




CROSS-CUTTING EDGE

Seeking medical wisdom: Development of a physician-defined practical model of wise competence

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Abstract

Purpose: Medical practice is complex, ambiguous and dynamic. It requires more than technical knowledge; it necessitates the application of wisdom. Unfortunately, integration of the wisdom construct into established U.S. medical competency frameworks has been difficult. This study explored this interdisciplinary problem by investigating how academic physicians define medical wisdom (MW) and discern barriers and facilitators to such integration.

Method: Investigators conducted in-depth, semi-structured interviews with 19 faculty physicians at 3 U.S. academic medical centres. They probed physicians' definitions of MW and perceived barriers and facilitators to the development of MW. Interview data were analysed using thematic analysis (TA). TA results and insights from non-medical models of wisdom and complex problem-solving supported the creation of a model of MW. Polarity mapping of the moral economies of medical wisdom and medical science was utilized to clarify the challenges and opportunities of integrating these two philosophically distinct paradigms.

Results: TA of transcripts suggests physicians understand MW as consisting of interactions between 3 core components: adaptive capacity, values and technical knowledge. This finding and insights on their integration derived from non-medical models of wisdom supported the creation of a tripartite model of medical wisdom (TMMW) with features of complex adaptive systems (CAS). Polarity mapping of the moral economies of medical wisdom and medical science highlighted differences in assumptions, values and practices between the two paradigms. Barriers and facilitators identified through TA reinforced the relevance of these differences to difficulties in incorporating wisdom into established medical competency frameworks.

Conclusions: Wise competence is the ability to integrate medical knowledge with clinical context and patient wishes to deliver patient-centered care. The TMMW offers a mental model of such integration with features of CAS and a critical role for metacognition. Introduction of MW models into established competency frameworks may benefit from explicit acknowledgement of each paradigm's underlying moral economies.

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1 | INTRODUCTION

There is growing recognition that the American health care system is troubled by fragmentation that unfavourably affects the quality, cost and utilization of services and that these problems arise from a failure to account for complexity in the system.^{1,2} Despite this, established frameworks of medical competency in the U.S. generally enumerate individual competencies often without adequate attention to the integrated complex problem-solving skills necessary for real-world practice.^{3,4}

Extant models of wisdom seek to address system fragmentation. They emphasize broad and deep knowledge, insight into complex life matters supported by metacognitive competencies (e.g., context adaptability, epistemic humility), and moral aspirations (e.g., compassion, common-good orientation).⁵

The role of wisdom in medical practice has been a focus of significant scholarship.^{6–29} Although most studies connect medical wisdom with the concept of practical wisdom, in defining wise practice, they often emphasize different dimensions of patient care. Kaldjian emphasizes the identification of worthy goals and a commitment to moral principles as core elements of practical wisdom.⁶ Paes highlights complex decision-making in his understanding of practical wisdom.⁷ Cosgrove describes practical wisdom as the judicious application of evidence as opposed to strict adherence to guidelines in primary care practice.⁸

Unfortunately, efforts to *apply* these findings in American medical education have been hindered by conceptual differences between wisdom's integrated view of capabilities and the reductionist structure of prevailing medical education competency frameworks. As a consequence, “wise practice” interventions remain focused on individual competencies or define them in terms too general for meaningful application in professional development. The American Board of Internal Medicine's (ABIM) “Choosing Wisely” campaign focuses on technical decision-making without addressing other areas such as ethical decision-making, epistemic values and adaptive behaviour.³⁰ Plews-Ogan studies the development of personal wisdom through the experience of medical errors, but does not explore a broadly applicable definition of *medical* wisdom.³¹ Kaldjian encourages us to consider five core elements of practical wisdom but does not propose a model that integrates them or applies them to established medical competency frameworks.⁶

One hypothesis for difficulty reconciling the conceptual *paradigm* of wisdom with the established paradigm of medical competence is that the two are *incommensurable*. The terms “paradigm” and “incommensurable” originate from the philosophy of science³² but are increasingly used by cross-disciplinary researchers to describe taxonomic, methodologic and philosophic tensions that pose barriers to interdisciplinary work.³³ We define “paradigm” as a set of exemplars shared by a community and “incommensurable” as a *relative* difficulty with the transferability of assumptions, epistemic values and methods from one paradigm to another due to their incongruence.^{34,35} According to this argument, integration of medical wisdom into American competency frameworks may be difficult

because the epistemic values of medical science (e.g., precision, reproducibility) are not easily reconciled with those of practical wisdom (e.g. integration, contextual relevance).

Although most would acknowledge paradigm incommensurability poses challenges, some proponents of boundary-crossing research argue that it is also an important *tool*.³³ If value systems contribute to disciplinary boundaries and reflect their depth and structure,³² understanding the “terrain” of any incommensurability is essential to the success of interdisciplinary activities. From this perspective, constructive “integration” of wise capabilities with established medical competency frameworks may not require a full reconciliation of the medical wisdom and medical science paradigms. Instead, a conceptual map of the two paradigms' borders and intervening topography may suffice.³⁶ One advantage of this approach is its support of meaningful dialogue between two paradigms without abandoning irreconcilable but essential features of either paradigm.³⁷

We seek to construct a practical, physician-informed model of medical wisdom capable of dialogue with established medical education competency frameworks. In this study, we aim to (1) thematically understand how academic physicians define medical wisdom and perceive barriers and facilitators to the conceptualization of “wise competence”, (2) reconstitute the results of this thematic analysis into a structural model of medical wisdom and (3) map the incommensurability between wise practice and clinical competence as defined by medical science. A clearer understanding of these relationships may further clarify the characteristics of wise competence and offer direction to its application in American medical education.

