# Rethinking the Basis of Medical Knowledge

Ayelet Kuper, Marcel D'Eon

**Abstract:**

*Introduction:*

Twentieth-century medical education constructed medicine as biomedical science. While bioscientific knowledge has brought large benefits to clinical practice, many have questioned the appropriateness of its domination of the medical curriculum. Since the content of that curriculum is itself a historically-mediated social construct, it can be changed to fit current descriptions of the competent physicians medical schools are expected to produce. Such physicians are expected not only to have biomedical expertise, but also to carry out multiple other roles as described in competency frameworks such as CanMEDS. Many of these other roles are socioculturally-based and thus not supported by bioscientific knowledge.

*Methods:*

We designed a thought experiment to delineate the need to identify and integrate the range of foundational knowledges to support the development of physicians capable of performing all the roles described in the competency frameworks. We specified assumptions and demarcated our scope. To illustrate our ideas we selected examples from the medical curriculum that linked to non-Medical Expert roles and outlined the disciplines that supported them.

*Results:*

Students educated in the foundational knowledge necessary for competence in all physician roles would need to be exposed to ideas and ways of thinking from a wide array of disciplines outside the traditional biomedical sciences. These would need to be

introduced in context and in ways that would support future medical practice. They would also broaden students' understanding of the nature of legitimate medical knowledge.

*Discussion:*

There are currently major gaps between the goals and objectives of competency frameworks such as CanMEDS and the actual contents of medical curricula. Addressing these will require curricular transformation to add knowledges, in context and in ways that positively affect practice, from disciplines not currently present within the medical school. In order to accomplish this, we will need to engage with colleagues throughout the university.

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For the last hundred years Western medical education has constructed medicine as biomedical science. Over that time, scientific discoveries and medical breakthroughs changed the face of medical practice. Biomedical research flourished within medical schools, with non-clinical bench science in particular becoming a major part of many of their missions.[1-3] The practice of medicine became understood as the objective application of the most advanced medical sciences to patient care; such medical sciences, in turn, were limited to those which produced bioscientific knowledge. Medical education thus became a predominantly bioscientifically-oriented preparation for practice, with medical schools assuming both the task of producing biomedical knowledge and of creating a curriculum to teach future physicians to practice within this bioscientific framework. While many recognize that there is also an 'art' to clinical medicine, becoming a physician continues to entail, almost exclusively, the acquisition of large amounts of bioscientific knowledge.

Certainly scientific knowledge has brought large benefits to patients in clinical practice – but it is not the only necessary foundation for medical education. Flexner himself, often cited in defense of scientism, did not think scientific knowledge on its own constituted adequate medical training.[2, 4-6] More recently, reports[7, 8] and academic publications[2, 6, 9-11] have questioned the exclusivity of the link between the emphasis on scientific knowledge in medical schools and teaching future doctors what they will actually need to know in order to practice medicine. The history of medical education also reminds us that the current generic medical curriculum is not the inevitable result of perfect understanding of how to train future physicians. Rather, it is the historically-mediated result of the social,

political and economic forces acting on medical education and its institutions over the time the curriculum was created and modified.[12] This realization that the medical curriculum is not 'what must be', but only 'what is currently', means that the structure and contents of the curriculum can change to concur with changing conceptions of its goals and objectives. We are therefore obliged to ensure that the medical curriculum contains the appropriate kinds of knowledge to train physicians according to what is currently believed to be competence.

**Implications of Competency Frameworks:**

It is now widely accepted that there are multiple domains in which physicians are required to be competent. It is not sufficient for physicians to have biomedical knowledge and technical skills. They must also, for example, be able to communicate well, to act in a professional manner and to work effectively with physician and non-physician colleagues. These competencies not only represent what medical educators, and the medical profession as a whole, believe to be important; they also reflect what the public, including patients and their families, want their doctors to be. For example, the CanMEDS competencies (see Box 1),[13] one of the earliest and perhaps best-known of the national competency frameworks, arose out of a series of public consultations in Ontario (the most populous Canadian province) in the 1980s.[14] That public process and subsequent professional stakeholder consultations, all part of the Educating Future Physicians for Ontario (EFPO) project, identified the physician roles which then became the CanMEDS competencies unveiled in 2000.[15] Other English-language competency frameworks have similar claims to professional and public consultation and/or support.[16-18] The societal expectations of physicians identified and drawn upon in such documents

are of course as much the historically-mediated outcomes of social, political and economic forces as the medical curricula with which they interact. Nonetheless, these frameworks can be seen to be (and are often presented as) surrogates for the current shared understanding between medical professionals, educators and patients about what physicians should be by the end of their training.

