

Clinical Reasoning in CanMEDS 2025

Raisonnement clinique dans CanMEDS 2025

Meredith Young,¹ Adam Szulewski,² Robert Anderson,³ Carlos Gomez-Garibello,¹ Brent Thoma,⁴ Sandra Monteiro⁵

¹Institute of Health Sciences Education, McGill University, Quebec, Canada; ²Queen's University, Ontario, Canada; ³NOSM University, Ontario, Canada; ⁴University of Saskatchewan, Saskatchewan, Canada; ⁵McMaster University, Ontario, Canada
Correspondence to: Meredith Young, PhD, Associate Professor, Institute of Health Science Education, McGill University, Room 200, Lady Meredith House 1110 Pine Avenue West, Montreal, QC; phone: 514-398-4059; email: meredith.young@mcgill.ca

Published ahead of issue: Dec 21, 2022. CMEJ 2022 Available at <https://doi.org/10.36834/cmej.75843>

© 2022 Young, Szulewski, Anderson, Gomez-Garibello, Thoma, Monteiro; licensee Synergies Partners. This is an Open Journal Systems article distributed under the terms of the Creative Commons Attribution License. (<https://creativecommons.org/licenses/by-nc-nd/4.0>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is cited.

Introduction

Clinical reasoning was one of the early cornerstones of medical education research, and this early research focus reflects its central role in medical training.¹ Therefore, it may be surprising that clinical reasoning was identified as an underrepresented concept in the CanMEDS physician competency framework.² However, a close examination of the framework demonstrates that clinical reasoning, despite its central importance, is rarely explicitly mentioned or integrated in CanMEDS. While some aspects of clinical reasoning are woven within the Medical Expert role as enabling competencies, our understanding of clinical reasoning has expanded beyond these few explicit mentions in CanMEDS 2015. This primer will orient readers to why clinical reasoning is a key concept for CanMEDS 2025, how our understanding of clinical reasoning has evolved, highlight how clinical reasoning is represented in CanMEDS 2015, and suggest ways that CanMEDS 2025 could be revised to more deliberately and comprehensively incorporate competencies related to clinical reasoning.

What is Clinical Reasoning and why is it important to physician competency?

Clinical reasoning has been described as the core of professional practice in healthcare,¹ as it is a key component of all aspects of patient care. Additionally, errors in reasoning have been named as a threat to patient safety given the high cost of errors to patients and

practitioners.³ Despite its centrality and importance,⁴ how we define clinical reasoning, how we conceptualize effective reasoning, and how we operationalize it for the purposes of teaching, assessment, and research remain varied if not deeply divided.^{4,5}

The notions of effective clinical reasoning have been variously described by different communities within medical education—as different conceptualizations or elements of reasoning have been used as objectives for instruction, targets for assessment, or areas of focused research. Each of these ways of thinking about clinical reasoning draw from different disciplines, domains, or theoretical homes—from human cognitive architecture to epistemologies of practice; which means each of these ways of thinking about clinical reasoning focus on different elements of the clinical reasoning process. These numerous ways of approaching clinical reasoning vary in important ways. Some focus on the outcomes of reasoning; from medical error (an unfortunate outcome of reasoning⁶) to diagnostic accuracy (an aspired outcome⁷). Some focus on clinical reasoning as an individual activity, focused on the cognitive processes of the practitioner or learner; while others explore clinical reasoning as a socially embedded activity, with attention paid to team provision of care (placing reasoning as an interactional activity⁸), decisions-in-context (reasoning as a situated or embodied activity⁹), or shared decision-making (patient-as-partner¹⁰). Still other members of the community have focused their attention on the limits of what is possible in a practitioners' clinical reasoning—from cognitive load considerations

