

Epistemology, culture, justice and power: non-bioscientific knowledge for medical training

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CONTEXT While medical curricula were traditionally almost entirely comprised of bioscientific knowledge, widely accepted competency frameworks now make clear that physicians must be competent in far more than biomedical knowledge and technical skills. For example, of the influential CanMEDS roles, six are conceptually based in the social sciences and humanities (SSH). Educators frequently express uncertainty about what to teach in this area. This study concretely identifies the knowledge beyond bioscience needed to support the training of physicians competent in the six non-Medical Expert CanMEDS roles.

METHODS We interviewed 58 non-clinician university faculty members with doctorates in over 20 SSH disciplines. We abstracted our transcripts (meaning condensation, direct quotations) resulting in approximately 300 pages of data which we coded using top-down (by CanMEDS role) and bottom-up (thematically) approaches and analysed within a critical constructivist framework. Participants and clinicians with SSH PhDs member-checked and refined our results.

RESULTS Twelve interrelated themes were evident in the data. An understanding of epistemology, including the constructed nature of social knowledge, was seen as the foundational theme without which the others could not be taught or understood. Our findings highlighted three anchoring themes (*Justice, Power, Culture*), all of which link to eight more specific themes concerning future physicians' relationships to the world and the self. All 12 themes were cross-cutting, in that each related to all six non-Medical Expert CanMEDS roles. The data also provided many concrete examples of potential curricular content.

CONCLUSIONS There is a definable body of SSH knowledge that forms the academic underpinning for important physician competencies and is outside the experience of most medical educators. Curricular change incorporating such content is necessary if we are to strengthen the non-Medical Expert physician competencies. Our findings, particularly our cross-cutting themes, also provide a pedagogically useful mechanism for holistically teaching the underpinnings of physician competence. We are now implementing our findings into medical curricula.

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 INTRODUCTION

Competency frameworks have become widely accepted as representing an ideal way to guide the training and assessment of future and current physicians. These frameworks have been developed, adapted and given regulatory power internationally.^{1–8} One of the earliest and most influential comprehensive definitions of physician competence is the Canadian CanMEDS framework, which outlines seven roles in which physicians must be competent in order to practise.^{1,2} This framework has gained significant regulatory authority in Canada and has been codified by the Royal College of Physicians and Surgeons of Canada (RCPSC),^{1,2,9} endorsed by the Canadian College of Family Physicians (CCFP),¹⁰ and adopted in accreditation standards for both undergraduate (medical school) and postgraduate (residency) medical education. The CanMEDS roles have also been adopted and adapted worldwide, such that they now represent ‘one of the world’s most widely used competency frameworks’.¹¹ They were developed with significant public and professional consultation and are therefore currently seen as representing societal expectations of competent physicians.^{12–15} The current emphasis on social responsibility^{16,17} in medical training thus further underscores the importance of including in medical curricula appropriate content to support the effective teaching of all seven CanMEDS roles.

CanMEDS makes clear that, although necessary, it is not sufficient to train physicians to possess only the biomedical knowledge and technical skills encompassed in the Medical Expert role. Rather, we must also ensure that trainees become scholarly, compassionate professionals who collaborate well, communicate effectively, and advocate for individual patients and systems change.^{1,2} By definition, such competencies cannot merely be innate personal qualities or attitudes, but must be able to be taught and their acquisition assessed.^{18–20} Yet for over a century medical education equated medicine with biomedical science and constructed its practice as the objective use of bioscience for patient care.^{21–28} These particular privileged ways of thinking and knowing^{22–24,28–31} historically limited acceptable curricular content^{28,32–34} such that medical school and residency curricula continue to be comprised primarily of bioscientific knowledge. Although clinical care has, of course, greatly improved as a result of the medical community’s ever-increasing bioscientific knowledge, many medical educators have highlighted the insufficiency of bioscience as the sole

basis for contemporary medical curricula.^{21,26,35–40} In particular, as the majority of the six non-Medical Expert (sometimes called ‘Intrinsic’¹¹) CanMEDS roles are based in the social sciences and humanities (SSH) rather than in bioscience,²¹ we cannot expect them to be taught and assessed adequately in a curriculum comprised primarily of bioscientific knowledge.

Recent publications and reports have highlighted physician perceptions of the inadequacy of current teaching and assessment of all six non-Medical Expert roles.^{14,41–45} Residents and their programme directors have especially identified concerns about overly simplistic approaches that are often employed to teach the non-Medical Expert roles,^{44,46–50} and many clinician-educators claim simply not to know what to teach to support these roles. To address this gap, and in recognition of the non-bioscientific bases of much of the content of current competency frameworks, there have been several attempts recently to document aspects of necessary non-bioscientific knowledge for medical curricula. These efforts have led to the listing of curricular topics (e.g. tobacco use, domestic violence, bioethics) that might require non-bioscientific knowledge to be well understood,^{51–55} rather than exploring the necessary knowledge itself. A thorough understanding of the knowledge required to underpin the CanMEDS roles has not yet been developed; to date, the delineation of the non-bioscientific knowledge underlying the CanMEDS competency framework has existed in the literature only as a ‘thought experiment’ published in 2011 by the principal author of this paper.²¹

The goal of this overall programme of research is therefore to identify the knowledge needed in medical curricula to train physicians who meet Canadian societal expectations of physician competency, as represented by the CanMEDS framework, and to disseminate, legitimate, translate, implement and evaluate the implementation of those findings. In this paper, we present the results of Phase 1 of this research programme, in which we answer the following research question: What forms of knowledge beyond bioscience should be included in medical curricula to best support the development of physicians who are fully competent in the six non-Medical Expert CanMEDS roles?