2 | METHODS

We conducted one-on-one semi-structured interviews with participants; we then used thematic analysis (TA) to analyse interview data, engaged in model development and pursued polarity mapping.^{36,38–41} The University of Chicago Institutional Review Board approved this study (IRB #19-0796). All participants gave informed consent. All methods were carried out in accordance with relevant guidelines and regulations. This report conforms to Standards for Reporting Qualitative Research guidelines.⁴²

2.1 | Setting and participants

Faculty physicians from the Departments of Medicine at the University of Chicago, University of Washington and Stanford University were recruited to participate. We randomly selected interview candidates from a pool of 146 faculty who had completed a prior survey about professional identity formation and had agreed to be contacted for a follow-up interview. In summer 2021, we invited 104 faculty members by email to participate in this study. Recruitment was discontinued after 19 interviews. Given the comprehensive nature of the protocol and the explanatory richness of the interviews, this sample provided sufficient information power for

TABLE 1 Characteristics of 19 interviewees from a qualitative analysis of physicians' understanding of medical wisdom.

Participant characteristic	No. (%)
Gender	
Male	8 (42)
Female	11 (58)
Race/ethnicity	
White	12 (63)
Black or African American	1 (5)
Asian	6 (32)
Age range	
30–39	2 (11)
40–49	7 (37)
50–59	5 (26)
60–69	5 (26)
Career type	
Clinician	2 (11)
Clinician–educator	8 (42)
Clinician–scientist	1 (5)
Clinician–leader or administrator	8 (42)

identifying a robust set of themes.^{43,44} Characteristics of these participants are displayed in Table 1.

2.2 | Interview procedure

An interview guide was developed by the study team (N.M.W., PhD, psychologist researcher with expertise in wisdom; W.W.L. and J.N.W., both physicians and student affairs deans; and J.M., medical student) based on background literature. The guide was piloted with one faculty member at the University of Chicago; input was incorporated into the final interview guide. J.M. conducted all interviews via videoconferencing between June and September 2021.

Semi-structured interviews began with a brief description of the study and its aims. Prompts covered five topics: the definition of medical wisdom; situations that require wisdom in medical practice; factors that support wisdom development; barriers to wisdom development; and suggestions for interventions to support wisdom in medical education (see Supplemental Digital Appendix 1). In this report, we focus on the first two prompts but selectively include data from prompts 3 and 4 that directly refer to the conceptual integration of medical wisdom into accepted frameworks of medical *competency*; we plan to report the qualitative analysis of wisdom *development* (the last three prompts) separately. The protocol was structured to build rapport before transitioning to topics participants may be more reluctant to discuss candidly. Interviews ranged from 30 to 66 minutes in length. We compensated participants with a \$50 gift card. Interviews

were digitally recorded, transcribed and de-identified for analysis. J.M. reviewed the transcripts against the audio recordings to verify their accuracy.

2.3 | Thematic analysis

We analysed transcripts using TA³⁸ facilitated by the Dedoose software program.⁴⁵ Located within the broader qualitative analytic paradigm, TA is a flexible method that can be applied in various ways. We took an inductive approach to TA and adopted a semantic realist theoretical frame which assumes people's words are a direct reflection of their reality that can be interpreted for surface meanings. As a method, TA proceeds in six phases: familiarization; coding; searching for themes; reviewing themes; defining and naming themes; and writing the report. In the first two phases, all members of the study team reviewed four transcripts independently and then met to discuss their codes. They subsequently reviewed an additional two transcripts to refine code definitions before coding the remaining transcripts independently. Coders met regularly to discuss new codes until no new codes were identified. Through discussion, codes were collapsed into themes and subthemes. Discrepant themes identified in the analysis were retained and interpreted as tensions. J.M. conducted all interviews and reviewed transcripts independently coded by J.N.W., N.M.W. and W.W.L. to verify codes were reflective of the interview experience.

2.4 | Structural model development

We reconstituted the results of the TA into a structural model of medical wisdom by organizing themes into conceptual categories and then assembling these categories into a wisdom construct.^{40,41} This reconstitution process was informed by comparative analysis with two established models of wisdom and a model of complex adaptive systems.^{3,46,47} Model development was further influenced by insights from one investigator with expertise in the psychology of wisdom (N.M.W) and another with expertise in complex adaptive systems (J.N.W.).

2.5 | Polarity mapping of constructs

We utilized Polarity Thinking™ to map tensions between two pairs of constructs³⁶: (1) the moral economies of medical science versus medical wisdom and (2) established American medical competencies embedded in structural frameworks mandated by these two moral economies. Drawing from our TA and the literature, we identified common assumptions, values and practices embedded in the medical science and wisdom paradigms.^{6,48–51} It is not our intent to provide a systematic review of these paradigms; rather, the purpose of our paper is to highlight exemplars of the two paradigms to identify

tensions between an established conception of competency and wise practice. Barrier and facilitator themes were taken from the TA described above.

3 | RESULTS

3.1 | Thematic analysis

In our TA of interview transcripts, we identified language describing medical wisdom as an essential and pervasive element of patient-centered care. Comments suggested medical wisdom was seen as a complex construct combining medical knowledge with other human capabilities. Participants often emphasized the importance of this complex by describing the shortcomings of relying on medical knowledge alone in the provision of care.