(clinical reasoning and task performance are limited by working memory constraints¹¹), to the dangers of bias (e.g. inequities and health care disparities¹²). Finally, some focus on human factors and system contributions to error³ and how individuals adapt to complex contexts such as adaptive expertise,¹³ collective competence,¹⁴ and complexity theory.¹⁵ Each of these perspectives highlight different components of the reasoning process, value different “outcomes” of reasoning, and have different conceptualizations of what makes “effective” reasoning. These differences in valued components, outcomes, and notions of effective reasoning all feed into very different areas for focused teaching, different assessment targets, and different approaches to research.¹⁶

To render a large and complex concept such as clinical reasoning into something that can be taught, assessed, or researched in medical education, decisions about what constitutes effective clinical reasoning in each context or specialty must be made. Depending on what is determined to be effective reasoning, different components of the clinical reasoning process, different contextual variables, or different outcomes of clinical reasoning come to the forefront.¹⁷ For example, effective reasoning can be characterized by speed,¹⁸ accuracy,¹⁹ cost implications,²⁰ balancing of patient desires with clinical recommendation (i.e. shared decision making),¹⁰ balancing over-testing with a desire for certainty,²¹ recognition of and adaptation to contextual variables,²² effective adaptation of a management plan,²³ and effectively managing cognitive load within working memory limitations.¹¹ These characteristics of effective reasoning become the targets of assessment, learning, and teaching that vary depending on the expertise level of the population in question, specialty context, and care context (i.e., urgent care vs. community care).

How is Clinical Reasoning represented in the 2015 CanMEDS competency framework?

In the CanMEDS 2015 framework, aspects of Clinical Reasoning are found primarily as enabling competencies within the Medical Expert role (Table 1A) with some elements interwoven throughout other roles (Table 1B). Research related to the theoretical and conceptual understanding of clinical reasoning has grown since CanMEDS 2015.² More recent work extends beyond individual cognition to include team-based reasoning;⁸ from diagnostic decision-making to consideration for

management reasoning,²³ and from individual cognitive processes to exploring clinical reasoning as a situated behaviour in complex contexts.⁹ Our notions of what constitutes good and sound clinical reasoning have broadened in lockstep with our growing theoretical understanding of clinical reasoning, and our growing acknowledgement of the complexity of care. While clinical reasoning remains at the core of what it means to be a healthcare provider,¹ what that clinical reasoning looks like and how it is operationalized into targets of teaching, learning, and assessment have expanded. While the concept of clinical reasoning is reflected in some enabling competencies within CanMEDS 2015—recognizing that specialty context will shape how these competencies are enacted - we believe that clinical reasoning should be more explicitly and comprehensively represented within CanMEDS 2025.

How can Clinical Reasoning be better represented within the 2025 CanMEDS competency framework?

To better align with current understandings of clinical reasoning, the 2025 CanMEDS competency framework can, and should, more deliberately integrate the many aspects of clinical reasoning that contribute to providing high quality clinical care. In a more granular sense, clinical reasoning includes the integration of necessary fundamental knowledge, and the ability to mobilize that knowledge while delivering care in a variety of contexts in a timely and effective way. While some key components of effective clinical reasoning are important current enabling competencies for the Medical Expert Role, aspects of clinical reasoning are also woven throughout other CanMEDS roles (i.e., communicator, collaborator, scholar, and professional; see Table 1). The scope of requisite knowledge, standards of care, standards of “good” reasoning, and complex contextual factors that influence clinical reasoning could and should be better integrated into CanMEDS 2025.² In order to better reflect clinical reasoning within the CanMEDS framework, we suggest adapting several existing enabling competencies, and articulate those that we believe are important considerations for CanMEDS 2025. The suggested enabling competencies (Table 1; section C) helps ground an already nebulous concept, and reflect the notion that clinical reasoning can be observed, taught, assessed, and studied in the context of several Roles. Meaning, the delivery of care necessitates effective clinical reasoning, several

enabling competencies needed for effective clinical reasoning, and these enabling competencies are integrated across several CanMEDS roles. Clinical reasoning is an excellent example of how enabling competencies across multiple CanMEDS roles need to be integrated to effectively deliver care.