 METHODS

Using CanMEDS as our model of medical competency, we identified experts in a wide range of

academic disciplines outside bioscience – within the SSH – to work through all domains of physician competency except that of Medical Expert in order to concretely identify the knowledge from each of their area(s) of expertise to support each non-Medical Expert CanMEDS role. We used the roles as delineated in CanMEDS 2005,² but we were also increasingly aware (J R Frank, personal communication [by telephone], 2011) of some of the changes that were to come in 2015.⁵⁶ Our intention was not to create full disciplinary SSH courses to add to medical curricula. Much as medical educators have historically identified aspects of physics or chemistry that are integrated into medical curricula to support the Medical Expert role, we sought to identify those elements from the SSH that, if similarly integrated into medical curricula, would support the development of competent physicians as currently defined. As outlined to our participants, these elements included:

- forms of knowledge: epistemological underpinnings⁵⁷ and philosophical claims to authority,^{58,59}
- theories: macro-level theories^{60–62} that speak to broad social forces⁶³ and make claims to universal applicability;⁶⁴ mid-range and micro-level theories that are used in specific disciplines or fields,^{65,66} and the positivism associated with the objectivist paradigm,⁶⁷ and
- facts: facts conceptualised within an objectivist notion of absolute truth, as well as socially constructed facts that can be agreed on within a particular context.⁶⁸

Research team

Our research team represents several points of view relevant to our research question. It is led by a practising physician with masters and doctoral degrees in SSH disciplines whose clinical practice and research take place within a large faculty of medicine. Three other members of the research team are physician faculty members with SSH masters degrees (two in health professions education, one in feminist science studies) who are heavily involved in medical education administration and curriculum design; a fourth physician faculty member with an SSH PhD has served in senior educational and leadership roles in both the faculty and the university. Three more of our team members became involved as medical students (one following a masters degree in the history of science); all of them are now resident physicians. The final member of our team is an experienced qualitative researcher in the health

domain with a background in health promotion. As clinicians, we all share a deep commitment to the importance of compassionate medical care that addresses the social contexts and individual needs, as well as the disease states, of our patients and their families and communities; as researchers, we try to find innovative ways to identify and to instil in medical trainees the knowledge and skills required to provide such excellent care.

Sampling strategy

We identified initial participants using purposive sampling (through university websites and granting agency databases) for local university faculty members with: (i) formal expertise (i.e. a PhD or equivalent terminal degree) in one of a broad range of SSH disciplines we considered to be potentially relevant to the non-Medical Expert CanMEDS roles, as well as (ii) an academic interest in medicine, other health professions, or other aspects of health and disease. Some of these SSH experts studied health professions education, but most studied health, illness, disease, disability, the health care system or the health professions. As clinicians ourselves, we were mindful of the fact that although many of us have extensive graduate training in the SSH, we had nonetheless all been acculturated into the medical community's dominant views of medical education. We therefore excluded participants with clinical training in order to avoid such clinician preconceptions about the limits of the acceptable medical curriculum and medical knowledge, as well as to elicit fresh ideas about the curriculum in order to complement the many existing papers on medical curricula written by clinicians. Although we began with an initial list of potentially relevant disciplines (sociology, anthropology, history, political science, economics, philosophy, ethics, education, psychology, rhetoric, linguistics, literary studies, religion, classics, music and drama) and purposively identified individuals, we then expanded this initial list by snowball sampling (a non-probability method that relies on referrals from initial participants to find additional ones^{69–71}) both for disciplines and for specific individuals in order to maximise variation in the perspectives gathered and to mitigate against our own assumptions about disciplines relevant to medical education. We began by recruiting participants from multiple local universities in order to gather a range of opinions within single disciplines, to ensure multiple voices from key disciplines, and to take advantage of pockets of expertise in different research areas at different institutions; we

ultimately extended our sampling to include several universities further afield within our region.

Data collection

We conducted 55 semi-structured interviews^{72–75} plus one small focus group^{76,77} early in the data-gathering process. We conducted no additional focus groups because, firstly, participants were rarely available to come to a central location and, secondly, the focus group generated less information than individual interviews with the same number of participants. In total, 58 individuals were either interviewed or participated in our focus group. Participants received an information package in advance of the interview containing the CanMEDS Physician Competency Framework,¹ a shorter document written by the project team describing the history, definitions and current uses of the CanMEDS roles in medical education, and a published article by the principal investigator of the study outlining the goals of our research project.²¹ We conducted interviews at a location of the participant's choosing or by telephone. We audio-recorded all interviews with the permission of participants.