You have to bring together a lot of different pieces and a lot of different experiences, because there isn't just a do this, this, and this. ... I guess I would add integration ... of different sources ... would be part of my definition of wisdom. —

Participant 1

Identified themes described a high level of dynamic integration within this complex construct. Manifestations of this integration included thematic tensions and synergies, for example, tension between “technical knowledge” and “humility” and synergy between “humility” and “retaining curiosity”. Many themes overlapped or blurred into each other, such as “emotional intelligence”, “perspective taking” and “empathy”.

So I think of wisdom as a confluence of knowledge, experience, discretion, and humility ... there's a component of experience to it of having run through something a number of times to see how it plays out. And then from that you learn how to fine tune it. —

Participant 7

Taken together, these themes describe medical wisdom as the integration of medical knowledge with ethical commitments and an intentional accounting of context. This deliberative view of medical wisdom shares many similarities with classic conceptions of practical wisdom (*phronesis*)⁴⁹ and is consistent with Kaldjian's emphasis on worthy goals and a commitment to moral principles.⁶

TA identified three categories of themes representing structural components of the medical wisdom complex: *technical knowledge*, *values* and *adaptive capacity* (Table 2, section A). TA suggested that technical knowledge is considered essential for medical practice, serving as a tool that facilitates practice, but by itself cannot account for the particulars of each patient's context and preferences.

TA suggested that wise practice is guided by core principles and standards of behaviour. These values included the desire to act upon

spiritual beliefs or to demonstrate compassion, altruism or courage. Values serve as a compass for the adaptive application of technical knowledge in the setting of complexity.

Many themes clustered in the category of adaptive capacity. These themes represent character traits and habits permitting growth and flexible responsiveness to complex environments. A sufficient number of themes were identified to divide them into three subcategories representing a response loop between the practitioner and the environment: *receptive*, *metacognitive* and *expressive adaptive capacities*. TA suggested that wise practitioners are highly receptive in that they are actively attentive to their environment. Such practitioners also have well-developed metacognition, often described as an awareness of one's own thinking processes. Completing the adaptive response loop, wise practitioners express their adaptive capacity through contextually appropriate responses. For example, participant comments indicated that nuanced communication skills and flexibility (being able to change one's response based on contextual change) were characteristics of wise practice.

Combined with themes outlining the general description of medical wisdom, the structural information offered by TA suggests medical wisdom is a highly integrated and dynamic construct with metacognitive capabilities that coordinate knowledge and values in problem-solving.

Three categories of themes were identified in participants' descriptions of situations requiring medical wisdom: *epistemological uncertainty*, *values-driven care* and *interpersonal subjectivity* (Table 2, section B). In situations characterized by high epistemological uncertainty, practitioners should be wary of certainty and question their understanding of the situation. In some situations, professional or personal values should be prioritized over rigid application of technical knowledge. In other situations, interpersonal subjectivity is an inherent component of the problem being solved; in such circumstances, wisdom is needed to guide interactions within the interprofessional team and in each patient encounter.

In response to questions about barriers and facilitators of wisdom development, investigators identified seven barrier and four facilitator themes directly related to the appropriate conceptualization of wise competence (Table 2, Section C). Barrier themes focused on a rigid overreliance on knowledge. Facilitator themes focused on humility and attention to capabilities other than knowledge.

TA of situations requiring wisdom and barriers to the proper conceptualization of wise competence offer insights into difficulties integrating wisdom with many established paradigms of medical competence. Findings suggest this relative incommensurability may arise from differences between the two paradigms regarding the types of problems being solved and approaches necessary to address those problems.

3.2 | Structural modelling of medical wisdom

Using the results of TA and comparisons to several non-medical models of wisdom and complex problem-solving, we crafted a model

TABLE 2 Results of thematic analysis of physicians' understanding of medical wisdom (MW): Thematic categories defining MW, situations requiring MW and barriers and facilitators to integrating wisdom into established competency frameworks.

