the world [2]. Conversely, the above is greatly outweighed by the exercise of judicious medical science problem solving leading to the curing of diseases, longer life spans, and vastly improved quality of life for many patients globally. Notwithstanding the wonderous breakthroughs enabling up-to-date clinical decision making, in the majority of cases, these processes would not have been possible without a strong physician–patient relationship. This perspective is based on my interactions with thousands of patients and a similar number of colleagues over many years in my practice of medicine in the fields of nephrology/internal medicine. My interpretation and use of models of clinical decision

making and the physician–patient relationship are in their representations as frameworks for problem solving and delivery of care, particularly in the treatment of multifaceted and intricate diseases.

Both clinical decision making and the physician–patient relationship are construed by models with the purpose of applying more concrete structures to formulations that are often nebulous and ill-defined. Four separate models of clinical decision-making "processes" will be explored, although it should be noted that there are intersections and overlapping aspects of each in day-to-day practice. Likewise, four separate models of the physician–patient relationship will be presented, which similarly demonstrate overlapping features in the realities of clinical practice. Rapidly advancing healthcare technologies and mass media are greatly influencing the physician–patient relationship and leveraging its dynamics to a more collaborative alliance of shared decision making. Emphasis is thus placed upon patient autonomy in contemporary "patient-centered care". Moreover, the elements of trust, empathy, and communication will be discussed as the true foundations for a solid association between physicians and patients.

Intricate schematic representations will be posited, and real-life clinical examples will be interspersed throughout the sections of this perspective. Briefly, three separate paradigms (with sub-paradigms) will be proposed, represented by two- and three-dimensional geometric figures: the four models of clinical decision making, the four models of the physician–patient relationship, and the multifaceted relationships and interconnections between the models of clinical decision making and the physician–patient relationship. The sequential order of these analyses in this perspective is based on the central importance of the physician–patient relationship as the "catalyst" for clinical decision making and, thus, the ultimate purpose of healthcare. These precepts will become more tangible as this perspective develops. Effectively, my strong leanings favor the model of shared decision making for both clinical decision making and the physician–patient relationship, which will be elaborated upon.

At a higher level, the physician–patient relationship acts as a "rate-limiting step" for the execution of clinical decisions. Furthermore, this alliance interacts with and develops its characteristics from the models of clinical decision making. Interestingly, the inverse will also become apparent—that is, the processes of clinical decision making also interact with and develop their characteristics from the models of the physician–patient relationship. The main thesis of this perspective, therefore, is the inductively derived precept that the execution and ultimate effectuation of clinical decision making is accomplished by its filtering and distillation through the medium of the physician–patient relationship. In this vein, the current vast literature concerning clinical decision making and the physician–patient relationship will be distinguished from my opinions and personal perspectives, gleaned and refined throughout my years of medical practice.

The intent of this perspective is to serve as a framework of critical thinking for the scientific and medical communities. The overriding objective is to shed insight into the constructs and components integral to modern-day patient care, particularly those of a complex nature. Ultimately, the aim is to assist scientists, clinicians, and all professionals directly or indirectly involved in the healthcare field in the advancement of their appreciation of the mechanics of the entities of clinical decision making and the physician–patient relationship. In point of fact, I wish to share my "epiphany", which will come to light through the unfolding of this perspective piece, that a synergism and reciprocal interrelationships exist between the two. In sum, a "bird's eye view" of this intricate topic will be presented to the scientific and medical communities in this Special Issue of Advanced Decision Making in Clinical Medicine.

This compendium will be partitioned into main segments (and their subsegments), with the intent of sequentially introducing descriptions, concepts, and precepts in a building block fashion, ultimately leading to conclusions and their synthesis:

1. The processes of clinical decision making: the four models, with clinical examples,
2. The integral role of the physician–patient relationship: historical notes of the four models, with clinical examples,
3. The variables of trust, empathy, and communication: hallmarks of shared decision making,
4. Neurobiological, psychosocial, and behavioral components of clinical practice,
5. The essential role of the physician–patient relationship for the effectuation of advanced clinical decision making.

2. Discussion

2.1. The Processes of Clinical Decision Making: The Four Models, with Clinical Examples

2.1.1. Overview

The skeletal framework of clinical decision making is predicated on the steps involved in hypotheco-deductive reasoning adapted from the scientific method: hypothesis generation, evaluation, refinement, and verification [3]. The more recent literature describes slight variations of the above, although the root of medical decision making is based on a stepwise process of validations in the initial and subsequent face-to-face encounters with patients [4]. More "ornate" frameworks exist based on the complexity of the individual cases, with advanced clinical decision making in clinical medicine now able to insert its "tentacles" within and between any number of steps of this elaborate paradigm (Figure 1). In fact, such a scaffold may be applied to various degrees to a universal approach in the applications of scientific inquiry and pursuits of many different disciplines. The preeminent processes in clinical decision making currently encompass four models:

- Rational Model,
- Evidence-Based Model,
- Intuitive Model,
- Participatory/Shared Decision-Making Model.

The Rational Model emanates from the study of cognitive science, which consists of critical thinking, metacognition (thinking about thinking), introspection, reflection, and communication [5,6]. This approach pre-supposes adequate data and information for well-defined and structured clinical scenarios coupled with the availability of the required time. This process can optimally be used in cases such as those of slow-growing (or even aggressive) malignancies or long-term conditions, including chronic kidney, pulmonary, and heart disease, in which a number of possible diagnostic studies, imaging techniques, and laboratory and genetic analyses are available for the evaluation and treatment of the specific malady.

The Evidence-Based Model parallels the Rational Model as it is predicated on high-quality research engendering empirical pathways, practice guidelines, and clinical decision rules, although it also includes the wishes of the patient [7,8]. Conversely, in my opinion, the many nuances, variables, and anecdotal elements so often present in clinical medicine and contributing to its "art form" are not wholly emphasized in this model. By way of illustration, this process of decision making is not optimal in all cases, such as with certain complex illnesses in which the infusion of packed red blood cells would likely benefit the patient. The above would occur only through the implementation of transfusion thresholds higher than those recommended by societal guidelines (as the guidance is currently based on a trigger of a low level of hemoglobin to administer transfusions). Another example would include the treatment of hypertension, in which adherence to current guidelines

from a number of medical societies is not always applicable and appropriate for all patients. These would include those with cerebrovascular and renovascular diseases, which often require higher blood pressures for the adequate perfusion of blood to these tissue beds. As a result, although beneficial in many circumstances, this approach is not always tailored to the individual manifesting unique pathophysiological characteristics.

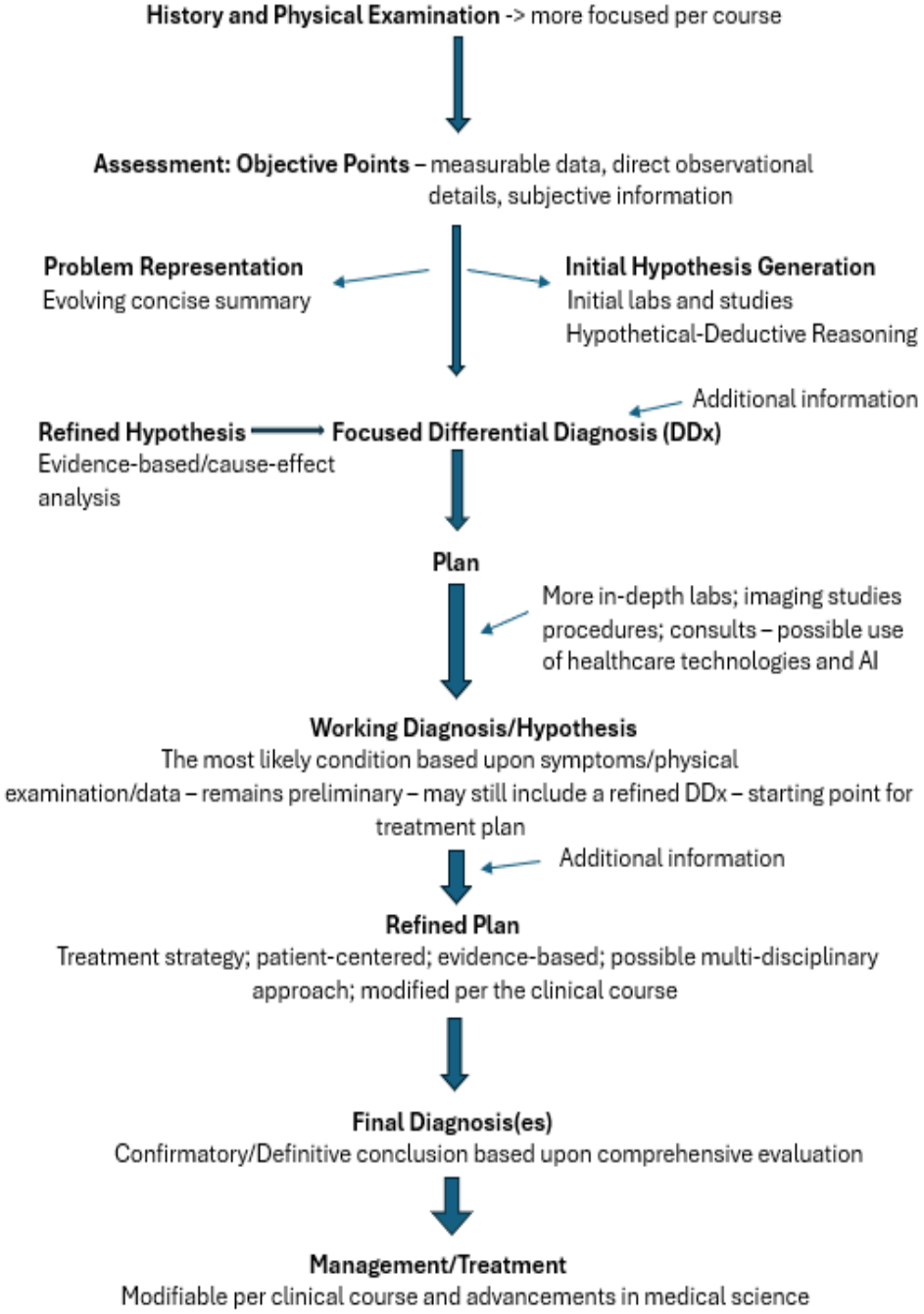


Figure 1. Diagnostic Paradigm of Clinical Decision Making.

The Intuitive Model employs spontaneous decisions based on the physician's combination of experience, wisdom, instincts, and, at times, emotions [9]. This unique approach is frequently utilized in acute and critical circumstances, such as those seen in the Emergency Departments with cardiac arrests or intraoperatively when unanticipated anatomical challenges or complications (such as hemorrhage) spontaneously occur. Under these conditions, the decision-making process must take place very rapidly, and, at times, immediately due

to the emergent nature of the condition. Instinctual responses based on the experience of the physician are thus required at times. Also, it is rare that a decision using this model cannot be retraced and adjusted in the setting of the unpredictability of the challenges being addressed.