Each interview was conducted either by a medical student trained by ourselves in qualitative research methods or by a research assistant experienced in qualitative research and taught by ourselves about the CanMEDS roles. During each interview, the interviewer described each non-Medical Expert role to the participant and then, using a semi-structured interview guide, engaged the interviewee in a discussion of the forms of knowledge, theories and facts from his or her area(s) of academic expertise that would underpin a thorough understanding of each role. We also asked participants to identify any useful curricular resources, texts and pedagogical techniques relevant to the material they were sharing with us. We iteratively adjusted the interview guide throughout the study based on our concurrent analysis. Interviewing continued until all the perspectives identified by ourselves or through snowball sampling had been adequately represented and thematic saturation^{70,78,79} had been achieved.

Analysis

One researcher listened to the audiotape of each interview and transcribed the sections of that interview that contained the non-bioscientific forms of knowledge, theories and facts suggested by the research participant for each non-Medical Expert CanMEDS role. We further abstracted the

transcripts using meaning condensation and direct quotations, resulting in approximately 300 pages of relevant data. We uploaded these abstracted transcripts into NVIVO Version 10.0 (QSR International Pty Ltd, Melbourne, Vic, Australia) in order to organise the data. We coded the data using both top-down (by CanMEDS role) and bottom-up (thematically within a constructivist critical framework) approaches concurrently with data collection, constantly revising our bottom-up thematic coding structure as data collection progressed, as well as returning iteratively to earlier transcripts. When we thought we had reached saturation (when we had exhausted our snowball sampling for disciplines to include in our sample and were no longer eliciting novel concepts from our participants in relation to either the CanMEDS roles or our thematic coding structure), two members of the research team (AK, CW) who are MDs with extensive academic training in SSH, as well as an experienced qualitative researcher in the health domain (PV), reviewed the analysis in full; we challenged established categories and compared data across participants, across CanMEDS roles and across themes to: (i) formulate a conceptual model of the data; (ii) ascertain that we had indeed reached saturation, and (iii) establish relationships among bottom-up themes and between these themes and the CanMEDS roles.

Once we had confirmed through our analysis that we had concluded our data-gathering process, we created a preliminary confidential report from our data that was shared with two groups: (i) the full research team (medical students and physicians with interest or graduate training in SSH) for their final formal input (in addition to their ongoing involvement over the course of the study), and (ii) 18 of our original 58 interview participants who volunteered to take part in member checking⁸⁰ (to ascertain that we had accurately represented their ideas and they could 'hear their own voices' in our report). The written feedback from these two groups necessitated only minor modifications to the report (primarily clarifying correct nomenclature related to Canadian Aboriginal health and adding definitions of various SSH terms). The modified preliminary confidential report was then reviewed by seven clinicians from different health professions (including medicine) with SSH PhDs in order to allow it to be member-checked within the community most likely to implement its findings; this added further clinician voices to our analysis beyond those of our research team. Again, written feedback from this last group, the members of which were not previously involved in our study, necessitated

only minor modifications to the report (such as further clarifying definitions of various terms and adding more emphasis to the importance of concepts such as equity and reflexivity).

Ethics

This project was formally exempted from requirements for ethics approval by the University of Toronto's Research Ethics Office under Article 2.1 of the Canadian *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*, which states, in part: 'In some cases, research may involve interaction with individuals who are not themselves the focus of the research in order to obtain information. [...] Such individuals are not considered participants for the purposes of this Policy.'⁸¹ We nonetheless sought and received written informed consent from all study participants. Those participants who wished to be acknowledged in our final publication are listed in the Acknowledgements section of this paper.

RESULTS

Multiple SSH disciplines relevant to non-Medical Expert CanMEDS roles

We initially identified more than two dozen local SSH researchers who had expertise in disciplines (e.g. sociology of health, history of medicine, critical disability studies) that were *a priori* likely to encompass knowledge relevant to the non-Medical Expert CanMEDS roles. Our participants were then able to identify other relevant areas of expertise (some of which we had not initially considered), as well as a long list of names of other SSH researchers at universities within our city and region who fit our inclusion criteria in various disciplines (and whom we contacted as part of our snowball sample). The universities at which our 58 participants work and their areas of academic expertise are listed in Table 1.