SECTION A - Tripartite model of wisdom			Illustrative quotes
Technical knowledge			<p>"So medical wisdom ... requires significant knowledge. So ... to be wise as a physician, you need to have [a] very solid knowledge base."</p> <p>—Participant 12</p>
Values	Compassion/altruism		<p>"I feel like the wisdom there is that—talking to this person and understanding who they are a little bit and understanding that it may screw with their life a little bit to have something hanging over their head ... the wisdom there is going against the, strictly speaking, medical indication to do something because it's better for the patient."</p> <p>—Participant 13</p>
	Courage		<p>"[Wisdom is] some bravery to call it like it is ... like the courage of your conviction."</p> <p>—Participant 5</p>
	Spiritual beliefs		<p>"Wisdom is a figure that's used a lot including, including a personified figure in Judeo-Christian scriptures, wisdom is sort of one of the ... the faces or the avatars of God, in a sense. ... Wise clinical judgement ... also brings in a justice connotation as well and that part also is quite scriptural." —Participant 9</p>
Adaptive capacity	Receptive (afferent)	Emotional intelligence	<p>"[Wisdom] comes from your learned experience of talking to people and relating information and sensing body language and people's aptitude for understanding and where they are in their lives and what they want to hear and how they can understand things ... it's having that kind of wisdom to recognize other elements of the interaction other than just sort of the factual basis of the storyline or of the test results."—Participant 11</p>
		Empathy	<p>"I have gained a tremendous amount of insight I think through patient stories, and that helped me to view their presentation and their behaviour in the context of what is often just notably abuse and neglectful circumstances as they grew up and through life ... and I think that that allows me to approach the relationships and what sometimes can be difficult behaviour in a grounded neutral less judgmental way." —Participant 3</p>
		Perspective taking	<p>"It's using the things that you have learned over time and putting them into some sort of perspective to either help yourself or your patients." —Participant 13</p>
	Metacognition (central)	Contextual awareness	<p>"It's just very different to learn something in a—in a book or in a lecture, um, that's not in the real world, without context. And ... clinical training in medicine is where you start to actually encounter real, clinical situations where you take all that book-learning and lecture-learning and then you have context for it, and over multiple different instances of applying that in different contexts, you have a sort of a deeper understanding of what you learned." —Participant 18</p>
		Knowing oneself	<p>"I think good physicians know what they know what they do not know ... and defend against becoming egotistical or ever thinking that clinical decision making is about them as the physician as opposed to doing a service for the patient." —Participant 2</p>
		Epistemic humility	<p>"Wisdom is ... the ability to know what you do not know ... It's a kind of a strange thing to ... accumulate knowledge, but at the same time, realize some vast expanse you do not know." —Participant 16</p>
		Understand limits of technical knowledge	<p>"Knowing when to follow the rules and when the rules do not really apply in the situation—when it comes to medicine anyway. When the rules aren't really applicable to the situation you are looking at when you need to look elsewhere." —Participant 1</p>
		Accepting loss of control	<p>"And I think, [he] taught me the wisdom to be able to sit in sadness and in ambiguity and a little bit of helplessness, with patients and families. And I think he made me a much, much wiser physician, through that." —Participant 2</p>
	Expressive (efferent)	Nuanced communication	<p>"I think medicine ... is also distinct because you have wisdom about how to communicate with people, how to interact with people, ... that has an extra dimension that you might not have with just wisdom related to, um, a content area or a specific academic topic." —Participant 16</p>
		Flexibility	<p>"I think for me actually shifting jobs, uh, really helped me be less annoyed about small things ... I think of it as wisdom sort of become truly at peace with that, you know, I'm like, 'This is a part of the system. It is there for reasons that make sense and I just need to incorporate them into my practice and there's no sense in being frustrated.'"—Participant 17</p>

(Continues)

TABLE 2 (Continued)

SECTION B - Situations requiring wisdom		Illustrative quotes
Epistemological uncertainty	Real-world complexity	"I thought I was being the expert ... but in the nicest way possible she stopped me and said, 'I live in a neighbourhood that does not have sidewalks. And even if there were, I would not feel safe going for a walk in my neighbourhood.' That, that really taught me some humility, like I needed to step back and say you know what, I'm sorry. What type of movement would be helpful to you, what would you enjoy?" —Participant 7
	Contextually sensitive decisions	"There's some wisdom needed to help sort through how much is needed, how much is too much, and then sort of, you know, having that discernment about the medical piece." —Participant 9
	Medical dilemmas	"We take care of patients who have a limited life expectancy, and it requires a certain amount of wisdom I would think to think through when it's appropriate to be aggressive with diagnostics and therapeutics ..., it's really tough." —Participant 8
Values-driven care	Respect for patient autonomy	"During the course of my career I had the privilege of working with a lot of people with diabetes, and it was very common for me to see a patient with diabetes and to hear them recount prior encounters with ... another clinician [that] was trying to ... persuade them to do something, they did not want to do it. And they, they really came to a, to a stalemate, and the patient really felt like they had no choice but to go see care elsewhere." —Participant 6
	Integrity	"And I had to tell them ..., 'Yeah, we are supposed to be taking care of you, but we did this terrible thing. It's stuck, it might be an infection risk in the future, and there's nothing we can do about it. And we do not even know when it happened, and we are so sorry.'" —Participant 14
Interpersonal subjectivity	Complex interpersonal interactions	"Relationships amongst the various people who are caring for a patient are extremely complex ... in addition to the thoughts and the patient and their particular needs, values, and preferences, family members, etc. But that they need to be addressed in a way that is open, transparent, ethical so that the suffering for the person who is at the end of life can be minimized." —Participant 10
	Individualization/personalization	"I think there's also, you know, individual patient situations, lots and lots of them, where you have to decide what's the ... what to advise or how to approach something based on their wants and desires." —Participant 1
SECTION C - Barriers and facilitators to integrating wisdom into the concept of medical competence		Illustrative quotes
Barriers	Lack of commitment to growth	"Let us just move on and you move on to the next patient. And there's a little bit of an armour built up I think where people, if there's a bad outcome, do not reflect on it. 'Let us just move on to that you. You did all the right things. And let us just see the next patient. And I think it's hard, because I think systemically that's, that's sort of the culture that sort of built up.'" —Participant 13
	Mistaking technical knowledge for wisdom	"So you might look wise by saying we should do this ... but [it] does not actually build any skill or wisdom in that person." —Participant 5
	Intolerance of uncertainty	"I think there is a tradition like, you know you are graded on how well your answer ... Socratic questions that are asked on rounds. If you say well you know, it could be this this and this, and they are like oh that's not right, I want the one answer." —Participant 8
	Overemphasis on technical knowledge	"We have rare bird conferences, which people talk about these rare diseases they found ... we do not talk a lot about medical decision making and end of life care and morbidity and mortality, where mistakes were made. These are things that we do very little of, you know, there- I think there's a quarterly in the Department of Medicine Morbidity and Mortality Conference, you know what, four times a year. Versus a daily conference about rare birds." —Participant 13
	Culture of perfectionism	"There's this expectation that you are always going to perform at 100% always, that you are always going to know, that you are always the authority." —Participant 7
	Inflexible adherence to evidence	"There's some people that only want an article or only like 'show me the literature, show me that' ... 'But this article says this.'" —Participant 18
	Rigid thinking	"A lot of times people will say 'we are going to do it this way because that's the way I do it- that's why I say we are going to do it.'" —Participant 12
Facilitators	Knowing your limits	"You know, it's to embrace your mistakes and embrace your ignorance ... All of us want to be knowledgeable, to be seen as knowledgeable, and that's great. Obviously, knowledge is important ... I'm convinced that ignorance is more important. Because if you do not really understand what you do not know, how can you improve how can you learn? ... So saying 'I do not know but I'll find out,' or 'can you help me find out,' or whatever it is. But embracing ignorance, I think is just absolutely key, [not] just during training but all the way through life." —Participant 14