The enabling competencies we propose in Table 1C reflect our growing understanding of how clinical reasoning is mobilized in the clinical environment and recognize the complexity of care environments that shape clinical

reasoning processes and outcomes. These suggested enabling competencies will continue to require contextualization within each of our medical specialties, as important distinctions do exist regarding what “good” clinical reasoning looks like across contexts and care environments. While we do not believe clinical reasoning should be named as an independent competency,²⁴ we believe the complexity of clinical reasoning can be better reflected in several new, and several adapted enabling competencies across the CanMEDS framework.

Table 1. Clinical reasoning competencies for the CanMEDS physician competency framework.

A. CanMEDS 2015 Competencies directly applicable to Clinical Reasoning	
Medical Expert 1.6 Recognize and respond to the complexity, uncertainty, and ambiguity inherent in medical practice	
Medical Expert 3.1 Determine the most appropriate procedures or therapies	
Medical Expert 3.3 Prioritize a procedure or therapy, taking into account clinical urgency and available resources	
Medical Expert 4.1 Implement a patient-centred care plan that supports ongoing care, follow-up on investigations, response to treatment, and further consultation	
B. CanMEDS 2015 Competencies partially related to Clinical Reasoning	
<u>Medical Expert:</u>	
Medical Expert 1.3 Apply knowledge of the clinical and biomedical sciences relevant to their discipline	
Medical Expert 1.4 Perform appropriately timed clinical assessments with recommendations that are presented in an organized manner	
Medical Expert 1.5 Carry out professional duties in the face of multiple, competing demands	
Medical Expert 2.1 Prioritize issues to be addressed in a patient encounter	
Medical Expert 2.2 Elicit a history, perform a physical exam, select appropriate investigations, and interpret their results for the purpose of diagnosis and management, disease prevention, and health promotion	
Medical Expert 2.3 Establish goals of care in collaboration with patients and their families, which may include slowing disease progression, treating symptoms, achieving cure, improving function, and palliation	
Medical Expert 3.4 Perform a procedure in a skillful and safe manner, adapting to unanticipated findings or changing clinical circumstances	
Medical Expert 5.2 Adopt strategies that promote patient safety and address human and system factors	
<u>Communicator:</u>	
Communicator 2: Elicit and synthesize accurate and relevant information, incorporating the perspectives of patients and their families	
Communicator 5: Document and share written and electronic information about the medical encounter to optimize clinical decision-making, patient safety, confidentiality, and privacy	
<u>Collaborator:</u>	
Collaborator 1.3 Engage in respectful shared decision-making with physicians and other colleagues in the health care professions	
Collaborator 3.1 Determine when care should be transferred to another physician or health care professional	
Collaborator 3.2 Demonstrate safe handover of care, using both verbal and written communication, during a patient transition to a different health care professional, setting, or stage of care	
<u>Scholar:</u>	
Scholar 3.1 Recognize practice uncertainty and knowledge gaps in clinical and other professional encounters and generate focused questions that address them	
Scholar 3.4 Integrate evidence into decision-making in their practice	
<u>Professional:</u>	
Professional 1.2 Demonstrate a commitment to excellence in all aspects of practice	
Professional 3.3 Participate in peer assessment and standard setting.	
Professional 4.1 Exhibit self-awareness and manage influences on personal well-being and professional performance	
C. Suggested additions or modifications for the CanMEDS 2025 Framework related to Clinical Reasoning	
<i>New or Modified Competency</i>	<i>Rationale for change</i>
<u>Medical Expert</u>	
<u>2.5 (New) Synthesize the history, physical exam, and investigations to guide diagnosis and management, disease prevention, and health promotion</u>	Effective clinical reasoning requires the synthesis of these components.
<u>3.3 (Revised): Prioritize a procedure or therapy, considering clinical urgency, available resources, and the relevant clinical context</u>	The correct procedure or therapy needs to consider the clinical context.
<u>5.3 (New): Seek out performance data, feedback, and coaching from colleagues and other members of the health care team to support practice improvement</u>	Improving clinical reasoning and patient care requires external input.