Integrated conceptual model of knowledge from the SSH relevant to non-Medical Expert CanMEDS roles

We identified 12 interrelated themes in our data that form an integrated conceptual model of the knowledge from the SSH that underpins the non-Medical Expert CanMEDS roles. These themes cut across disciplinary lines and were well represented in multiple transcripts. Of these themes, an understanding of the nature of knowledge (*Epistemology*), including the constructed nature of social

Table 1 Participants' universities and areas of academic expertise

Universities	Areas of academic expertise
McMaster University	Anthropology
Ontario College of Art and Design	Architecture (inc. landscape architecture)
Ryerson University	Art education
University of Ottawa	Art history
University of Toronto	Behavioural medicine/science
University of Waterloo	Comparative literature
York University	Critical disability studies
	Education
	English
	Environmental planning
	Ethics
	Fine arts
	Gender/women's studies
	Geography
	Health economics
	Health policy/health systems
	Health promotion
	Health psychology
	History
	Labour
	Law
	Performance arts (inc. music and theatre)
	Philosophy
	Philosophy of science
	Planning
	Political science
	Religious studies
	Rhetoric
	Social psychology
	Social science and health
	Sociology

Note that some participants identified academic expertise in more than one area

knowledge and how knowledge is produced in various paradigms, was seen as the foundational curricular component without which the other themes could not be appropriately taught or understood. Among the remaining 11 themes, our findings highlighted three interrelated anchoring themes: *Culture*, *Justice* and *Power*. These anchoring themes are essential to all of the CanMEDS roles to varying

degrees; they also all link in turn to each of the remaining eight cross-cutting themes, a series of rich content areas about the future physician's relationships to the world (aspects related to others) and to the self (facets applying to the individual him/herself). All of these themes, and the relationships between them, are represented in Fig. 1. We will address each theme in turn, focusing more extensively on the foundational and anchoring themes of *Epistemology*, *Culture*, *Justice* and *Power*, and touching briefly on the remaining eight themes. Each of these themes is also described in much greater detail in Appendix S1, online.

Epistemology refers to the nature and scope of knowledge. It questions what knowledge is and how it can be acquired, and the extent to which any given subject or entity can be known. *Epistemology* as a cross-cutting theme was identified by virtually all interviewees. There was considerable emphasis on **constructivism: the notion that there is no single fixed truth but that our perceptions of reality are constructed based on our historical, social, economic, cultural, gender and class locations**. This theme includes understanding of what knowledge is, the limitations of different forms of knowledge, and how knowledge is created in certain social, historical and cultural contexts from which the knower cannot be removed and which affect what he or she is able to

perceive and how he or she interprets phenomena. In our data, prominent areas of focus within this theme include: the tension between objectivity and subjectivity; the question of what 'counts' as evidence (what is privileged, included or excluded); limits to empirical knowledge; ways of knowing in other professions; narrative forms of knowledge, particularly among patients, and the roles of culture and location in defining health knowledge.

Culture can be defined as the shared behaviours, ideals, values and beliefs of a particular group. It is a pattern of basic assumptions that have come to be considered valid and are implicitly taught to new group members as ways to feel, perceive and behave. Medicine is itself a culture (see also *Medical identity/Culture* in Table 2); participants suggested it would be helpful to illuminate for medical students how medical culture can contribute to their society's pervasive, systematic social inequities. However, culture is also a social determinant of health with direct and indirect effects on health outcomes. There was strong support of the need for medical curricula to explicitly foster awareness of, and respect for, cultural differences, as well as knowledge of the impact of culture on health, on an individual's ability to access health care, and on an individual's beliefs about health. A reflexive awareness of one's assumptions about other cultures – of

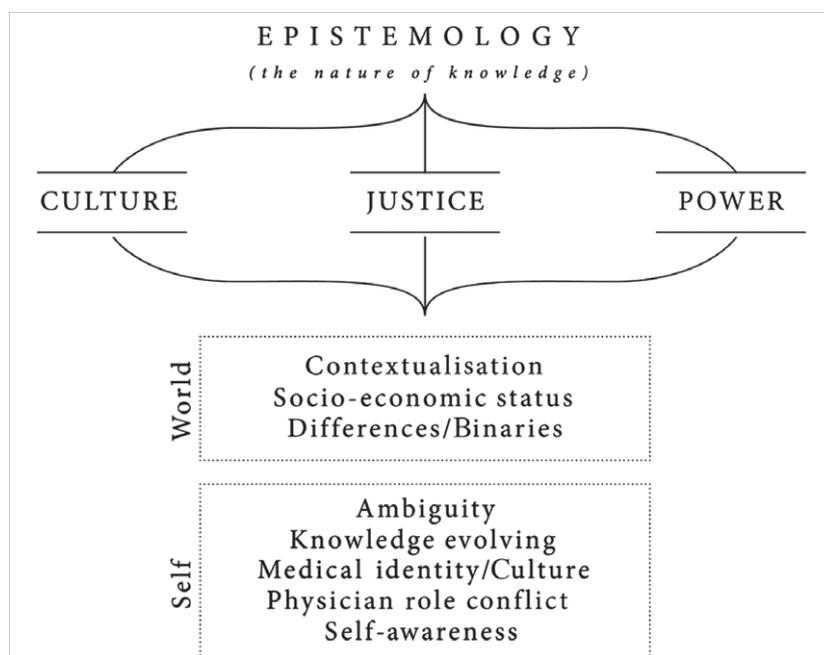


Figure 1 Integrated conceptual model, derived from the research findings presented in this paper, of the cross-cutting themes encompassing the forms of knowledge, theories, and facts from beyond bioscience that are required in medical curricula to best support the training of physicians to be fully competent in the six non-Medical Expert CanMEDS roles