TABLE 2 (Continued)

SECTION C - Barriers and facilitators to integrating wisdom into the concept of medical competence		Illustrative quotes
Developing emotional intelligence		"I've been in medicine for a long time ... I think the openness to discussing how to self-improve has come a long way. The patient doctor relationship and patient doctor communication used to be either not mentioned, or mentioned very little, or discounted and laughed at. You know, it wasn't a part of my education at all. And so now, I think it'll be better, because we are talking about it more."—Participant 19
Identifying and affirming professional values		"How do you bring yourself to the table in being able to execute your work in the best way possible ... and it's more than being conscientious ... it's much more of an ethical moral commitment that demonstrates integrity that's brought to the process of being a physician ... There are different ways in which people can execute on this leaning that can bring wisdom to the table as they think about why they got into medicine in the first place."—Participant 10
Retaining curiosity		"You're curious. And you question. So that accumulated for 38–40 years is a real advantage when it comes to developing wisdom." – Participant 4

of medical wisdom (Figure 1, left). The Tripartite Model of Medical Wisdom (TMMW) is structured around three components of medical wisdom identified through TA: *technical knowledge*, *values* and *adaptive capacity*. Adaptive capacity's three subcategories are retained in the model, each representing portions of the response loop between the wise practitioner and the environment.

The TMMW shares significant homology with one of the most widely cited psychological models of wisdom, Ardel's three-dimensional wisdom model. Ardel's model is a tripartite model with cognitive (interest in complex understandings of situations), reflective (willingness to interpret situations from multiple perspectives) and compassionate (motivated to nurture the well-being of others) domains (Figure 1, right).⁴⁶ TMMW's broader "values" component adds to Ardel's compassion domain by accommodating other values integral to the wise practice of medicine such as epistemic values that promote rigour in decision-making, aesthetic values that facilitate relationships with patients, and a number of self-referential ethical values including integrity, excellence and responsibility.^{52–55} In addition, TMMW's adaptive capacity component builds on Ardel's reflective domain by outlining a clear role for "reflection on context" and offers key metacognitive themes to guide such reflection. TMMW also adds receptive and expressive elements of wisdom necessary for connecting metacognitive functions to a complex medical environment.

The TMMW shares similarity with models of complex problem-solving in fields as disparate as ancient Greek philosophy and complexity science. The Stoics described wisdom as the interplay of logic (sound application of reasoning), physics (informed view of the system and one's place in that system) and ethics (commitment to addressing the needs of the community) (Figure 1, right).⁴⁷ Though the content of these three "virtues" does not perfectly map to the TMMW, there is significant overlap, and the function of each element remains consistent. In each of the three tripartite wisdom models (the TMMW, Ardel's model of wisdom and the Stoic model of wisdom), one component serves as home to the metacognitive dimension of human reason, a second component represents knowledge of the

system at hand, and the third represents values that direct complex problem-solving.

A tripartite model of complex adaptive systems (CAS) recently developed in reference to medical practice shares homology with the TMMW and the models of wisdom mentioned (Figure 1, right). This model suggests that complex problem solving does not rely on control, but instead on A) the responsive interaction of system elements, B) informed by intrinsic characteristics of the elements and environment and C) guided by an "attractor" or a particular value.³ These three dimensions of CAS provide the system with contextually appropriate solutions to local perturbations and higher-level, emergent properties across the system. Through this lens, wisdom can be seen as a manifestation of CAS in human behaviour, one that allows humans to navigate complexity through integrated application of adaptive capacity (responsiveness), knowledge (tools/information) and values (attractor).³ The concept of CAS encourages one to extend the notion of wisdom to complex problem-solving pursued by teams and communities.^{3,56}

Comparative analysis of these models also demonstrates what is meant by system *integration*. CAS differ from technological systems in their dynamic integration. Whereas technologies are merely the sum of parts that interact mechanistically, components of CAS interact, change and respond to one another yielding context-appropriate responses to local perturbations. Dynamic and flexible interactions between components yield a system responsiveness that benefits problem-solving in complex environments such as healthcare.^{3,56}

The Stoic model of wisdom is illustrative here as well. Like our interview participants, the Stoics understood wisdom as the natural and irreducible *integration* of three virtues. As stated by the Stoic scholar Hadot: "For Stoics, the parts of philosophy are virtues which—like all virtues, in their view—are equal and mutually imply one another: to practice one of them is necessary to practice all of them."⁵⁷