The Participatory/Shared Decision-Making Model is as much a process for decision making as the mainstream model for the physician–patient relationship itself, in which patient autonomy and patient-centered care are highlighted. The shared decision-making process appears to be abetted by the rapid growth of medical science and mass media, leading to multiple diagnostic approaches and treatments that were not available until the last decade or even more recently. As a result, the process of arriving at a decision is based on the contribution of both the physician and the patient in a climate of respect for each other's system of values and goals [10–13]. A prime example of this model of decision making occurs in the arena of hematology–oncology, in which the very rapid advancement of diagnostics and medications/treatments now leads to multiple potential options of care, which require significant input from the patient/family. In addition, my own field of nephrology has rapidly grown such that multiple treatment regimens for many different types of kidney diseases now appear to also oblige the involvement of the patient and their family.

These prodigious advancements in the medical sciences have also affected my practice as the greater part of my current decision-making processes is based on this model of Participatory/Shared Decision Making. Interestingly, studies over the last twenty years reflect improved outcomes with the application of this model of clinical decision making, particularly among patients with diabetes mellitus and systemic lupus erythematosus [14,15]. Anecdotal experiences also favor this "prototypical" model in my personal discerning and formation of decisions. Patients are typically keenly aware of the dynamics, distinctions, and subtleties of their own bodies; thus, they are well-positioned to contribute in a collaborative fashion to the determination of the plan of action for their specific disease process/processes. However, this model of decision making may not be preferred by all physicians (and patients) due to a number of potential circumstances, which will be explored later.

2.1.2. Geometric Paradigms for the Interrelationships of the Models for Clinical Decision Making

As a means of conceptualizing the intricacies of these four models of clinical decision making, a novel metaphorical geometric schematic paradigm will be proposed (never previously introduced in the literature): a 3-dimensional tetrahedral triangular pyramid composed of four triangular-plane figure faces, six straight edges, and four vertices (Figure 2).

This geometric figure represents the summation and integration of the four models of clinical decision making as a Principal paradigm. Each vertex represents one individual model of clinical decision making, with the entire geometric figure consisting of and broken down into four separate metaphorical plane figure "triangulations" with the following reciprocal relationships:

- Sub-paradigm a: Participatory/SDM Model—Evidence-Based Model—Rational Model (Figure 3a),
- Sub-paradigm b: Participatory/SDM Model—Evidence-Based Model—Intuitive Model (Figure 3b),
- Sub-paradigm c: Participatory/SDM Model—Rational Model—Intuitive Model (Figure 3c),
- Sub-paradigm d: Evidence-Based Model—Rational Model—Intuitive Model (Figure 3d).

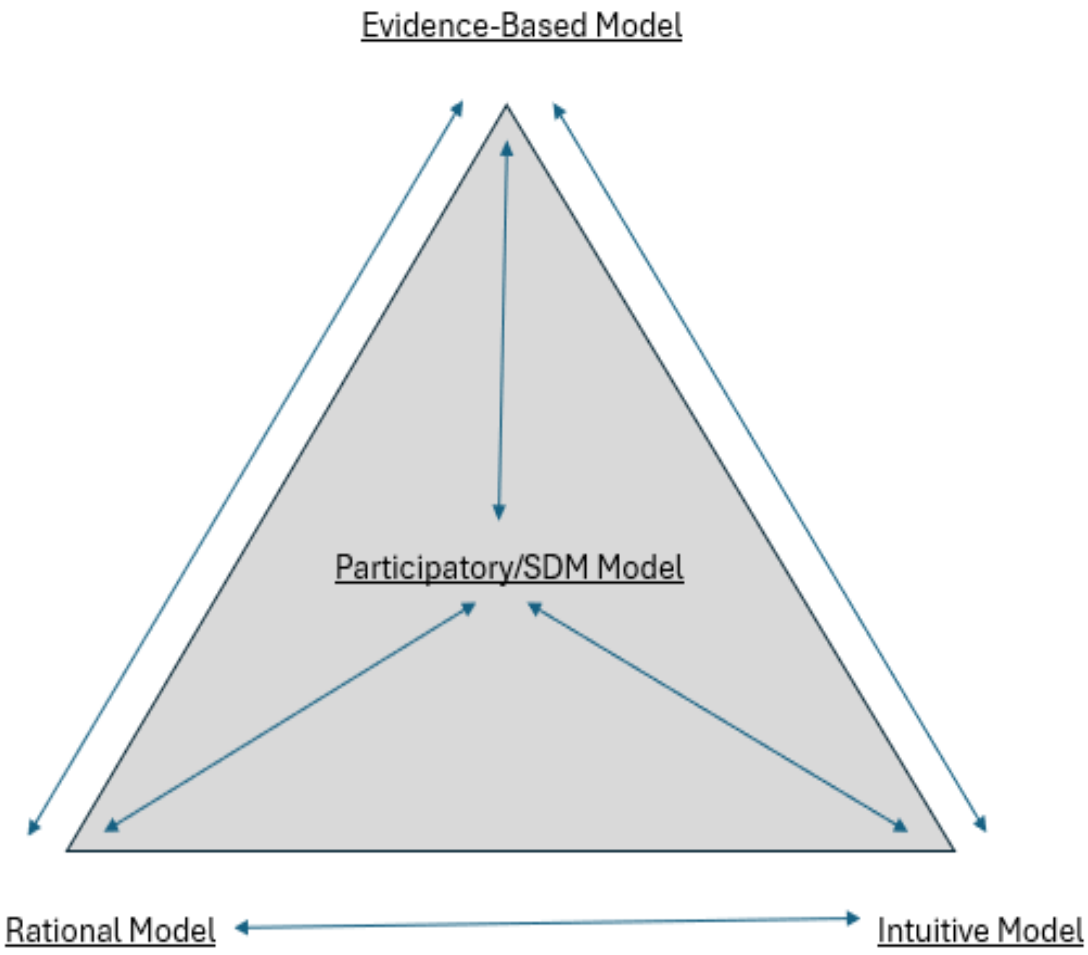
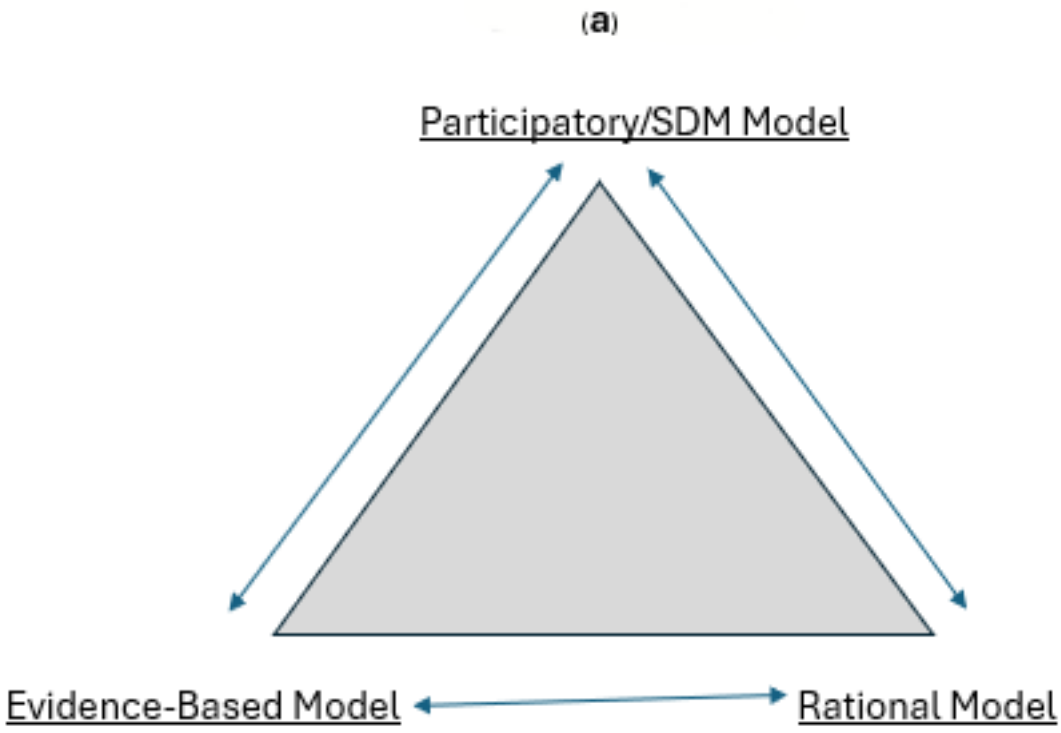
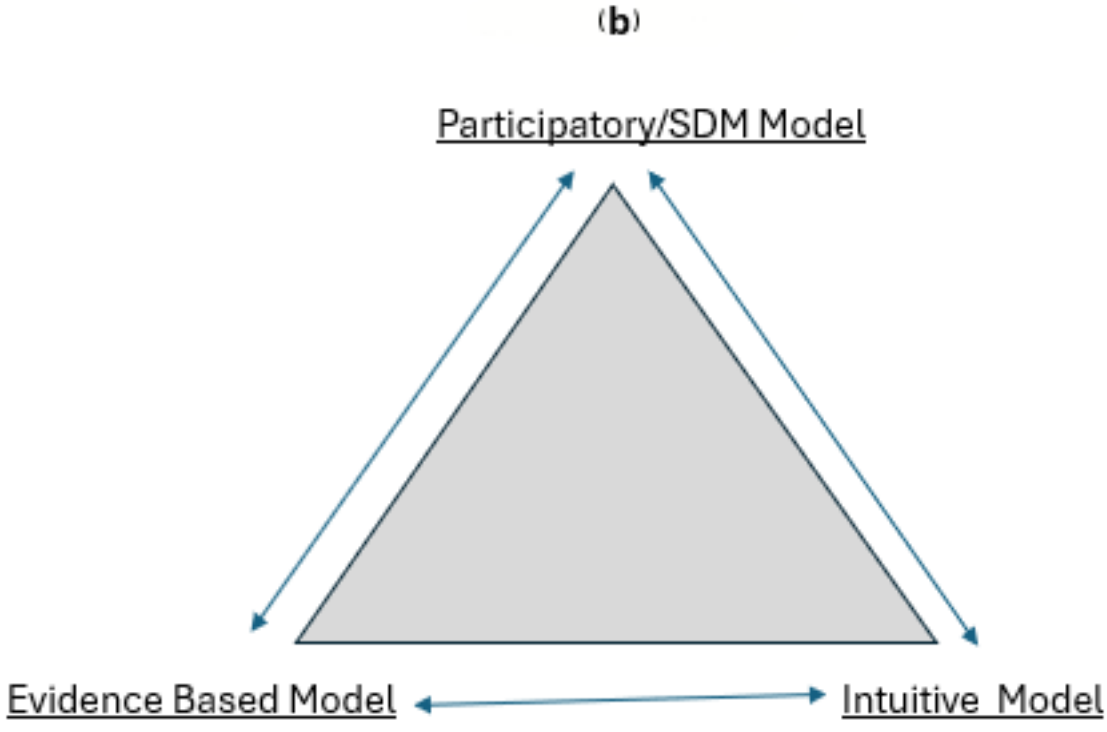


Figure 2. The Principal paradigm represented as a tetrahedral pyramid metaphorically demonstrating the summation and integration of the all the reciprocal relationships of the four models of clinical decision making.