Table 2 Cross-cutting themes concerning relationships with the world and the self

Themes about the future physician's relationship with the world

Contextualisation	The necessity of other-awareness, including the solicitation of information about, and recognition of, contextual factors (e.g. living situation, socio-economic status, historical and political contexts, lived experience, world view) that contribute both to health outcomes and to how individuals respond to situations. This is part of an approach to health care in which a patient's illness or disease can only be understood in context, and involves close-looking and close-describing, drawing out patient narratives, and tailoring physician responses to individual patient needs
Socio-economic status	The combination of financial, occupational, educational and lifestyle factors (e.g. housing, immigration status) that determine the social location of an individual or group. Such class differences are important determinants of health for patients and play a role in the structure of the health care system and interprofessional hierarchy
Differences/Binaries	Socially produced differences between a dominant, privileged group and other, less valued groups, which are often used to produce, enact or limit power. Contemporary binaries include (but are not limited to) gender, age, race, sexuality, religion, class, body size and ability; these binaries often overlap or intersect, which can magnify social disadvantages that are important determinants of health

Themes about the future physician's relationship with the self

Ambiguity	The concept that there often are not clear answers in medicine, with respect both to medical evidence and to other aspects of physicians' roles, and so physicians need to become comfortable with ambiguity in their daily practice. This defies contemporary medicine's focus on objectivity and truth and physicians' traditional propensity for certainty and predictability
Knowledge evolving	The constant and rapid change of medical knowledge over time, including a critical look at the social and historical forces behind paradigm shifts in our understanding of disease, illness, treatment and health. This ties into the assumptions of the scientific model currently used in medicine and how these relate to the ways in which other disciplines create knowledge, and fosters a degree of intellectual humility about physician expertise
Medical identity/Culture	The realisation that medicine has its own constantly changing culture (as distinct from the cultures of the patients it serves) that shapes both physician identity and the ways in which physicians can perceive and interact with the world. An overview of the historical trajectory and socio-politics of the medical profession and of the changing role of the physician over time, including contemporary critiques, can help medical students make sense of, and function effectively within, their current cultural milieu
Physician role conflict	The conflicts inherent in being a physician, including physical limits on available time (e.g. for direct patient care, for continuing education, for other roles such as teaching, advocacy and academic work, and for self-care) and tensions between attending to the needs of individual patients and those of populations or society. Resource limitations can worsen such conflicts; e.g. financial difficulties increase the tension between advocating for individual patient needs and maintaining physician identity as an autonomous, self-regulated professional on the one hand, and the imperative for physicians to help manage scarce resources and improve the efficiency of the health care system on the other hand
Self-awareness	The application of the concepts of close-looking and close-describing (as in <i>Contextualisation</i>) to oneself, leading to self-reflection (introspection on one's beliefs, emotions and behaviours through activities such as reading, writing, talking with mentors and peers, etc.) and reflexivity (understanding one's own privileges and tacit assumptions). These processes can foster flexibility and humility and can help physicians deliberately shape their own future behaviours

The foundational theme, *Epistemology*, links to the three interrelated anchoring themes of *Culture*, *Justice* and *Power*. The anchoring themes all link in turn to each of these remaining eight cross-cutting themes, a series of rich content areas about the future physician's relationships to the world (aspects related to others) and to the self (facets applying to the individual him or herself)

one's explicit and implicit biases – was felt to be critical in this regard. The linked concepts of cultural competence, cultural humility and cultural safety were also highlighted in this context; their relevance to successful communication and to the patient–physician relationship was particularly emphasised. Finally, the concept of cultural hegemony, or dominance, was raised by many participants, relating both to medicine's traditional dominance over other professions and to its ongoing legacy of use as an agent of colonisation, which is particularly significant in Canada in relation to Aboriginal communities but also has implications for the delivery of care to other minoritised groups.

Justice was discussed by our participants in two inter-linked ways: (i) as morality, law and professional ethics, which referred to concepts like fairness and equity, and (ii) as social justice. Issues within the purview of justice as morality included: codes of conduct and other prescribed rules of ethical behaviours; the social contract view of professionalism; the development of an ethical imagination that incorporates principles such as honesty, empathy and integrity; the ability to recognise and question moral standards that privilege certain groups over others; an understanding of research ethics, including the appropriate ownership of knowledge that is derived from patients and their bodies, and a recognition of industry influence in research and clinical practice. A variety of ethical frameworks were discussed, such as the distinction between procedural justice (e.g. fairness in the decision-making process regarding the distribution of resources) and distributive justice (e.g. fairness in the actual distribution of resources), as was applied philosophy (e.g. consequential reasoning versus principle-based reasoning). Several moral theories (e.g. utilitarianism, feminist ethics, value ethics) were also suggested as ways to provide trainees with more robust language with which to be able to discuss ethical issues.