Close examination of the TMMW discerns two levels of increasing integration. At the first level, medical competencies are clustered according to function within the three components of wisdom:

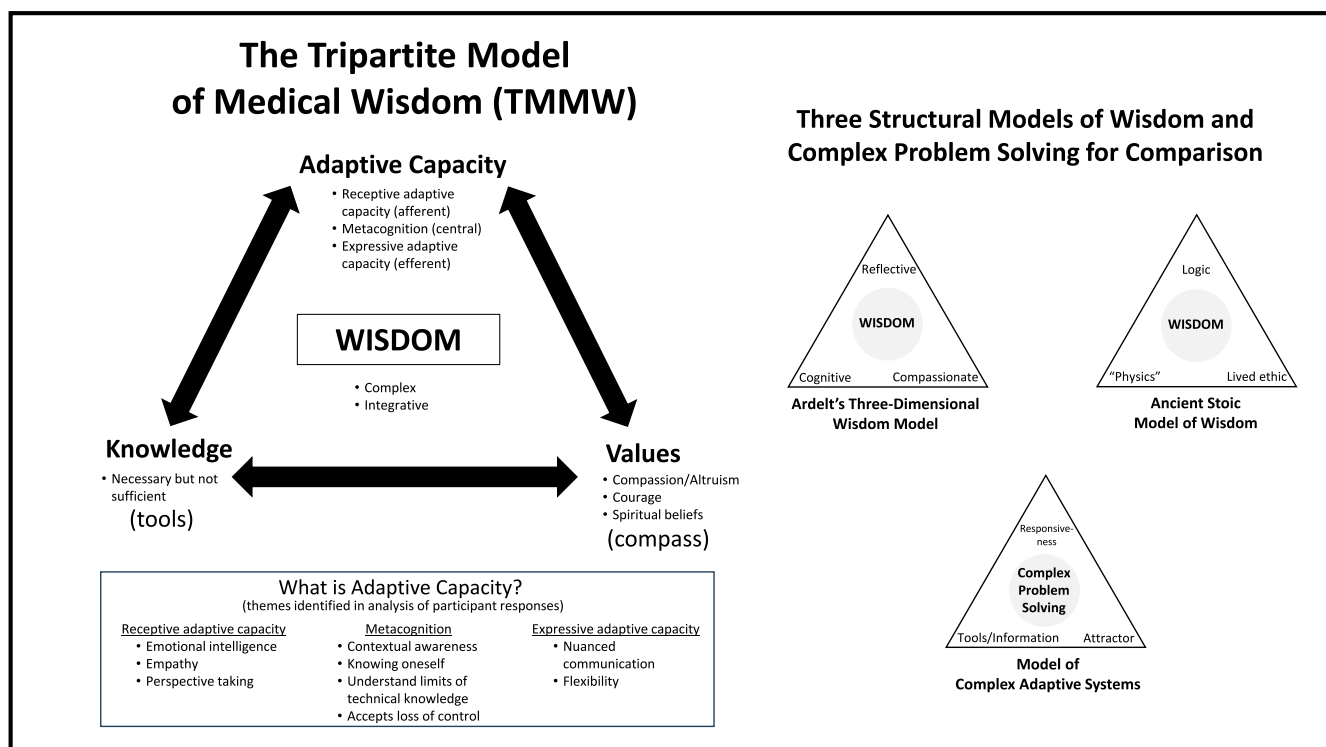


FIGURE 1 The tripartite model of medical wisdom (TMMW) depicts wisdom as a complex construct representing the integration of three core components: knowledge, values and adaptive capacity. Themes from the TA are grouped with each component (see inset for adaptive capacity). Three established structural models of wisdom and complex problem-solving share homology in content and organization with the TMMW strengthening support for the TMMW and offering insights on the adaptive and integrated nature of medical wisdom.^{3,46,47}

adaptive capacity, knowledge and values. On a second level, wisdom represents the integration of these three *interdependent* components. As occurs in CAS, the development and expression of each component is influenced by the others.⁵⁸ For example, small changes in context can lead to re-prioritization of values, shifts in the relevance of knowledge domains and substantial alterations in decision-making.

The TMMW offers a useful approach to understanding the structure of medical wisdom. But to more clearly characterize wise *competence*, it is essential to understand the moral terrain in which the TMMW resides.

3.3 | Polarity mapping of the moral terrain

Recent scholarship suggests that polarity mapping of apparent dilemmas, such as the one between *analytic* competencies and *holistic* performance, offers opportunities for optimization of complex problem-solving.^{36,59}

Figure 2 (upper half) displays a polarity map of selected assumptions, values and practices associated with the medical science paradigm^{48,50,51} versus those associated with the wisdom paradigm.^{6,49} Each set of paradigm-specific assumptions, values and practices can be described as a *moral economy*: “a web of affect-associated values” that outline “equilibrium points and constraints” on what is considered optimal practice.⁴⁸

The moral economy of medical science reflects *analytic* and predictive imperatives for the pursuit of “truth”, whereas that associated with the wisdom paradigm reflects *holistic* and adaptive imperatives appropriate for the pursuit of patient-centered “goods”. These differences are important as they impact one's conception of competence, and, consequently, may contribute to difficulties we experience incorporating the concept of wisdom into medical competency frameworks.

This explanation is reinforced by themes identified in our TA (Figure 2, centre). For example, TA identified modern medicine's “overemphasis on technical knowledge” and “intolerance of uncertainty” as *barriers*, and “epistemic humility” and the appreciation of human adaptive capabilities beyond knowledge as *facilitators* to the conceptualization of wise competence.