The purpose of the principal paradigm and the sub-paradigms is to improve on the concept that "real-life" clinical decision making is based simply on individual models. Rather, this metaphorical tetrahedral triangular pyramid consisting of four triangles illustrates the confluence of the four models required for real-life clinical decision making. The double-sided arrows are placed between the vertices in a similar fashion to that of a symbol used in mathematics or logic: each vertex representing a single model is "true" only if each of the other three vertices is also "true". Each model is interconnected geometrically, although also in actuality; that is, each model of clinical decision making has a two-directional relationship with each of the other models. The translation to the real-life practice of medicine is that decision making cannot be based on just one model, but rather a composite with varying degrees of contribution by all four models.





SDM: Shared Decision Making

Figure 3. *Cont.*

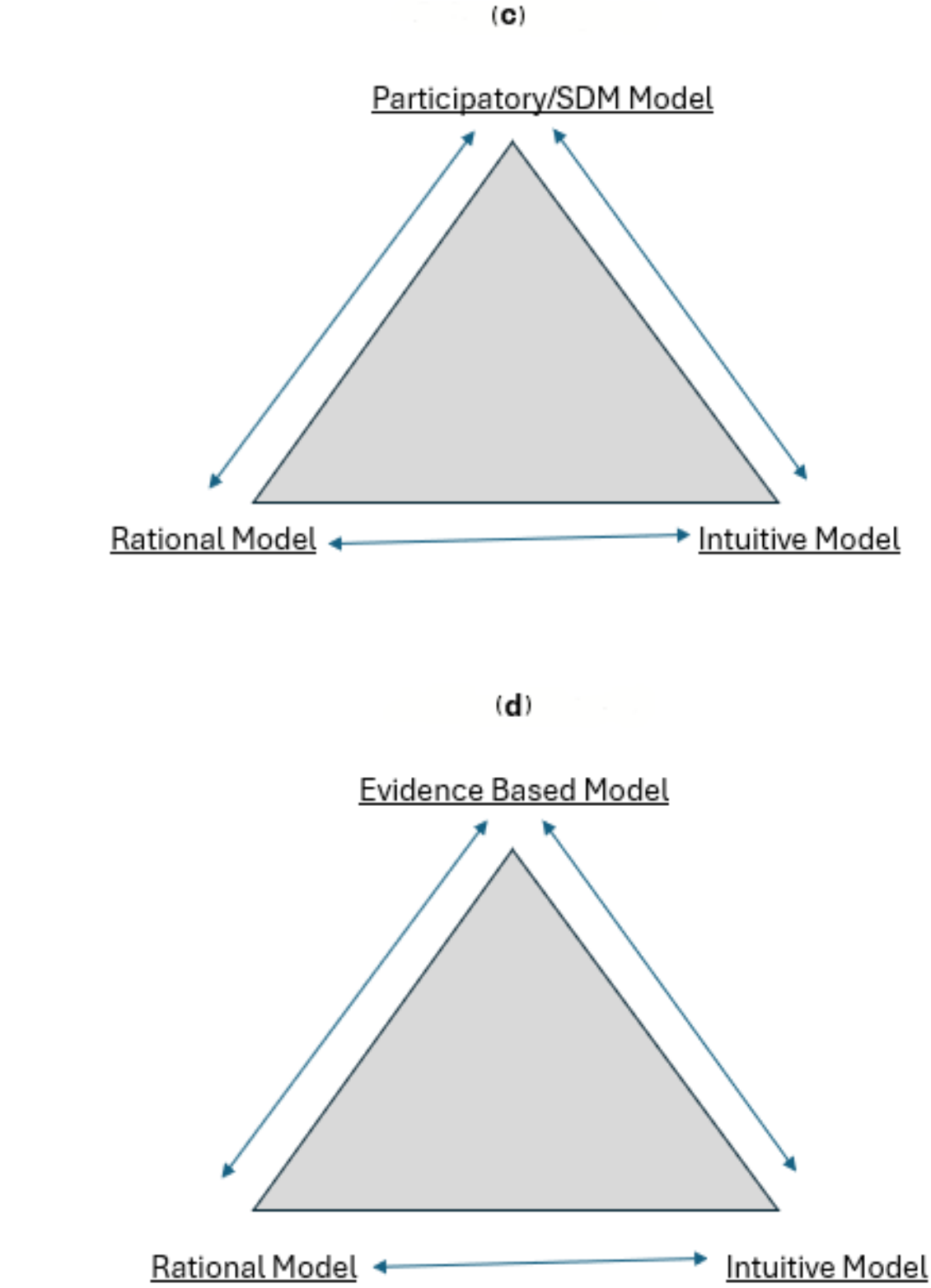


Figure 3. (**a**–**d**) The four separate triangular sub-paradigms which as a composite constitute the principal tetrahedral pyramid depicted in Figure 2. These plane figures metaphorically subtype all the interrelationships involved in clinical decision making.

For further elaboration, the essence of the four separate metaphorical "triangulations" is that the individual decision-making models in real-life medical practice cannot be utilized in isolation; rather realistic and tangible patient care is based on a synthesis of elements from multiple models. In order for the tetrahedral pyramid to take geometric form, each individual vertex must share a straight line with and thus be connected to each of the other three remaining individual vertices. The integration of the above, therefore, results in the confluence of all four models of clinical decision making in the care of patients. That is, one individual model (as represented by one individual vertex) does not exist in isolation, but rather in a fluid and dynamic interaction of various proportionate degrees with the other three individual models (likewise represented by individual vertices).

At a higher level, the four separate metaphorical triangulations, similarly, cannot exist in isolation, but rather as a convergence with each of the other individual triangles in order for the tetrahedral pyramid to take its geometric form. As with the individual vertices, a fluid and dynamic interaction exists in various proportionate degrees within and between each entire triangle (each representing three individual models of clinical decision making). As a result, an intermingling of all the models again occurs in the composition of the entire metaphorical tetrahedral pyramid. Moreover, certain models of clinical decision making also contribute to a greater or lesser extent in the overall decision-making process for each individual patient based on multiple factors: the availability of data, the complexity of the medical problem(s), the multiple nuances and exceptions seen in the particular disease process(es), the availability of resources and clinical expertise in addressing the medical problem(s), and the cooperation and wishes of the patient, in addition to other considerations.

2.1.3. Clinical Examples of the Convergence of the Models of Clinical Decision Making

Real-life examples of the intersection of the models of clinical decision making abound in the day-to-day practice of medicine. An example would be the care of a complex renal transplant patient with many comorbidities in the intensive care unit facing sepsis, hemolysis (breakdown of red blood cells), respiratory failure, and progressive renal failure from an overwhelming infection. The multiple models/processes essential in attaining the decisions required in the care of this patient may often change in regard to their relative contributions and consequences, although they may still interact with each other based on the undulating courses of the diseases and conditions themselves. The participation of the patient (to the extent possible) and the family is paramount, although a rational overview of the clinical course, at times using evidence-based strategies, as well as involving elements of clinical intuition by the physician are all important components of arriving at the advanced care decisions required in this and many other complicated cases requiring multiple specialists at tertiary and quaternary care institutions. Patients requiring a lower amount of involved care, for example, those with a single clinician caring for a less critically ill individual than the former, also require varying models (with various relative contributions) in the decision-making processes. Such an example would be represented by a hemodialysis patient in the outpatient setting experiencing fluid retention and hypertension, with complications during treatments, such as fluctuating hypotension and hypertension, cramping, and malaise, ultimately leading to suboptimal treatments. The attending nephrologist and patient must often use the process of shared decision making, particularly in this case as the patient will need to gainfully participate in and agree to the treatment plans. The clinician will also need to utilize rational and evidence-based decision-making processes (possibly with some intuition) in arriving at the solutions in the care of this particular patient. As the course continues, the models remain interrelated with each other, although their relative contributions to the overall treatment plan may change.

2.2. The Integral Role of the Physician–Patient Relationship: Historical Notes of the Four Models, with Clinical Examples

2.2.1. Overview

The objective of this segment is to diverge from the models of clinical decision making discussed in the previous segment and focus on the separate models of the physician–patient relationship. The interlocking and reciprocal relationship between the overall models of clinical decision making and those of the physician–patient relationship will be elaborated in Segment V.

The modern-day study of the physician–patient relationship commenced with the writings of Talcot Parsons, Professor of Sociology at Harvard University, who described and championed an asymmetric Paternalistic Model, in which the physician acts as a fatherly figure and as a trained and institutionally certified expert caring autonomously and knowing the best course of action, with no input by the patient [16]. In rare circumstances, elements of this model may still be applicable. This professionally dominant model was preeminent following World War Two until the mid-1960s, during a period coined as the Golden Age of Medicine. This period served as the springboard for the evolution of the physician–patient relationship due to the growing "commodification" of healthcare, in which the medical landscape was forced to change due to numerous external pressures to include insurance companies, the rapidly growing pharmaceutical industry, and federal governments around the world [17].

In 1972, Robert Veatch, Professor Emeritus of Medical Ethics and Philosophy at Georgetown University, was the first to accommodate to the new medical landscape by proposing four models of the physician–patient relationship, upon which all the subsequent literature and scholarly discussion has been based: Priestly Model, Engineering Model, Contractual Model, and Collegial Model [18]. Parenthetically, I am honored to have been a student of Professor Veatch in my early collegiate years. Similar to the Paternalistic Model, the Priestly Model assumes that the physician makes all the medical decisions without input from the patient or recognition of their system of values. The Engineering/Scientific Model can be construed as the antithesis of the above and as the foundation of a consumerism approach, in which the patient asymmetrically makes the medical decision after the data, technical information, and options are presented by the physician. Both the Contractual and Collegial Models are very similar, with slight variations, in which a collaboration exists between the physician and patient, thus presaging shared decision making in the current era of patient autonomy and patient-centered care.

Twenty years later, Ezekiel Emanuel and Linda Emanuel, from the Dana Farber Cancer Institute (Boston, MA, USA) and the Kennedy School of Government of Harvard University, respectively, elaborated upon four models of the physician–patient relationship (paralleling those of Veatch), which remain the basis for current-day scholarship and practice: Paternalistic Model, Informative Model, Interpretive Model, and the Deliberative/Shared Decision-Making Model [19]. The Paternalistic and Informative Models retain their age-old characteristics. The latter is based on Veatch's Engineering/Scientific Model, which portrays the physician as the provider of information and the patient as the consumer, thus representing a relationship presupposing the modern-day "commodification" of medicine. Examples of the above include the not-so-infrequent patient referred to as the "doctor shopper", who will often admit that they have not been satisfied with their previous physicians (or the advice given); therefore, multiple different clinicians are sought. In my experience, these patients typically do not seek partnerships or alliances in their interactions with physicians.