The second aspect of *Justice*, social justice, can be defined as the distribution of a society's social and economic resources for the benefit of all people.⁸² Within this area, participants highlighted the relationship between justice and power (including the notion that physicians might use their influence and authority to advocate for social change) and the link between class and health. They pointed out the tension between justice and economic drivers such as efficiency and cost-effectiveness, as well as the related double-agency conflict between a physician's responsibilities to advocate for individual

patients and to preserve the resources of society at large. Participants also linked social justice to diversity, pointing out that some patients experience more barriers to accessing health care and other services than others, and emphasising that such social disadvantage was compounded for individuals belonging to multiple minoritised groups.

Power, which can be defined as having influence or control over the beliefs, behaviours and values of individuals, groups or institutions, was the third anchoring theme within our data. Our participants articulated issues of power related to four specific aspects of health care: (i) relationships between patients and physicians; (ii) relationships between physicians and other health professionals; (iii) institutional hierarchies within the health care system, and (iv) legal and policy environments including the state and the judicial system. In terms of the patient–physician relationship, participants focused heavily on multiple aspects of the power differential between patients and their physicians, including the power inherent in knowledge, in language, and in non-verbal forms of communication, as well as issues of trust, rapport, agency, and shared decision making. They pointed out that physicians need to acknowledge and take responsibility for their own authority and that, in order to do so, they need to have an understanding of the social constructs that inform variations in power among individuals and groups, such as class, gender, ethnicity and other sources of difference (see also *Difference/Binaries*, Table 2 and Appendix S1). Participants also discussed the power dynamics between physicians and their non-physician colleagues, pointing to the traditional position of power held by physicians over other health professionals and to the sense of authority to which they are socialised during their training.

In addition to commenting on the interactions between individuals and groups, participants conceptualised *Power* in relation to institutions, such as hospitals, the health care system as a whole, and the state. The notion of the self-regulation of the medical profession, a form of legitimacy granted to physicians by the state, was discussed by many participants. They explained that physicians have been granted immense authority as gatekeepers to the health care system and as arbiters of the definitions of legitimate diseases and their treatment, and that this authority and access to resources gives physicians the responsibility to leverage their power positively in the interests of the public, including by advocating for change. They noted the historical roots and evolution of this power in the context of

changes in patient expectations, in health professional scopes of practice, and in the organisation of health care funding in capitalist economies. They emphasised that physicians need to be aware of their power with respect to the state and to use this knowledge of the political dimension of medicine to shape their work. They therefore suggested that medical students be taught the basics of public policy, of the process of policy change, and of the legislative process in their jurisdictions.

Beyond *Epistemology, Culture, Justice and Power*, the remaining eight cross-cutting themes focus on the future physician's relationships with the world (*Contextualisation, Socio-economic status and Differences/Binaries*) and with the self (*Ambiguity, Knowledge evolving, Medical identity/Culture, Physician role conflict and Self-awareness*) (Fig. 1). These themes are described briefly in Table 2 and in much greater detail in Appendix S1.

The cross-cutting nature of SSH knowledge with respect to non-Medical expert CanMEDS roles

We had initially intended to distinguish which of the themes identified in our data were linked to each of the non-Medical Expert CanMEDS roles. However, it quickly became clear to us that this would not be possible. Although some themes related more closely to some roles than to others, the themes were truly cross-cutting: that is, every theme was linked to all of the non-Medical Expert roles. We explored this intersection further by comparing (within the approximately 300 pages of abstracted transcript data we had already coded in NVIVO 10.0) the chunks of data that we had coded bottom-up for each cross-cutting theme with the chunks of data we had coded top-down for each CanMEDS role. The results of this comparison, which are presented numerically in Table 3, confirmed that although some themes and CanMEDS roles are particularly closely related (e.g. *Culture* and the Communicator role, *Power* and the Collaborator role, *Physician role conflict* and the Health Advocate role), each of the 12 themes includes material that had also been coded separately as relating to each of the six roles. This intriguing finding may provide evidence in support of a conceptual integration of the non-Medical Expert CanMEDS roles.

Concrete curricular content from the SSH relevant to particular non-Medical expert CanMEDS roles

Beyond the conceptually rich basis for our 12 cross-cutting themes, our data contain an immense

amount of concrete curricular content identified by our participants as being related to each of the non-Medical Expert CanMEDS roles. In order to maintain the breadth and variety of this material, rather than summarising it more briefly, we have sorted it by role and compiled it into six large documents for use in curriculum planning. Table 4 contains a brief sampling of the knowledge our participants thought was relevant for each role. It is important to note that the examples in Table 4 are intended to be neither necessary nor sufficient; that is, they are neither the definitive forms of knowledge that would be required for the appropriate teaching of each role in every medical education context nor the only material our participants perceived as important for that particular role. Rather, they are illustrative examples that provide the reader with a flavour of our diverse data.

DISCUSSION

Our study shows that there is a definable body of knowledge that forms the conceptual underpinnings for the non-Medical Expert CanMEDS roles, and provides empirical evidence for the types of non-biomedical content required within medical education to train practitioners who meet Canadian societal expectations of physician competency. Although much of this content appears novel within most medical education contexts, our academic colleagues elsewhere in the university have enormous experience in both appropriately sequencing and practically teaching it. We can draw on that experience as we determine the depth of materials appropriate to various stages of the medical education continuum, from medical school through to residency and then to continuing medical education, as trainees and practitioners become more sophisticated in their enactment of the CanMEDS roles.