The contrast between medical science and medical wisdom's *moral economies* has implications for the problem-solving approaches of each economy (Figure 2 lower half). Medical science's *analytic* imperatives call for a well-defined competency framework structure, one that *resists integration* in favour of delivering specific, precise and reproducible measurement. The ACGME core competencies⁶⁰ (lower left), when structured as individual competencies linked to specific and measurable behavioural anchors, adhere to the *medical science moral economy*.

Wisdom's *holistic* imperatives call for a flexible competency framework that aims to deliver contextually relevant outcomes

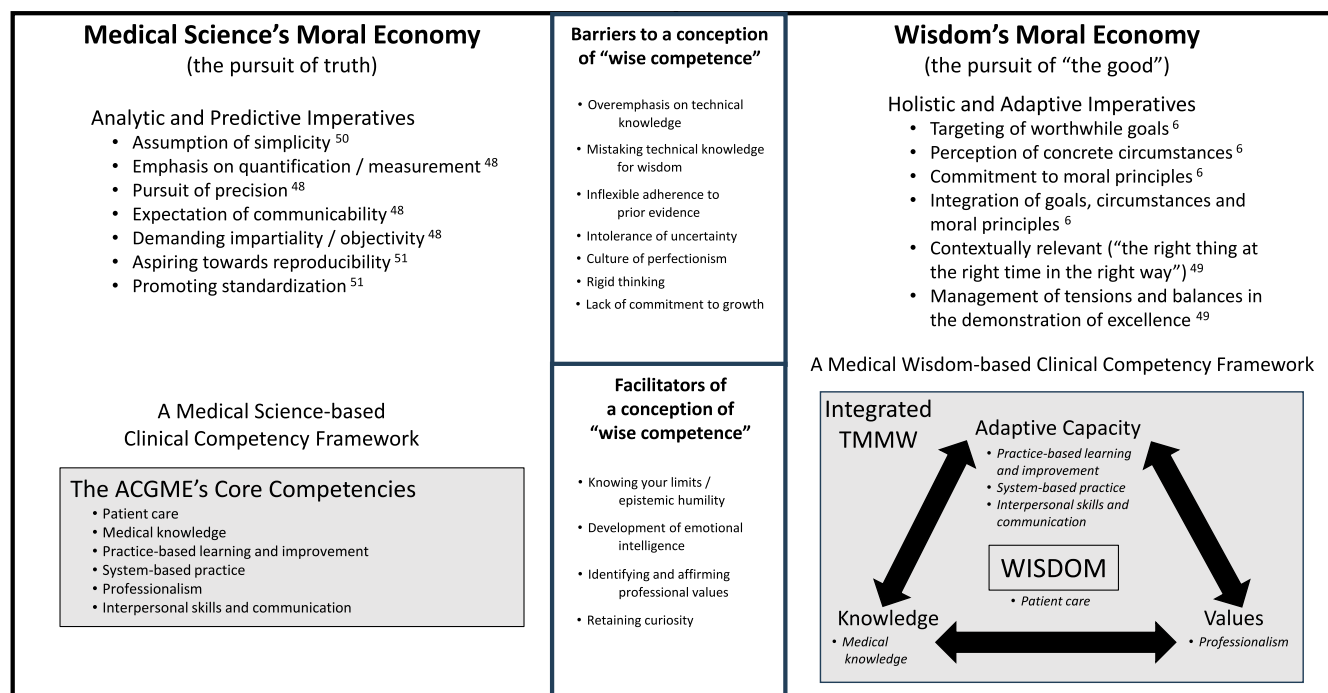


FIGURE 2 Differences in imperatives between the moral economies of medical science and medical wisdom offer philosophical resistance to the conception of "wise competence" (upper half of figure). Barriers and facilitators to the conception of "wise competence" identified by TA correspond to tensions between these two moral economies. The traditional ACGME competency framework organizes clinical competencies in a manner that supports the analytic and predictive imperatives of medical science (lower left). The integrated TMMW framework nests the ACGME competencies into a structure that better supports the holistic and adaptive imperatives of wisdom (lower right). Abbreviation: ACGME, Accreditation Council for Graduate Medical Education.⁶⁰

characterized by *nuanced integration* of goals, circumstances and moral principles. The integrated TMMW (lower right), representing a dynamic synthesis of the same six ACGME competencies, likewise, adheres to *medical wisdom's moral economy*.

This analysis illustrates a practical point regarding the role of moral economies in curriculum design. Ideally, moral economies dictate the structure of frameworks into which competencies are placed. Such frameworks can then serve as *mental models* for practitioners regarding "optimal" execution and coordination of competencies. When shared, these mental models may also enhance the performance of clinical teams and evaluation committees in their work.^{61,62}

4 | DISCUSSION

Having examined the relative incommensurability of the medical wisdom and medical science paradigms, we are better prepared to define the characteristics of wise competence.

In the Nicomachean Ethics, Aristotle measured the competence of a wise person by their capacity to "deliberate finely".⁴⁹ Such individuals were honoured for their ability to integrate knowledge with context and meaningful goals. Aristotle and others have acknowledged that, despite significant differences in methods for seeking the "truth" and achieving "the good", an integration of the two is essential for accomplishing worthy goods.^{18,49}

The integrated TMMW is one way of thinking about wise medical competence in the modern era. In its problem-solving structure, scientific knowledge and technology are integrated with patient and physician goals by an adaptive capacity seated in metacognition. Through its deliberative functions, metacognition aims to deliver "the right thing at the right time and in the right way".