On the other hand, the Interpretive Model connotes a collaborative relationship between the physician and the patient, with the nuance that the physician acts as a counselor of sorts, assisting the patient in understanding their own value systems and goals in arriv-

ing at treatment plans. In this case, the physician does not inject his or her own system of values and thus uses those of the patient as the basis for recommendations in the treatment plan. This relationship is often close and highly productive, although without true involvement of the physician's own preferences. Occasionally, I utilize this Interpretive Model style of interaction and seek to highlight the patient's own set of principles and morals; thus, I will not elaborate on my personal recommendations and preferences. However, I certainly share my experiences and interpretations of the medical condition/s (as well as those of my colleagues and the medical community) with the patient in a collaborative fashion. An example would be that of an elderly, although "physiologically fit", patient with a certain kidney disease, in which the treatments are evolving and are not clear-cut. This patient has previously clarified their wishes of "allowing nature to take its course", which will be revisited by myself, and thus, the aggressivity of the medication and treatment regimen would require tailoring. Although my personal preference and recommendations in cases such as these, at times, would be to pursue a more aggressive plan of action, it would oppose the patient's value system and preferences; therefore, a milder regimen with fewer potential side effects would be chosen.

The Deliberative Model is synonymous with and the template for the current era of shared decision making between the physician and the patient. Spurred by the prodigious mass media in tandem with rapidly accelerating medical science, the patient is now approaching a more central role in clinical decision making and in their engagement in the physician–patient relationship. As such, the modern-day bond between the two involves the physician analyzing and presenting the scientific data in the context of the patient's case, giving recommendations for courses of action and treatment with mutual input from the patient regarding their preferences. Both the physician and the patient share each other's personal system of values, although the final decision is typically arrived at by the patient.

I principally prefer this latter relationship model, although I also appreciate the intersection of the other models of the physician–patient relationship in fostering unions with patients. This may be illustrated with nephrological diseases such as glomerulonephritides (inflammation of the microscopic filtering portion of the kidneys) and other renal diseases, in which many forms may exist as primary or secondary conditions. The treatment paradigms have become more numerous and diverse due to ongoing research such that "one size does not fit all". There are now multiple medications, immunosuppressive, biological, and non-biological agents, and procedures that are employed in the arsenal for the treatment of kidney diseases. As a result, treatment plans must consider variables such as age, sex, ongoing comorbid issues, and psychological/social/cultural issues, which require input and mutual discussion between the physician and the patient. I will make clear my recommendations and preferences to be followed by deliberation in a collaborative fashion, although ultimately the decision rests with the individual patient (and family in many circumstances). In addition to the growing literature supporting the Shared Decision-Making Model, it appears, in point of fact, that it is a logical outgrowth of the rapid advancement of healthcare technologies. In my opinion, a maturation and evolution of the "position" of the patient is occurring in our era of cybermedicine, which is more adeptly aligned with the model of shared decision making.

2.2.2. Geometric Paradigms for the Interrelationships of the Models for the Physician–Patient Relationship

In the same vein as schematizing the models of clinical decision making, I will proceed with also schematizing the four models of the physician–patient relationship in the same manner. As a means of conceptualizing the intricacies of these four models, I will again propose a novel metaphorical geometric schematic paradigm (never previously introduced in the literature) consisting of a 3-dimensional tetrahedral triangular pyramid composed

of four triangular-plane figure faces, six straight edges, and four vertices (Figure 4). This is the same geometric figure used in the schematization of the models of clinical decision making in Figures 2 and 3, although they involve a different subject matter. This geometric figure represents the summation and integration of the four models of the physician-patient relationship as a Principal paradigm. Each vertex represents one individual model of the physician–patient relationship, with the entire geometric figure consisting of and broken down into four separate metaphorical plane figure "triangulations" with the following reciprocal relationships:

- Sub-paradigm a: Shared Decision-Making Model—Counselor/Interpretive Model—Paternalistic Model (Figure 5a),
- Sub-paradigm b: Shared Decision-Making Model—Counselor/Interpretive Model—Consumerism/Informative Model (Figure 5b),
- Sub-paradigm c: Shared Decision-Making Model—Paternalistic Model/Consumerism/Informative Model (Figure 5c),
- Sub-paradigm d: Counselor/Interpretive Model—Paternalistic Model—Consumerism/Informative Model (Figure 5d).

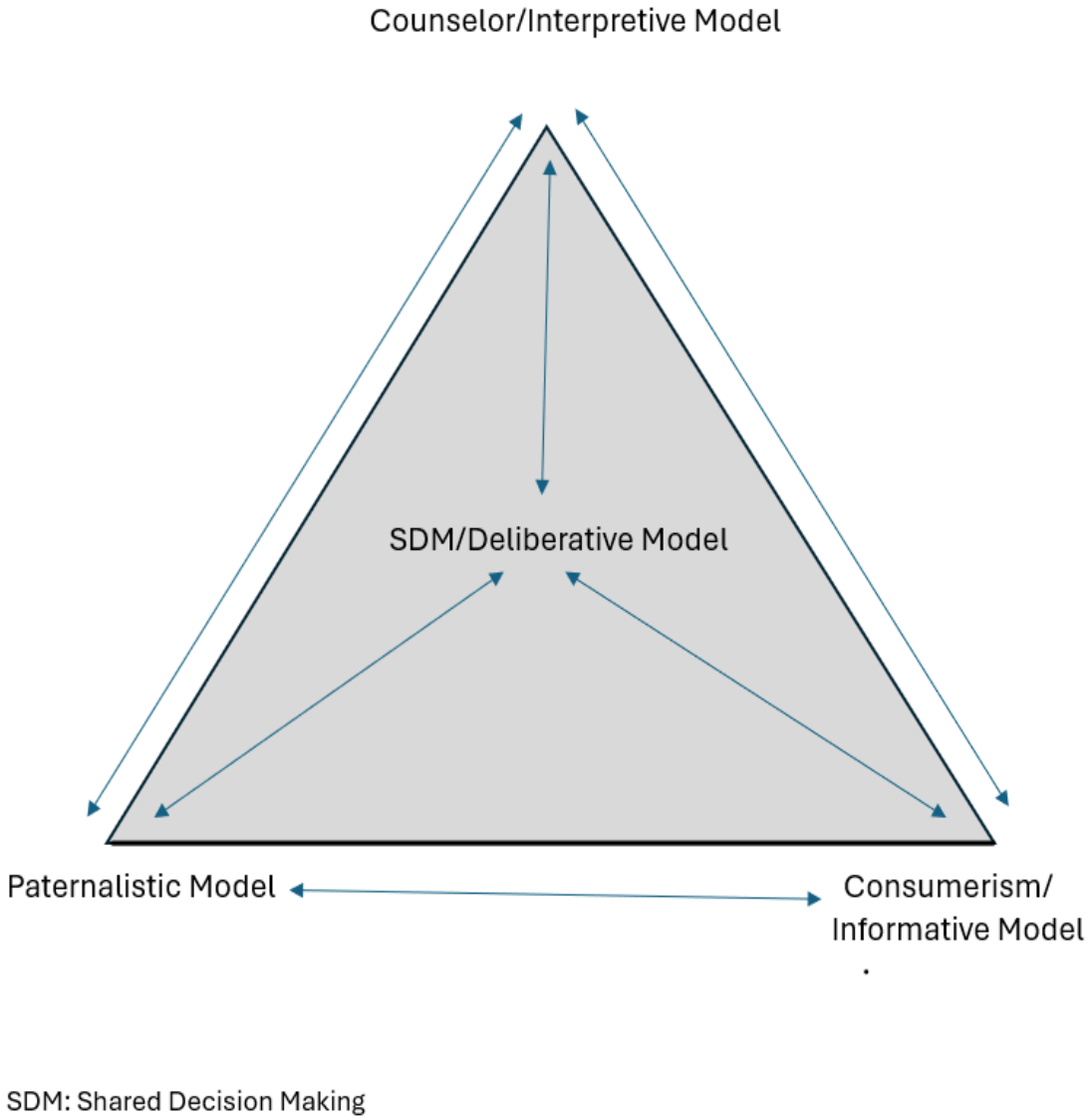
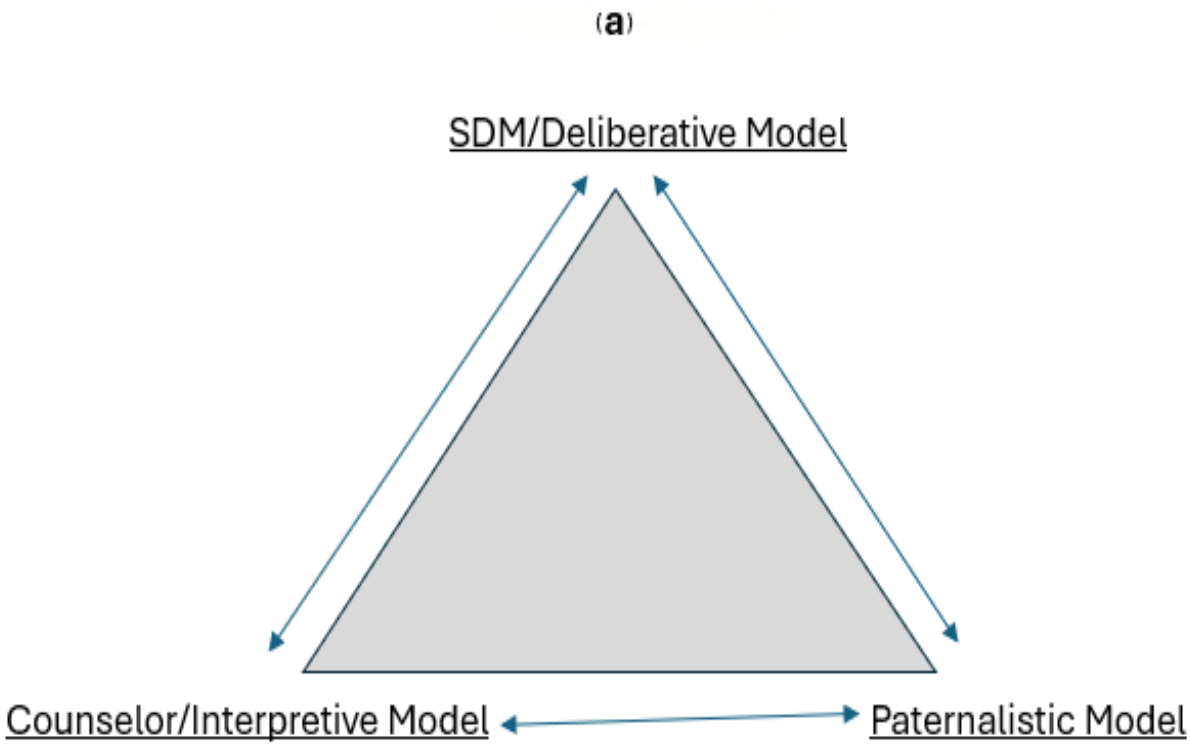


Figure 4. The Principal paradigm represented as a tetrahedral pyramid metaphorically demonstrating the summation and integration of the all the reciprocal relationships of the four models of the physician-patient relationship.