Our methodology has provided a substantial body of practical materials for use by medical educators (Appendix S1). We hope that studies such as this, which provide many concrete curricular options, will make it less daunting for educators to teach the non-Medical Expert roles. Curricular change that incorporates rigorous content knowledge from the SSH, such as we have included in our framework, is absolutely necessary if we are to support the teaching of competencies other than those of the Medical Expert role. The relative lack of medical educators who are experts in these areas points to the need for broader academic physician

Table 3 The intersection of cross-cutting themes and non-Medical Expert CanMEDS roles

Theme	CanMEDS role					
	Collaborator	Communicator	Health advocate	Manager	Professional	Scholar
Epistemology	59	81	49	19	39	74
Culture	16	41	22	7	20	11
Justice	23	45	66	56	66	23
Power	101	73	59	43	51	24
Contextualisation	19	64	38	13	10	18
Socio-economic status	12	18	28	7	5	5
Difference/Binaries	38	48	31	16	15	12
Ambiguity	5	3	3	2	6	7
Knowledge evolving	1	5	5	1	4	24
Medical identity/Culture	13	17	11	11	10	18
Physician role conflict	12	15	40	32	14	19
Self-awareness	39	38	30	11	40	31

Each box shows the number of chunks of data coded both bottom-up as relating to a particular cross-cutting theme and top-down as relating to a particular non-Medical Expert CanMEDS role (within approximately 300 pages of abstracted transcript data)

recruitment, for partnership with faculty members from across the university (just as many medical schools already partner with basic biomedical science departments), and for significant faculty development. However, this lack of internal expertise is a challenge that can be overcome (as it has been in other novel medicine-related domains⁸³).

On a more theoretical level, our data (both the content overlap between roles and the themes that cut across all six of them) provide clear evidence for the conceptual integration of the non-Medical Expert CanMEDS roles. There have been complaints in the published literature that these roles are artificial divisions – that the constructs they represent are all deeply interrelated – and arguments for the integration of the teaching and assessment of these roles.^{42,44,84} As has been pointed out elsewhere, the CanMEDS roles as they exist today (and as they have shifted over time)^{1,2,9} are social constructs that fit with our contemporary conception of the good physician and are neither natural nor inevitable.^{44,85} It may be that the current anatomisation of physician competence will decrease over time. In the interim, our findings, particularly our cross-cutting themes, provide a pedagogically useful mechanism for teaching the underpinnings of physician competence in a holistic way.

Limitations

There are several important limitations to this study. We must, for example, acknowledge that our findings are very specific to the English-speaking, North American, Eurocentric environment in which CanMEDS was developed and in which our study was conducted. This places important limits not only on the applicability of the competency framework we used,⁸⁶ but also on the relevance of the forms of knowledge outlined by our respondents to physicians and patients in other cultural contexts; in other words, both the conceptual model presented in this paper and its accompanying curricular materials are innately culturally specific. We would therefore very much welcome collaborators who would be interested in exploring the use of a similar methodology in different cultural milieus to derive materials appropriate for their contexts.

Similarly, although we focused on a very widely used competency framework,¹¹ other competency frameworks^{3,4,6} are used in jurisdictions that are culturally quite congruent with our own. Nonetheless, many of the competencies represented in CanMEDS are also present in these other frameworks, which points to the potentially broader relevance of our findings. In addition, the straightforward nature of our methodology should allow others to extend our

Table 4 Examples of potential concrete curricular content from the social sciences and humanities relevant to each non-Medical Expert CanMEDS role