Medical schools, postgraduate training programs, and local and national educational systems worldwide have begun incorporating competency frameworks like CanMEDS into educational objectives, curriculum plans and assessment strategies. North American frameworks in particular have been adopted (and sometimes adapted) by medical schools throughout the Americas and in Europe, Oceania, Asia and the Middle East.[19, 20] Modules and sessions have been added; assessment forms have been rethought. While these are incremental changes, the development of frameworks that explicitly recognize that biomedical expertise is only one competency out of many is a radical change from the way the goals of medical education were perceived when our curricula were standardized 100 years ago by the post-Flexnerian reforms. Moreover, many of these new competencies are culturally-based and socially-mediated,[21] calling into question whether the biomedical sciences so dominant in the medical curriculum provide the appropriate foundational knowledges for developing expertise in these domains.

**A Thought Experiment:**

Our understanding of the contingent nature of the medical curriculum and of the challenges posed by the competency movement led us to design a thought experiment with the following questions: What foundational knowledges need to be in the curriculum to support the development of competent physicians? Is biomedical knowledge sufficient,

or are there knowledges from other disciplines that are also required to equip the doctors of the future?

*Assumptions:*

This thought experiment is guided by the following underlying assumptions:

- that the organization and contents of medical curricula are not 'normal' or 'natural' but were created by people in response to particular circumstances (historical events, cultural contexts, power relationships, etc) in particular times and places, and that we can therefore alter them as circumstances change

- that we are obliged to ensure that the curriculum is congruent with our current understanding of its desired product, which is the competent physician

- that competency frameworks represent the current dominant perspective in the medical education community on what competent physicians ought to be by the end of their training, and should therefore form the basis for the current goals and objectives of the curriculum (we are using CanMEDS in this discussion as an exemplar of the genre of competency frameworks; similar widely-used frameworks include the ACGME competencies from the United States[22] and Tomorrow's Doctors from the UK[23])

- that the goal of the medical curriculum is not to train researchers in an academic discipline (whether as physiologists, epidemiologists, anthropologists or social theorists) but rather to teach the knowledges and ways of thinking which, based in their respective research traditions but always in context, can support competent medical practice

- that as part of making every effort to help our students become competent in all of their roles as physicians, we will need to add some content that will support our current goals and objectives and eliminate other content that no longer does

- that biomedical expertise is still an important component of being a physician as Medical Expert and should remain in the curriculum insofar as it supports that role, but that arguments around the extent and types of traditional bioscientific knowledge needed in the medical school curriculum to support this competency have been well-described elsewhere[24-27] and are beyond the scope of this paper

*Methods:*

With these assumptions in mind, we began to think critically about the elements of the medical curriculum which might map onto non-Medical Expert CanMEDS roles and to delineate ways in which such curricular integration could be supported, in context, by knowledges and theories from disciplines outside the traditional biomedical sciences. Multiple practical and concrete examples described in this paper have been included in order to address all of the non-Medical Expert CanMEDS roles as well as multiple levels of undergraduate learners. They were developed to be neither prescriptive nor comprehensive, but rather explanatory and thought-provoking. Specifically, they do not provide an exhaustive list of all instances in which the non-Medical Expert competencies and/or new areas of knowledge would be addressed in the curriculum, nor of all pedagogical methods which could be used to teach this material; they are but a sample of the possible ways that this material could be brought into the medical school.

**Results of the Thought Experiment:**

The results of this thought experiment are illustrated by the following series of curricular vignettes:

*Vignette 1 – The Doctor-Patient Relationship:*

A group of first-year medical students is taking an introductory course about the doctor-patient relationship. At the beginning of a short series of sessions, the teacher asks: 'What does it mean to go to the doctor or to seek out healthcare? How should the doctor interact with you?' After some discussion, the teacher continues to probe: 'How would your teenaged sister answer those questions, or your immigrant grandmother, or your father? What do they want from their doctors?'

The discussion is guided to illustrate that there are many possible right answers to these questions depending on sociocultural context, and to show that each patient has a role in determining what makes a good doctor-patient relationship for him/her. The relevance of this sort of knowledge for the practicing physician is explored, such as how it could be used both to make individual physicians better at doing what patients want as well as to improve those physicians' abilities to help patients adhere to treatment plans for their diseases. On a broader scale, the teacher mentions that such knowledge could also help to create a medical system that responds better to patients' wants and needs.

In this context, the teacher explains that patients' understandings of illness, of healthcare and of relationships with health care providers are studied by social scientists from disciplines like medical anthropology and medical sociology, each of which is briefly described by the teacher. The students are given a few examples from the literature of relevant questions that have been studied within these disciplines in the past and an overview of the ways in which this sort of research is commonly done. Their course

assessment later includes a component about sociocultural aspects of illness and their effects on care. The curriculum map shows that these sessions teach knowledges that underpin aspects of both the Communicator and Professional competencies.