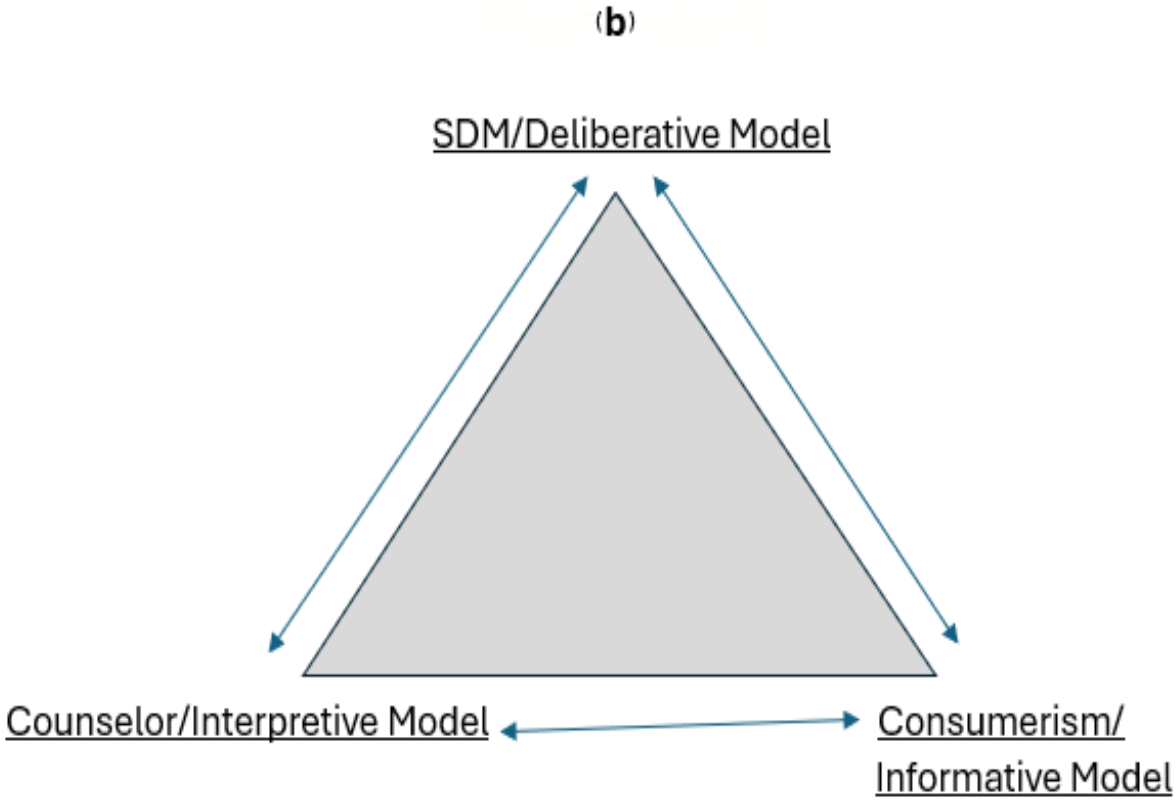


Figure 5. *Cont.*

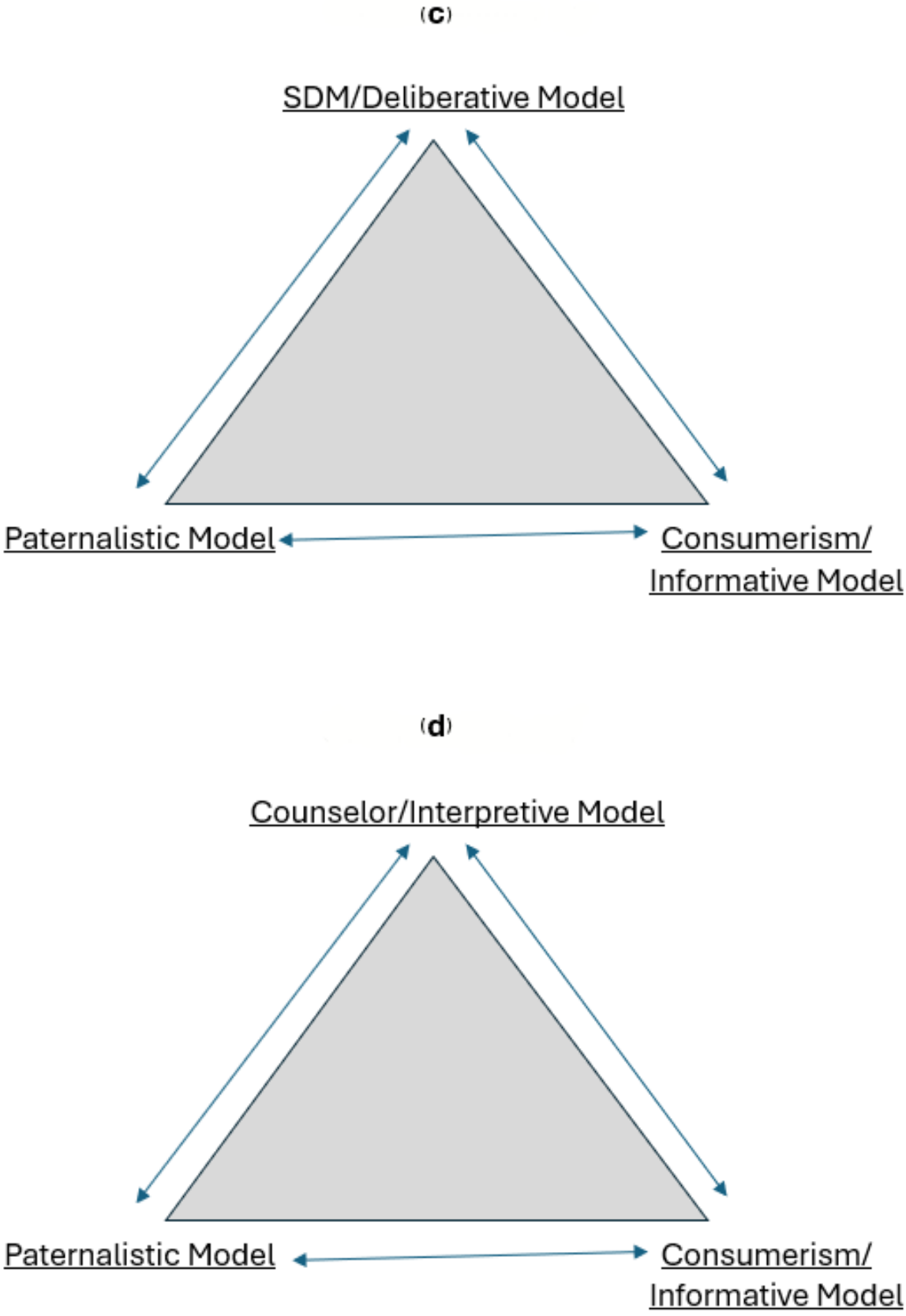


Figure 5. (**a**–**d**) The four separate triangular sub-paradigms which as a composite constitute the principal tetrahedral pyramid depicted in Figure 4. These plane figures metaphorically subtype all the interrelationships involved in the physician-patient relationships.

As with clinical decision making, the essence of the four separate "triangulations" of the physician–patient relationship is that no single model can be considered in isolation; rather, patient care involves a synthesis of elements from the multiple models. At a higher level, in order for the tetrahedral pyramid to take geometric form, each individual vertex must share a straight line with and thus be connected in a reciprocal fashion to each of the other three individual vertices. The mechanics of this novel paradigm follow those of the models of clinical decision making previously elaborated in Figures 2 and 3. The integration of the above results in a relative confluence of all four models of the physician–patient relationship, which is operative in the care of patients. That is, one individual model may take precedence during one period of time in the care of patients, although it does not exist alone, but rather as a convergence with the others to various degrees. Certain models may also contribute to a greater or lesser extent to the physician–patient relationship based on multiple factors: the nature and complexity of the disease processes, the preferences of the patient and the physician in the delivery and acceptance of care, the individual value systems of the physician and patient (as discussed above), social and cultural determinants, geographic and logistical issues, and patient "health literacy" (understanding of health-related issues), in addition to other considerations.

2.2.3. Clinical Examples of the Convergence of the Individual Models of the Physician Patient Relationship

Real-life examples of the intersection of the models of the physician–patient relationship are ubiquitous in the day-to-day practice of medicine. An example would include a patient followed for years with stable lung and kidney disease developing a rapidly progressive primary cancer of another organ system. The relationship has been built and based on years of mutual decision making, although benefits may ensue with the physician assisting in redefining the patient's own past system of values as a counselor/interpreter without his or her direct input. The patient may also wish to seek additional opinions (which may also be recommended by the physician) in a consumer-like fashion, although after this occurs, both parties again may partake in a collaborative relationship of shared decision making. Ultimately, the patient wishes to be guided and be "in the hands" of the original physician, viewed as a paternal figure. Another example is of a younger patient with a history of drug abuse (although abstinent for a number of years) presenting after a severe motor vehicle accident developing rhabdomyolysis (breakdown of muscle tissue) and ultimately multiorgan system failure. A shared decision-making relationship ensued in the Intensive Care Unit with the mutual collaboration of information and desired treatment plans with the family. The hospital course eventuated in the need and acceptance of a period of hemodialysis, although the patient also required revisiting his own set of values clarified by the physician (in a Counselor/Interpretive fashion) to include this individual's passion for life, exemplified by previous philanthropic activities and occupations. The patient also considered and valued the attending physician as an authoritarian figure in his continued and follow-up care. Such scenarios exemplify the real-life interrelations and interplay of the four separate models of the physician–patient relationship captured and schematized above by the paradigm of the metaphorical geometric tetrahedral pyramid and metaphorical triangulations.