Role	Examples	Illustrative quotations
Communicator	<p>The key post-structuralist concept that language constructs reality</p> <p>The basics of persuasion and classical rhetoric, in order to theorise the impact of contemporary contextual factors like culture, class and education on patient–physician communication</p> <p>How to use narrative techniques from literary studies to listen for stories, not just to stories, and to place patient stories in context</p>	<p>‘Communicator, the initial thing you think of is talking, but I tend to think that some of the best communicators are the best listeners. So listening for stories, not just listening to stories [...] Robert Coles’ book, <i>The Call of Stories</i>, he talks about two different teachers he had who [...] taught him about medicine. And the one doctor, Dr Ludwig told him to listen to patients’ stories, to hear his patients’ stories as they told them themselves and to listen for their stories and to allow patients to contextualise their stories for you’</p>
Collaborator	<p>Sociological ideas about hierarchies and power dynamics between social groups, professional groups, genders, etc. (and how these have played out both recently and historically in health care and beyond)</p> <p>Aspects of theories including Foucault’s⁸⁷ concepts of how power works in society and Witz’s⁸⁸ critical approach to power relationships between professions</p>	<p>‘We talk a lot about power, especially in terms of binary oppositions that seem to be equal (e.g. women–men, Black–White) but how they encode implicit hierarchies; how there’s always [a] power relationship in dealing with people and how do you negotiate that power, how is it developed, how is it instituted, where are its limits? And Foucault is really useful about power because he always sees power and disempowerment and the potential for resistance’</p>
Manager	<p>Ideas from critical theory and philosophy about understanding and managing the tension between justice and efficiency or effectiveness</p> <p>Aspects of theories including Rawls’s⁸⁹ theory of distributive justice and Powers and Faden’s⁹⁰ work on feminist ethics in resource allocation</p>	<p>‘In terms of justice and efficiency and effectiveness and allocation of resources, that’s a battle of conscience [...] If we give a kidney transplant to people in these age groups with this illness, we don’t want a deviation from that because we want to manage costs’</p>
Health Advocate	<p>Aspects of theories like Engel’s⁹¹ biopsychosocial model of health and Freire’s⁹² critical pedagogy and consciousness raising</p> <p>How various minority groups have historically been treated in Western medical systems and the health care impact of this today</p> <p>Knowledge of public policy, the legislative process, and how policies get changed within their legislative and political structure</p>	<p>‘It’s not just about Aboriginal communities [...] an understanding of colonisation in other parts of the world will help us better think through how we deliver care to newcomers in a place like Toronto, where so many people are impacted by colonisation in their home countries [...]’</p>
Scholar	<p>Basic ideas from philosophy about epistemology and ontology (about ‘how we know’ and ‘what can be known’)</p> <p>Ideas from the history and philosophy of science about the assumptions of the scientific model currently used in</p>	<p>‘Epistemology is concerned with questions of how do we know what is knowledge, how do we know that we know, how does our social location affect what we can perceive or not</p>

Table 4 (Continued)

Role	Examples	Illustrative quotations
	medicine and how this is similar to (or different from) how other disciplines create knowledge	perceive, and there's questions about evidence [...] what counts as evidence [...] and what gets included and what gets excluded and what gets privileged'
Professional	An overview of the historical trajectory of the medical profession and of the changing role of the physician over time, including recent and contemporary critiques of the physician's current role Introductory ideas from sociology and anthropology about socialisation during medical education Aspects of theories including Freidson's ⁹³ theory of the professions and Hafferty and Castellani's ⁹⁴ concept of the hidden curriculum	'Freidson critiqued much of the sociology inherent in medical education as "sociology in medical education" because it is subjected to medical assumptions about positivism [...] But the problem that he identified is that it doesn't identify the power relationships. It talks about how sociology can be used to further the professional project of the health profession in question. He contrasted that with critical sociology, which he called the "sociology of medicine"'

The examples in the second column of this table are intended to provide the reader with a flavour of our diverse data; they are illustrative, rather than necessary or sufficient. They are not definitive curricular content that would be required for the appropriate teaching of each role in every medical education context, nor are they the only material our participants thought was important for that particular role. The quotations in the third column are intended to illustrate for the reader the type of data gathered from our participants after they were asked about each CanMEDS role. Each quotation links to one or more of the examples in the second column of same row

work in order to refine our findings for their own specific contexts; again, we would very much welcome collaborators interested in doing this.

Finally, it should be noted that some of the details of, and language around, the CanMEDS roles have changed over the past several years. This process began at about the same time that we initiated our study (J R Frank, personal communication [by telephone], 2011) and culminated in the release of CanMEDS 2015 in October 2015.² We have closely examined the changes between the 2005 and 2015 CanMEDS documents, which are summarised on the RCPSC website⁵⁶ and which focus on coherence and practical application rather than a conceptual reframing. The vast majority of changes (including the most obvious, the renaming of the Manager role as the Leader role) are clarifications of language and organisation, with the exception of one major new content area (patient safety and quality improvement) which draws on disciplines outside the SSH. There are some minor shifts of content between roles (e.g. communicating with non-physician health care professionals has now moved more explicitly into the Collaborator role), but these do

not substantially mitigate the conceptual overlaps noted by our participants. Finally, we note the explicit recognition in CanMEDS 2015 of a few concepts (e.g. cultural safety) identified by our participants as implicit in 2005 and for which we have already developed curricular and pedagogical materials.

Future directions

Although this study originally grew out of an intellectual exercise,²¹ we had hoped that we would eventually locate a programme willing to implement our findings. Due perhaps to current local interest in curriculum renewal and to the continued use of CanMEDS in Canadian accreditation requirements at multiple levels, we have indeed found willing collaborators (administrators, educators and students) at multiple Canadian undergraduate and postgraduate programmes, as well as in programmes that train other health professionals in professions that have modelled their own competency frameworks after CanMEDS. Together with this team of collaborators, we have begun a multi-site rollout of curricular content specific to each programme and are now building model curricula that will spiral SSH content

between different levels of education (medical school, residency, faculty development) at a single institution. In addition to a standard evaluation of the novel curricular materials we have developed, we are also conducting a rigorous realist evaluation of the implementation process for this complex intervention, gathering input from curricular stakeholders ranging from deans to medical students; we intend to share the findings from this work in future publications.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Delineating the non-bioscientific knowledge needed to train competent physicians.

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