*Vignette 2 – The Doctor-Patient Relationship Redux:*

In a different group of sessions in the same doctor-patient relationship course, another teacher is teaching micro-level communication skills. The teacher asks: 'Why would many physicians in our hospital sit down beside an inpatient's bed to be at their eye level? Why do they look patients in the eye?' The simple point is made that while in that hospital's cultural context being at eye level with a patient and looking them in the eye often seems respectful and might be more comfortable for some patients, to other patients at that hospital and elsewhere it would be more appropriate to look away, or to remain standing.

The discussion shifts to understanding the goals of using such techniques, such as trying to remove obvious reminders of hierarchies and power differentials and to show respect to the patient. The students brainstorm about ways to reduce power differentials while speaking with patients; they are led to emphasize being sensitive to this issue on a case-by-case basis rather than memorizing specific tricks that 'work' in common cultural groups. They debate whether some patients are actually more comfortable communicating in the presence of a clear hierarchy, and whether patient-centred communication requires minimizing hierarchy nonetheless or acting to maximize patient comfort based on patient expectations.

In this context, the teacher introduces and identifies knowledge from social psychology, sociology, and rhetoric. Key contributions these disciplines have made to the

understanding of doctor-patient communication are highlighted, including a brief discussion of the ways in which this knowledge was created. When the students are later assessed, they are asked not only to show their mastery of certain communication skills, but also to reflect on parameters for determining if the techniques they are using are appropriate for an individual patient in a particular situation. The curriculum map shows that these sessions teach knowledges that underpin the Communicator competency.

*Vignette 3 – The Health Care System:*

The second-year medical students are taking a course on the health care system. One session begins with the principles of organization of health care in that country and the modes of payment for that system. After some exposition on that subject, the teacher asks: 'So, why do we have hospitals?'

The discussion is guided away from the purposes of modern hospitals, likely initially thought to be self-evident and natural by many students, towards their initial appearance and historical development. It is broadened to include other institutions that affect health care, such as insurance companies and/or national insurance agencies, clinics, medical schools and physician licensing bodies. Students are given readings from which they learn that all of these institutions are the constantly-evolving products of particular circumstances, and so might have developed very differently (or not at all) in other contexts. At their next session the implications of that understanding are explored, including the idea that since the forms of institutions are not inevitable or natural, they can be changed if they are not meeting society's needs.

In this context, the course has introduced ideas and ways of thinking from history and social theory. Other ways these disciplines contribute to understanding institutional

health care delivery are added to the conversation, along with a brief explanation of how this kind of knowledge is made. Students are later assessed on their understanding of how and why their health care system came to be as well as describing its current state. The curriculum map shows that these sessions teach knowledges that underpin aspects of both the Health Advocate and Manager competencies.

*Vignette 4 – Interprofessional Collaboration:*

A group of more senior medical students who are soon to begin their first clinical placements are attending an orientation session to the 'health care team' they will encounter on the medical ward. The students work through a list of the members of the interprofessional team, their job descriptions and their frequent tasks, highlighting each of their areas of expertise. They talk about how and when the students will interact with these clinicians. The facilitator then asks: 'Are the doctors also part of this health care team? If they are, are they equal members to everyone else or do they have a different status?'

After some debate, the facilitator shifts the discussion to why there is still a hierarchy in clinical medicine, and how that hierarchy might be manifested on the wards. The students are introduced to the idea of power, and how their positions as future doctors give them power in other people's eyes even if they feel very powerless themselves as students. They are reminded of potential differences that can affect people's status and power in society, such as gender, social origin, education and income. During the following weeks, during their clinical placement, the students meet with the facilitator and take turns reviewing the results of a selection of studies of interprofessional collaboration, highlighting the relevance of the research findings for their own ward placements.

In the context of the student-led reviews, the facilitator highlights the usefulness of social psychology, sociology and anthropology in understanding how people work together in groups. The last session includes a discussion of how these disciplines can illuminate other aspects of life on the wards, and the students are encouraged to use that literature in future as a resource to understand issues they encounter during their ongoing training. Students are later assessed both on their ability to collaborate in the ward environment and on a written reflection on the nature of interprofessional collaboration on their ward. The curriculum map shows that this session teaches knowledges that underpin the Collaborator competency.

*Vignette 5 – Ethical Decision-Making:*

The senior medical students are nearing the end of their clinical placements and are attending mandatory seminars on ethical decision-making as part of preparation for residency (beginning Foundation Year One). The class begins with a review of current concepts in western medical ethics, focussing on the idea of autonomy. Following some examples of what respecting autonomy might look like in practice, the teacher shifts the discussion by asking the class: 'Why do we pay so much attention to autonomy in our medical system, instead of to other competing principles?'