2.3. The Variables of Trust, Empathy, and Communication: Hallmarks of Shared Decision Making

2.3.1. The Component of Trust

From a humanistic standpoint, devoid of deductive or inductive research, the essence of the physician–patient relationship is profoundly and poignantly captured by the modern-day Spanish infectious disease specialist, Dr. Teresa Hellin, in her analysis of the requisite tools for a physician to succeed in treating patients over twenty years ago:

> "To attend to those who suffer, a physician must possess not only the scientific knowledge and technical abilities, but also an understanding of human nature. The patient is a human being, at the same time worried and hopeful, who is searching for relief, help and trust. The importance of an intimate relationship between patient and physician can never be overstated because in most cases an accurate diagnosis, as well as an effective treatment, relies directly on the quality of this relationship". [20]

Trust by the patient has been shown to influence a number of clinical outcomes in a positive manner, as corroborated by the literature: emotional health, amelioration of symptoms, pain control, physiological parameters (including blood pressure control), and even mortality in certain groups [21–23]. Behavioral research in the early 2000s also strongly suggested that the trust of the patient in the physician is the bedrock of a privileged relationship and, coupled with the physician's positive attitude and approach, may be even more important to many patients than the medical issues themselves [24]. Conversely, well-performed studies also signify that the attitude and approach of the physician appear to be as important, or even more important to the patient, than any information being transmitted [25,26].

2.3.2. The Component of Empathy

An additional integral variable in the physician–patient "equation" is the key element of empathy demonstrated by the physician. Reviews investigating the subject of "empathic communication" in the acute hospital setting are based on relatively little research, although studies based on outpatient experience are numerous [27]. Intuitively, the expression of empathy in any type of human interaction will typically result in psychological benefits for both parties, particularly that of the physician and patient. In fact, research studies using qualitative assessment tools corroborate higher satisfaction [28] and determination of quality of care [29] among patients assessing their physicians as cognitively empathic. Furthermore, studies centering on empathy demonstrated by the physician are provocative in regard to subjective and objective (measurable) parameters of disease and infectious outcomes. As an example, a systematic review and meta-analysis of over 6000 patients revealed that greater practitioner empathy and communication of positive messages resulted in a modest reduction of pain (and other psychological outcomes) and a small benefit in physical outcomes, such as pulmonary function and length of hospital stay [30]. Moreover, in one report, levels of glycosylated hemoglobin (HbA1c) and low-density lipoprotein (LDL) among diabetic patients were found to be significantly improved in those who rated their physicians as more empathic [31]. Furthermore, a study of patients with the common cold revealed a shorter duration of illness and elevated levels of nasal wash Interleulin-8 and neutrophil counts among patients who rated their physicians as more empathic [32]. Although these reports suggest associations between empathy and medical outcomes, they cannot prove causality. Nonetheless, they certainly are compelling and are worthy of further research. The suggestions and implications of the above, therefore, are that empathy by the physician leads to improved clinical decision making, treatment plans, and patient compliance in the setting of a shared decision-making relationship.

2.3.3. The Component of Communication

In the spirit of the themes of confluences and reciprocities discussed throughout this perspective, the confidence of the patient in the physician can occur only through the art of communication between both parties. Communication is a learned skill affected by many factors, including verbal and non-verbal elements. Comparable to the ingredients of trust and empathy, communication between the physician and patient is multidimen-

sional and complex in its behavioral, psychological, and cultural components. In tandem with the benefits of empathy, research supports effective communication as contributing to successful diagnoses and treatment of medical conditions [33]. Moreover, the most powerful diagnostic tool available to the physician is still age-old communication as the majority of information needed to make a diagnosis is often provided by the patient. Best practices and societal guidelines have now been published over the last decade, addressing communication as integral to the relationship between the physician and the patient [34,35]. Viewed from a different angle, communication can be construed as the cohesive factor linking both trust and empathy in the overall care of the patient in the context of shared decision making. The essential foundation of communication was undoubtedly implied by a passage written in the early 1990s by the therapist Deborah Rotter in ascribing great value to the patient's unique knowledge base (as the bearer of the disease process) as being just as important as the physician's medical knowledge such that "the medical visit is truly a meeting between experts" [36].

2.4. Neurobiological, Psychosocial, and Behavioral Components of Clinical Practice

2.4.1. Overview

Apart from the "mechanistic" analysis of clinical decision-making processes, the human elements provide their true underpinnings and foundation. A growing field of study is now exploring neuroscientific and neurobehavioral correlates involved in the physician–patient relationship and the ultimate results and outcomes of medical treatments. From a neurobiological point of view, a social–neural system has been proposed, which has evolved over the millennia (similar to our cellular–humoral immune system) as a defense and protective mechanism supporting the survival of man [37]. As such, and separate from the wonders of modern-day medical science, the mere "ritual" of the "therapeutic act" may result in responses equal to or even greater than the biological effects of the medications and procedures themselves [37]. These non-pharmacological (placebo) effects, in my opinion, may or may not be operative in physician–patient relationships or possibly in varying levels in tandem with the true pharmacologic treatments. However, the study of the activation and inactivation of neurochemicals and regions of the brain based on the physician's words, behaviors, and overall perception by the patient opens the door to an intriguing field of study to complement the "hardcore" physiological, biological, and medical sciences.

2.4.2. Specific Examples of Neuroscientific Findings

Although a "fledgling" scientific field, specific findings will be enumerated, which serve as springboards for ongoing research:

- The thickness of the left caudal anterior cingulate cortex was found to be inversely correlated with patients' trust in physicians using structural magnetic resonance imaging (MRI) [38]. Furthermore, using interactive functional near-infrared spectroscopy of both physicians and patients exhibiting a high level of trust in each other revealed increased inter-brain synchronization in the bilateral tempo-parietal junction and right inferior frontal gyrus [39].
- Functional MRI (fMRI) neuroimaging studies of physicians administering anesthesia to patients undergoing experimentally induced pain revealed the activation of the medial frontal brain regions [40]. More recent similar studies by the same group demonstrated the activation of additional brain regions of the physicians, including the right ventrolateral and dorsolateral prefrontal cortices [41].
- More intricate recent studies were conducted, consisting of interacting whole-brain mapping and fMRI of physicians administering anesthesia to patients during experi-

mentally induced acute and repetitive (chronic) pain stimuli. Significant brain-to-brain concordance with the dynamic coupling of brain nodes was demonstrated among physicians and patients (both of which with previously established rapport) [42].

- As per a systematic review of fMRI studies, the recently discovered mirror neuron system of specific areas of the brain appears to be important in establishing the basis for empathy: ventral premotor cortex, parietal and somatosensory areas, and limbic and paralimbic structures [43]. The mirror neuron system is a group of specialized neurons that fire when an individual is performing an activity, and it also fires in the same pattern when the same individual observes another person performing the same previous activity (as if the observer was performing the activity again). This neuronal system is also implicated in neurocognitive functions and neuropsychiatric disorders [44].
- The neuroendocrine system has also been implicated in correlates in the physician–patient relationship as manifested by fluctuations in the secretion of stress hormones (cortisol and epinephrine) as opposed to those secreted during "peaceful" activities (oxytocin) [45]. In fact, field-labeled socio-physiology is developing, which involves the associations between social behavior and physiology in multiple areas of medicine.

2.4.3. The Expanding Field of Placebo Research

A fascinating area of research involves that of placebo and nocebo effects, that is, the results of patients' positive and negative expectations, respectively, regarding a medication, procedure, or treatment [46]. The literature concerning this topic is vast, with multiple approaches proposed in its analysis and ongoing study. Neuroscientific evidence supports multiple complex brain systems and neurochemical mediators, which are actively being discovered as underlying the placebo effect [47–49]. A recent meta-analysis shows that parts of the thalamus, somatosensory cortex, and basal ganglia are key for the placebo effect to occur [50]. Psychosocial research posits that the placebo effect is based on and evoked by psychological processes, which are shaped by the contextual elements of social effects and the environment [51,52]. The effective application of the placebo effect in the contexts of clinical decision making and the physician–patient relationship has been advocated by multiple authors, although much remains to be learned regarding its neuroscientific basis [52,53]. In fact, the placebo effect is a compelling ingredient for the therapeutic milieu if harnessed properly. Interestingly, behavioral studies performed on physicians themselves demonstrated their liberal use of placebo techniques on their own patients, particularly if the former underwent tutorials regarding the benefits of placebo and if the patients themselves reported positive results from previous placebo treatments [54]. My perspective addresses this topic from another angle, that is, the grooming of a trusting, empathic, and communicative relationship in the setting of shared decision making is a powerful adjunct to the plan between physicians and patients based on medical science. The positive effect of each of these qualities in the activity of human interaction is intuitive and supported by many years of research. On the other hand, and in a broader neuroscientific sense, it can also be argued that trust, empathy, and communication may employ placebo neural pathways and patterns in the attainment of positive outcomes, although this requires further clarification and study.

2.5. The Essential Role of the Physician–Patient Relationship for the Effectuation of Advanced Clinical Decision Making

2.5.1. Interrelationships Between Paradigms of Clinical Decision Making and the Physician–Patient Relationship: The Secondary Analysis

In many ways, the models of physician–patient relationships parallel and are contingent on those of the clinical decision-making processes. I wish to posit a compelling

argument that the bond between physicians and patients is the ultimate catalyst and effectuator for advanced clinical decision making to achieve fruition in optimal patient care. As asserted throughout this perspective, advanced clinical decision making and the physician–patient relationship are predicated on each other. The sub-relationships involving the individual models of clinical decision making and those of the physician–patient relationship are discussed separately above and schematized in Figures 2–5, respectively. Please indulge my proposition of novel higher "secondary and tertiary levels of analysis", again from a "bird's eye view" (Figure 4). The secondary level of analysis implies that the clinical decision-making models and processes cannot occur without the physician–patient relationship, and conversely, the latter cannot function without the former. Thus, the "domains" of clinical decision making and the physician–patient relationship do not represent a polarized dialectic with opposing forces and purposes, but rather a workable synergy and confluence required for optimal patient care. I would posit an imperative and, in effect, symbiotic interconnection of the two, depicted by an analogy from the field of astrophysics—a "harmonization" between all the "liaisons" and "sub-liaisons" within both domains. As a result, clinical decision making and the physician–patient relationship cannot exist without each other.

From a practical, pragmatic, and personal perspective, the existential aspects of a partnership between physicians and patients are manifested by mutual engagement in the framework of shared decision making in the analysis and execution by each party, as guided by the models of clinical decision making. The physician–patient relationship, therefore, has a large impact and influence on the models and processes of clinical decision making. Inversely, and in a similar fashion, the models/processes of clinical decision making will have a large impact and influence on the ensuing models and methods of interaction between physicians and patients. As schematized, the secondary analysis is, therefore, the determination from inductive reasoning that both domains of clinical decision making and the physician–patient relationship must interact with each other in order for each domain to function properly.

2.5.2. Clinical Examples of the Secondary Analysis

Real-life demonstrations of the proposed secondary analysis are rife in my practice. The models/processes contributing to clinical decision making (Participatory/Shared Decision Making, Evidence-Based, Rational, and Intuitive) will primarily affect the ensuing type of relationship between physicians and patients. Inversely, the type and character of the interaction between physicians and patients will primarily determine the model(s) that will be utilized in the decision-making process in the care of the patient. Therefore, clinical decision making will be affected based on the type of alliance between physicians and patients (Shared Decision making, Counselor/Interpretive, Consumerism/Informative, or Paternalism). In effect, the secondary analysis postulates that clinical decision making and the physician–patient relationship are tightly knit and thus reciprocally vitalized and energized by each other.