The structure of this model is consistent with the importance placed on pedagogic tools such as case-based learning, team-based learning and simulation-based learning that *integrate* cognitive, behavioural and constructivist approaches. Not surprisingly, evidence suggests these approaches support the development of complex elements of wise competence such as clinical intuition, ethical deliberation and collaborative problem-solving.^{63–65}

In pursuit of this integration, the medical practitioner must be prepared to constructively resolve the relative incommensurabilities of medicine's complex moral terrain. The TMMW and its associated moral economy offer trainees and educators mental models of approaches to resolving these incommensurabilities: balance, integration, interdependence and adaptive capacity. Such mental models, often unavailable in traditional competency frameworks, are recognized as essential components of pursuing, teaching and evaluating complex problem-solving.⁶⁶

Because of fundamental differences between their moral economies and problem-solving approaches, seamless integration of the TMMW with many traditional competency frameworks may not be

possible. But recent literature has called attention to the assessment of integrated competencies,⁶⁷ and the TMMW could provide structure, vocabulary and a distinct moral economy for such efforts. For example, entrustable professional activities (EPAs) are units of professional practice intended to represent the integration of multiple competencies.⁶⁸ But without clarity on its moral economy, trainees and instructors may envision EPAs as a collection of *independent* competencies. The TMMW framework could enhance their implementation by more explicitly outlining the structure, vocabulary and moral economy of integrated competence.⁶⁹

The incorporation of CAS-like features into the TMMW is important in several ways. It offers a model structure that more faithfully represents biological systems than linear and more analytic structures.⁷⁰ It provides a clearly delineated role for metacognition in medical practice.⁷¹ And, it encourages wisdom investigators to examine insights from complexity science regarding the mechanisms behind wise deliberation and the development of wisdom. For example, CAS's capacity to remember, adapt and evolve by retaining information from past interactions may help explain the essential role of experience in the development of practical wisdom.^{58,72}

For some, the concept of wise competence may feel inexact. But Aristotle reminds us that the best answers to *complex* problems are, by their very nature, not exact.⁴⁹ Instead, they are found in the finely considered and balanced goods achieved in each human life.

5 | LIMITATIONS

Because physicians volunteered to participate in the study and the study population was more likely to have an interest in wisdom than the general population, a nonresponse bias may be present in the study findings. Wise physicians who chose not to participate in this research may employ alternative definitions of wisdom. Participant responses may have been affected by social desirability bias. The interview required participants to recall situations that were often highly emotional; recall of these situations may have been selective or altered. Participants were exclusively internists, potentially threatening the applicability of results to medicine broadly.

6 | CONCLUSIONS

Using TA, structural modelling and polarity mapping this study yielded three major conclusions. First, our analysis suggests wise competence is the ability to effectively integrate medical knowledge with clinical context to address patient and physician goals. Second, we describe this deliberative process using a tripartite problem-solving model (the TMMW) sharing features of CAS and animated by a distinct moral economy. Third, clinical competencies can map to this tripartite wisdom model. Such augmented frameworks may better acknowledge interdependencies and interactions occurring between individual competencies and account for the roles of metacognition and adaptive expertise in the coordination of patient-centered care.

Further analysis of our study's dataset will explore perceived barriers and facilitators to the *development* of wise practice. This analysis could foster a deeper understanding of medical wisdom's relationship to CAS and suggest improvements to teaching holistic, patient-centered medical care. Given its importance to the definition of medical wisdom, further study of adaptive capacity is warranted.

AUTHOR CONTRIBUTIONS

Jordan Millhollin: Conceptualization; methodology; software; data curation; supervision; formal analysis; validation; investigation; visualization; project administration; resources; writing—original draft; writing—review and editing. **Wei Wei Lee:** Conceptualization; methodology; software; data curation; supervision; formal analysis; validation; investigation; funding acquisition; writing—original draft; writing—review and editing; visualization; project administration; resources. **Nic M. Weststrate:** Conceptualization; methodology; data curation; supervision; formal analysis; validation; investigation; funding acquisition; visualization; project administration; resources; writing—original draft; writing—review and editing; software. **Lars Osterberg:** Conceptualization; methodology; data curation; supervision; validation; investigation; visualization; project administration; resources; writing—original draft; writing—review and editing. **James N. Woodruff:** Conceptualization; methodology; software; data curation; supervision; resources; project administration; formal analysis; validation; visualization; writing—review and editing; writing—original draft; funding acquisition; investigation.

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DATA AVAILABILITY STATEMENT

Research data are not shared.

ETHICS STATEMENT

This study was approved by the University of Chicago Institutional Review Board (IRB #19-0796). All participants gave informed consent. All methods were carried out in accordance with the relevant guidelines and regulations.

OTHER DISCLOSURES

None reported.

PREVIOUS PRESENTATIONS

Portions of this work have been presented at the UChicago Pritzker Summer Research Program Symposium (virtual), August 26, 2021; The International Wisdom Summit (virtual), October 1, 2021; UChicago MedEd Day (virtual), November 18, 2021; the Conference on Medicine and Religion, Columbus, Ohio, March 13–14, 2023; the Society of General Internal Medicine Annual Meeting, Orlando, Florida, April

6–9, 2022; and the AAMC Central Group on Education Affairs Meeting (oral presentation), Indianapolis, IN, April 19, 2023.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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