The students are then introduced to the idea that medical ethical decision-making is based in particular philosophical schools of thought about what constitutes 'good' and 'right'. The basics tenets of those schools are outlined, and the students are invited to think of examples they've seen or read about that support or challenge its assumptions. The teacher explains that in other societies most people might follow different philosophies, and that their ethical decision-making would therefore be based in those schools of

thought. The role of religion as a basis for philosophical and ethical frameworks is also discussed. The students are challenged to think about how to address potential philosophical differences between patients, families and the medical team in order to create common understanding and thereby improve communication between them.

In this context, the teacher has brought knowledge from philosophy and comparative religion into the classroom. Brief descriptions of other contemporary systems of ethics, and the philosophies in which they are based, round out the seminar. Students are later assessed on their ability both to identify standard western medical ethical principles in a clinical setting and to explain why those principles might be perceived differently by people from different national and religious backgrounds. The curriculum map shows that these seminars teach knowledges that underpin aspects of the Professional, Communicator and Medical Expert competencies.

*Vignette 6 – Broadening the Definition of Knowledge:*

By the end of their training, the students in a curriculum like the one described, in part, in these vignettes will have been exposed to ways of knowing and thinking from a wide array of disciplines in addition to the traditional biomedical sciences. They will thus have encountered concepts and theories chosen to fit their school's political, economic, social and cultural contexts as well as ones that challenge their local and personal assumptions. They will also have encountered knowledges from multiple epistemological and ontological stances. Although medical education is not primarily about training researchers (or philosophers), this exposure will expand the understanding of those students who do want to be researchers; it will show them the breadth of the questions that can be studied within medicine and of the methods that can be used to answer those

questions. This broadening of their understanding of what constitutes legitimate knowledge and legitimate research within the medical school to include the social sciences and humanities will further enable the production of the many types of knowledge that support medical education and medical practice. The curriculum map shows that the curriculum as a whole teaches multiple knowledges that underpin and broaden the Scholar competency.

**Discussion:**

CanMEDS and the other competency frameworks are, like the curricula with which they interact, the products of particular circumstances, power relationships and cultural contexts. They are, however, the currently dominant and legitimated constructs of the competent physician. The successful production of competent physicians therefore requires that students be trained to meet the objectives described in these frameworks, which necessarily includes learning from and about many different kinds of knowledge. Many of these knowledges fall beyond the range of the traditional basic biomedical sciences, emerging from disciplines that draw on different ways of thinking and knowing about the world. This presents a significant challenge to medical educators, requiring a transformation of the contemporary medical school curriculum in order to authentically address the current inconsistency between its contents and the goals and objectives of the competency frameworks.

Note that this argument does not imply adding full courses in social sciences and humanities disciplines to medical training any more than it would mandate full courses in physics or organic chemistry. Medical education is training for competent medical practice, and the only justification for any kind of foundational knowledge is to support

that practice. Since our contemporary definition of the competent medical-school graduate does not include researcher-level expertise in any discipline, the presentation of these knowledges from the social sciences and humanities *in context* should therefore be no different from the way in which bioscientific knowledge should be introduced, taught and assessed.

*Limitations:*

We have limited our thought experiment to undergraduate medical education, when many of these concepts would be first introduced. This parallels the conventional practice of introducing basic bioscientific knowledge in medical school, rather than during residency. However, residency education and even continuing medical education could also be expanded to include relevant, practical and contextualized non-bioscientific knowledge.

Another limitation of this thought experiment is that we ignored the politics and territorialities inherent in many curriculum discussions. We also did not address important practicalities like locating and paying for competent, context-aware teachers for subjects in which some medical schools may not have a depth of expertise. While these are important issues that can impede curriculum reform, we have chosen to present a vision that may be difficult to achieve rather than to constrain our thought experiment to what could easily be implemented within our current system.

*Conclusion:*

Although it will be difficult, medical educators must go beyond tinkering with the contents of the current medical curriculum and reimagine it entirely based on the kinds of

bioscientific, social scientific, and humanities-mediated knowledges that physicians need to truly enact all of their roles in the specific social, political and cultural contexts in which they work. In this we already have the help of our colleagues in the bioscientific disciplines, many of whom regularly interact with the medical school and help us understand the relevance of their knowledge to our curricula. We need to begin the process of similarly engaging with our colleagues throughout the university, accessing their unique disciplinary perspectives to identify and to teach us the knowledges from their domains that will enable us to create curricula that support the competencies we believe our physicians need.

| Box 1: The CanMEDS Competencies[13] |
|---|
| • Medical Expert<br><br>• Communicator<br><br>• Collaborator<br><br>• Manager<br><br>• Health Advocate<br><br>• Scholar<br><br>• Professional |
| Note: This is the order in which the competencies are presented in the published Competency Framework[13] |

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