As cases in point, there are numerous examples of scenarios in which the models of clinical decision making will primarily affect the physician–patient relationship. With the advent of "cybermedicine", many patients are now conducting research on their own health issues via digital media and often proactively proceed with their own literature searches (complete with highlights and side notes). Typically, these patients are very interested in a collaborative interchange, including my ongoing opinions and feedback, without the intention of creating barriers to communication. As a result of these frequent occurrences, the clinical decision-making process that ensues is predominantly based on the Participatory/Shared Decision-Making Model and will most often lead to a relationship that is also predominantly based on shared decision making. On the other hand, another varying illustration would be a decision-making process based principally on evidence, which may

lead primarily to a more consumerism/informative relationship between physicians and patients. In this case, the patient will often clarify their wishes for a decision-making process based primarily on up-to-date studies, trials, and societal guidelines without the desire for a true rapport or my personal input based on experience. Although this type of clinical decision-making model/process is not my preference, I will seek to incorporate some elements of the other models in formulating the decisions in the treatment of the patient and conduct the interactions in an informative fashion. However, a decision-making process based more on reason may result principally in a relationship between physicians and patients that is more counselor/interpretive in nature. In this case, assistance would be given to the patient in the clarification of their own thoughts and value systems (without my personal preferential input), which would then lead to the particular course of action. In sum, the above examples of my relationships with patients are shaped and take greater form and purpose predicated on the processes of decision making themselves.

The secondary analysis also consists of a reciprocation such that the type of operative physician–patient relationship primarily leads to and determines the model/process of clinical decision making. Correspondingly, multiple scenarios in clinical practice also shed light on this dynamic. As cases in point, if a shared decision-making relationship predominates, the model of clinical decision making in arriving at medical plans would most likely be based on that of Participatory/Shared Decision Making (although it may also include elements of the other three in various proportions). However, a consumerism/informative relationship may primarily result in an evidence-based and rational process of decision making. A counselor/interpretive alliance (although strong and collaborative) would likely and, in a similar fashion, primarily result in evidence-based and rational processes of clinical decision making. A Paternalistic Model has become quite rare in modern-day clinical medicine, although it may be appropriate in isolated situations. This may prevail when the physician is treating close family members or if a close relationship has been present for many years between the physician and the patient and family members. In these cases, the patient may not wish or be able to express their overriding preferences regarding the processes of arriving at decisions; therefore, the ensuing decision-making models may consist of a combination of evidence-based, rational, and possibly intuitive ones.

2.5.3. The Tertiary Analysis

The tertiary analysis in this construct reveals the critical nature of the physician–patient relationship as obligatory for the effectuation of advanced clinical decision making (Figure 6). In my opinion, the bond founded primarily upon shared decision making (although also including elements of the other models) gives the necessary energy and impetus for the process of clinical decision making to be translated into the treatment plan and overall care of the patient. The relationship is thus the metaphorical filter through which clinical decision making is distilled, crystallized, and activated in the care of patients. This tertiary analysis illustrates the critical importance of the physician–patient relationship for the analysis, interpretation, and ultimate translation of the models and precepts of clinical decision making. The conveyance of the information resulting from the decision-making process is afforded by the alliance of the physician and the patient, leading to its grasping, assimilation, and ultimate incorporation into the treatment plan. As highlighted in this perspective, both the processes of clinical decision making and the relationships between the physician and the patient are intertwined and actualize their constructs through each other. Moreover, in the simplest of terms, my perspective and opinion are that the pathway of decision making in the clinical arena is based on, and must "travel through", the existence of a strong bond between physician–patient based on mutual respect and collaboration.

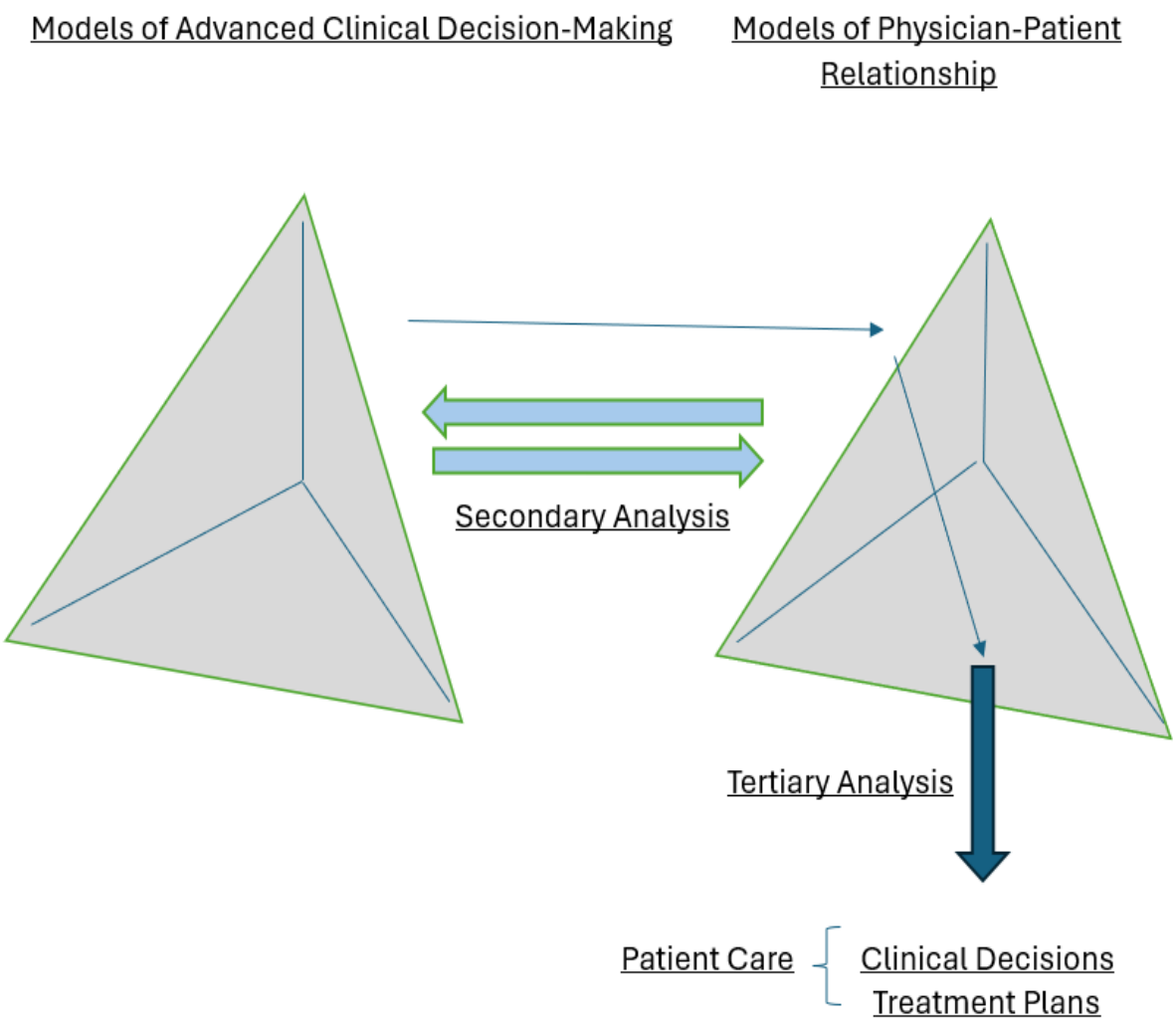


Figure 6. Interrelationships between Paradigms.

3. Conclusions

In summary, the complexities of advanced clinical decision making and the physician–patient relationship are interwoven amidst the multitude of interconnections and reciprocal relationships and sub-relationships detailed in this perspective. From my point of view, the resolute application of paradigms predominantly founded upon shared decision making within the domains of clinical decision making and the physician–patient relationship secures the most favorable results. Our modern-day digital era of mass-media "biomedicalization" is progressively impacting the terrain of healthcare, thus further necessitating a solid alliance between physicians and patients in the execution of the decision-making processes. The likelihood of successful medical outcomes is increasingly predicated on sound and robust practices within the clinical decision-making arena, filtered through robust collaborative interactions between the physician and the patient. These activities, including all their nuances and inherent challenges, will lead to the goal of optimal patient care in today's ever-complex medical and technological landscape. In conclusion, the practice of medicine is a delicate balance of art and science, which should be nurtured and groomed by trust, empathy, and communication between physicians and patients.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The author wished to thank his cherished son and wife, Matthew and Laleh Musio, for the exceptional technical assistance and inspiration to complete this article.

Conflicts of Interest: There are no conflicts of interest.

References

1. Fiore, J.A.; Madison, A.J.; Poisal, J.A.; Cuckler, G.A.; Smith, S.D.; Sisko, A.M.; Keehan, S.P.; Rennie, K.E.; Gross, A.C. National health expenditure projections, 2023–2032: Payer trends diverge as pandemic-related polices fade. *Health Affairs* **2024**, *43*, 910–921.
2. Rodziewicz, T.L.; Houseman, B.; Hipskind, J.E. *Medical Error Reduction and Prevention*; StatPearls Publishing: Treasure Island, FL, USA, 2024. Available online: https://www.ncbi.nlm.nih.gov/books/NBK499956/ (accessed on 9 September 2024).
3. Kovacs, G.; Croskerry, P. Clinical decision making: An emergency medicine perspective. *Acad. Emerg. Med.* **1999**, *6*, 947–952. [CrossRef] [PubMed]
4. Trimble, M.; Hamilton, P. The thinking doctor: Clinical decision making in contemporary medicine. *Clin. Med.* **2016**, *16*, 343–346. [CrossRef] [PubMed]
5. Croskerry, P. A model for clinical decision-making in medicine. *Med. Sci. Educ.* **2017**, *27*, 9–13. [CrossRef]
6. Djulbegovic, B.; Elqayam, S.; Dale, W. Rational decision making in medicine: Implications for overuse and underuse. *J. Eval. Clin. Pract.* **2018**, *24*, 655–665. [CrossRef]
7. Bate, L.; Hutchinson, A.; Underhill, J.; Maskrey, N. How clinical decisions are made. *Br. J. Clin. Pharmacol.* **2012**, *74*, 614–620. [CrossRef]
8. Gaddis, G.M.; Greenwald, P.; Huckson, S. Toward improved implementation of evidence-based clinical algorithms: Clinical practice guidelines, clinical decision rules, and clinical pathways. *Acad. Emerg. Med.* **2007**, *14*, 1015–1022.
9. Harteis, C.; Morgenthaler, B.; Kugler, C.; Ittner, K.P.; Roth, G.; Graf, B. Professional competence and intuitive decision making: A simulation study in the domain of emergency medicine. *Vocat. Learn.* **2012**, *5*, 119–136. [CrossRef]
10. Thomas, E.; Bass, S.B.; Siminoff, L.A. Beyond rationality: Expanding the practice of shared decision making in modern medicine. *Soc. Sci. Med.* **2021**, *277*, 113900. [CrossRef]
11. Fraenkel, L.; McGraw, S. What are the essential elements to enable patient participation in medical decision making? *J. Gen. Intern. Med.* **2007**, *22*, 614–619. [CrossRef]
12. Frosch, D.; Kaplan, R.M. Shared decision making in clinical medicine: Past research and future directions. *Am. J. Prev. Med.* **1999**, *17*, 185–294. [CrossRef]
13. Bomhof-Roordink, H.; Gärtner, F.R.; Stiggelbout, A.M.; Pieterse, A.H. Key component of shared decision making models: A systemic review. *BMJ Open* **2019**, *9*, e031762. [CrossRef] [PubMed]
14. van Dam, H.A.; Van der Horst, F.; Van den Borne, B.; Ryckman, R.; Crebolder, H. Provider-patient interaction in diabetes care: Effects on patients' self-care and outcomes. *Patient Educ. Couns.* **2003**, *51*, 17–28. [CrossRef] [PubMed]
15. Ward, M.M.; Sundaramurthy, S.; Lotstein, D.; Bush, T.M.; Neuwelt, C.M.; Street, R.L., Jr. Participatory patient-physician communication and morbidity in patients with systemic lupus erythematosus. *Arthritis Rheum.* **2003**, *49*, 298–306. [CrossRef] [PubMed]
16. Parsons, T. Illness and the role of the physician—A sociological perspective. *Am. J. Orthopsychol.* **1951**, *21*, 452–460. [CrossRef]
17. Nelson, O. Doctor-patient relationship. In *The Wiley Blackwell Companion to Medical Sociology*; Cockerham, W.C., Ed.; John Wiley & Sons Ltd.: New York, NY, USA, 2021. [CrossRef]
18. Veatch, R.M. Models for ethical medicine in a revolutionary age. What physician-patient roles foster the most ethical relationship? *Hastings Cent. Rep.* **1972**, *2*, 5–7. [CrossRef]
19. Emanuel, E.; Emanuel, L. Four models of the physician-patient relationship. *JAMA* **1992**, *267*, 2221–2226. [CrossRef]
20. Hellin, T. The Physician-Patient Relationship: Recent Developments and Changes. *Haemophilia* **2002**, *8*, 450–454. [CrossRef]
21. Stewart, M. Effective Physician-Patient Communication and Health Outcomes: A Review. *Can. Med. Assoc. J.* **1995**, *152*, 1423–1433.
22. Lee, Y. Linking patients' trust in physicians to health outcomes. *Br. J. Hosp. Med.* **2013**, *69*, 28040. [CrossRef]
23. Schoenthaler, A.; Kalet, A.; Nicholson, J.; Lipkin, M., Jr. Does Improving Patient-Practitioner Communication Improve Clinical Outcomes in Patients with Cardiovascular Diseases? A Systemic Review of the Evidence. *Patient Educ. Counsel.* **2014**, *96*, 3–12. [CrossRef]
24. Lee, S.J.; Back, A.L.; Block, S.D.; Stewart, S.K. Enhancing physician-patient communication. *ASH Educ. Program* **2002**, *2002*, 464–483. [CrossRef] [PubMed]
25. Pearson, S.D.; Raeke, L.H. Patients' trust in physicians: Many theories, few measures, and little data. *J. Gen. Intern. Med.* **2000**, *15*, 509–513. [CrossRef] [PubMed]

26. Dang, B.N.; Westbrook, R.A.; Njue, S.M.; Giordano, T.P. Building trust and rapport early in the new doctor-patient relationship: A longitudinal qualitative study. *BMC Med. Educ.* **2017**, *17*, 32. [CrossRef] [PubMed]
27. Haribhai-Thompson, J.; McBride-Henry, K.; Hales, C.; Rook, H. Understanding of empathic communication in acute hospital settings: A scoping review. *BMJ Open* **2022**, *12*, e063775. [CrossRef] [PubMed]
28. Arshad, M.; Sriram, S.; Khan, S.; Gollapalli, P.K.; Albadrani, M. Mediating role of physician's empathy between physician's communication and patient's satisfaction. *J. Fam. Med. Prim. Care* **2024**, *13*, 1530–1534. [CrossRef]
29. Gerger, H.; Munder, T.; Kreuzer, N.; Locher, C.; Blease, C. Lay perspectives on empathy in patient-physician communication: An online experimental study. *Health Comm.* **2024**, *39*, 1246–1255. [CrossRef]
30. Howick, J.; Moscrop, A.; Mebius, A.; Fanshawe, T.R.; Lewith, G.; Bishop, F.L.; Mistiaen, P.; Roberts, N.W.; Dieninytė, E.; Hu, X.Y.; et al. Effects of empathic and positive communication in healthcare consultations: A systemic review and meta-analysis. *J. R. Soc. Med.* **2018**, *111*, 240–252. [CrossRef]
31. Hojat, M.; Louis, D.Z.; Markham, F.W.; Wender, R.; Rabinowitz, C.; Gonnella, J.S. Physicians' empathy and clinical outcomes for diabetic patients. *Acad. Med.* **2011**, *86*, 359–364. [CrossRef]
32. Rakel, D.; Barrett, B.; Zhang, Z.; Hoeft, T.; Chewning, B.; Marchand, L.; Scheder, J. Perception of empathy in the therapeutic encounter: Effects on the common cold. *Patient Educ. Couns.* **2011**, *85*, 390–397. [CrossRef]
33. Belasen, A.; Belasen, A.T. Doctor-patient communication: A review and a rationale for using an assessment framework. *J. Health Org. Manag.* **2018**, *32*, 891–907. [CrossRef]
34. American College of Obstetrics and Gynecologist. Effective Patient-Physician Communication. Committee Opinion (Committee on Patient Safety and Quality Improvement/Committee on Health Care for Underserved Women). Number 587. *Obs. Gynecol.* **2014**, *123*, 389–393. [CrossRef] [PubMed]
35. American Medical Association, Code of Medical Ethics. Chapter 1: Opinion Patient Physician Relationships. 2020. Available online: https://www.ama-assn.org/system/files/code-of-medical-ethics-chapter-1.pdf (accessed on 9 September 2024).
36. Rotter, D.; Hall, J. *Doctors Talking with Patients/Patients Talking with Doctors: Improving Communication in Medical Visits*; Greenwood Publishing Group (Auburn House Westport): Santa Barbara, CA, USA, 1992.
37. Benedetti, F. *The Patient's Brain: The Neuroscience Behind the Doctor-Patient Relationship*; Oxford University Press: New York, NY, USA, 2010.
38. Sadhu, M.; Jalalizadeh, B.; Fritz, A.; de Freitas Nicholson, T.; Garcia, R.; Lampley, S.; Rain, M.; Van Enkevort, E.; Brown, E.S. Trust in physicians and regional brain volumes: A population-based study. *Prim. Care Companion CNS Disord.* **2019**, *21*, 19m02461. [CrossRef] [PubMed]
39. Liu, Y.; Liu, Y.; Zhang, M.; Wang, P. Preserving trust in the doctor-patient interaction: Unveiling the interactive positive evolutionary process of doctor-patient trust though fNIRS evidence. *Res. Sq.* **2024**, *preprint*. [CrossRef]
40. Jensen, K.; Gollub, R.L.; Kong, J.; Lamm, C.; Kaptchuk, T.J.; Petrovic, P. Reward and empathy in the treating clinician: The neural correlates of successful doctor-patient interactions. *Transl. Psych.* **2020**, *10*, 17. [CrossRef]
41. Jensen, K.B.; Petrovic, P.; Kerr, C.E.; Kirsch, I.; Raicek, J.L.; Cheetham, A.; Spaeth, R.; Cook, A.; Gollub, R.L.; Kong, J.; et al. Sharing pain and relief: Neural correlates of physicians during treatment of patients. *Mol. Psych.* **2014**, *19*, 392–398. [CrossRef]
42. Ellingsen, D.M.; Isenburg, K.; Jung, C.; Lee, J.; Gerber, J.; Mawla, I.; Sclocco, R.; Jensen, K.B.; Edwards, R.R.; Kelley, J.M.; et al. Dynamic brain-to-brain concordance and behavioral mirroring as a mechanism of the patient-clinician interaction. *Sci. Adv.* **2020**, *6*, eacb1304. [CrossRef]
43. Derksen, F.; Bensing, J.; Lagro-Janssen, A. Effectiveness of empathy in general practice: A systemic review. *Br. J. Gen. Pract.* **2013**, *63*, e76–e84. [CrossRef]
44. Jeon, H.; Lee, S.H. From neurons to social beings: Short review of the mirror neuron system research and its socio-psychological and psychiatric implications. *Clin. Psychopharmacol. Neurosci.* **2018**, *16*, 18–31. [CrossRef]
45. Adler, H.M. The socio-physiology of caring in the doctor-patient relationship. *J. Gen. Intern. Med.* **2002**, *17*, 883–890. [CrossRef]
46. Colloca, L. The placebo effect on pain therapies. *Annu. Rev. Pharmacol. Toxicol.* **2019**, *59*, 191–211. [CrossRef]
47. Colloca, L.; Barsky, A.J. Placebo and nocebo effects. *N. Engl. J. Med.* **2020**, *382*, 554–559. [CrossRef] [PubMed]
48. Wager, T.D.; Atlas, L.Y. The neuroscience of placebo effects: Connecting context, learning and health. *Nat. Rev. Neurosci.* **2015**, *16*, 403–418. [CrossRef] [PubMed]
49. Benedetti, F. Placebo and the new physiology of the doctor-patient relationship. *Physiol. Rev.* **2013**, *93*, 1207–1246. [CrossRef] [PubMed]
50. Zunhammer, M.; Spisák, T.; Wager, T.D.; Bingel, U. Meta-analysis of neural systems underlying placebo analgesia from individual participant fMRI data. *Nat. Comm.* **2021**, *12*, 1391. [CrossRef]
51. Zion, S.; Crum, A.J. Mindsets matter: A new framework for harnessing the placebo effect in modern medicine. *Int. Rev. Neurobiol.* **2018**, *138*, 137–154.
52. Testa, M.; Rossettini, G. Enhance placebo, avoid nocebo: How contextual factors affect physiotherapy outcomes. *Manual. Ther.* **2016**, *24*, 65–74. [CrossRef]

53. Carlino, E.; Pollo, A.; Benedetti, F. The placebo in practice—How to use it in clinical routine. *Curr. Opin. Support Palliat. Care* **2012**, *6*, 220–225. [CrossRef]
54. Piedimonte, A.; Volpino, V.; Campaci, F.; Borghesi, F.; Guerra, G.; Carlino, E. Placebos in healthcare: A behavioral study on how treatment responsiveness affects therapy decisions in a simulated patient-physician interaction. *Clin. Pract.* **2024**, *14*, 2151–2165. [CrossRef]