<u>5.4 (New): Recognize periods of high cognitive load during clinical care and demonstrate strategies to manage this load, including safely deprioritizing and/or delegating task-irrelevant activities</u>	Physicians must be able to manage cognitive load imposed by various elements such as task complexity, distractors, and affective factors (e.g., emotion, stress, uncertainty) during clinical work.
Communicator	
<u>2.4 (New): Develop a variety of strategies and techniques to elicit accurate and comprehensive information from, or about, a patient</u>	Eliciting an accurate and comprehensive history can be challenging in many contexts. Strategies need to be developed to address this.
<u>3.3 (New): Synthesize and communicate relevant medical information while incorporating the perspectives of patients, their families, and their communities</u>	Beyond the medical information, the perspectives of patients and their support networks should must be integrated into clinical reasoning.
<u>3.4 (New): Communicate information about diagnoses and treatment options in patient-centered ways when the physician is not fluent in the patient's language</u>	Communication needs to consider the limitations of physicians' fluency in their patients' dominant language(s).
Collaborator	
<u>1.4 (New): Demonstrate an understanding of the scope of practice of other clinicians in the health care team</u>	Effective clinical reasoning requires an understanding of the role of other health professions.
<u>2.3 (New): Engage with other clinicians in the health care team in a way that optimizes team function and invites input into determining the best care for patients</u>	Clinical reasoning is improved by the contributions of the health care team. Engaging others creates an environment wherein they can make contributions or suggestions that can be important to patient care.
<u>3.3 (New): Ask for help effectively in situations that exceed one's knowledge and skills</u>	Asking for help is a critical competency for all professionals. Clinical reasoning is only as good as a clinician's experience, so physicians need to recognize what they do not know and ask for help.
Leader	
<u>3.3 (New): Recognize when members of the healthcare team are being excluded to the detriment of patient care and re-engage them within the healthcare team</u>	Disengaged members of the health care team cannot contribute their perspective to support effective clinical reasoning.
Health Advocate	
<u>1.4 Apply knowledge of patient contexts, culture and values to identify local resources and guide patient care</u>	Context is an important factor in clinical reasoning that needs to be incorporated into treatment plans.
Scholar	
<u>1.1 (Revised): Develop, implement, monitor, and revise a personal learning plan developed through ongoing self-reflection and external feedback to enhance professional practice</u>	Self-reflection is an important part of a personal learning plan that should be guided by external feedback.
Professional	
<u>1.2 (Revised): Use clinical practice data to identify opportunities to improve while demonstrating a commitment to excellence in all aspects of practice</u>	We must move beyond being committed to excellence to show this through ongoing self-evaluation to support improvement.
<u>1.6 (New): Recognize when a situation exceeds one's knowledge and skills and seek assistance</u>	It is important to know the limits of one's capabilities and able to seek assistance to avoid patient harm.

Conflicts of Interest: Dr. Brent Thoma has received payments for teaching, research, and administrative work from the University of Saskatchewan College of Medicine, payments for teaching and administrative work from the Royal College of Physicians and Surgeons of Canada, honoraria for teaching or writing from Harvard Medical School, the New England Journal of Medicine, the University of Cincinnati Children's Hospital, and NYC Health + Hospitals, and research grant funding from the Government of Ontario and the Canadian Association of Emergency Physicians. Dr. Sandra Monteiro has received salary support from Touchstone Institute, consultant fees from Aquifer, and research grant funding from the royal college of physicians and surgeons.

Acknowledgement: The authors would like to acknowledge Ms. Megan McComb for planning and logistical support.

Funding: This project was completed with logistical support from the Royal College of Physicians and Surgeons of Canada. Funding for this work was partially supported by a Chercheur Boursier Junior 1 Award to M. Young from the Fonds de Recherche du Quebec-Santé (award no. 253008)

References

1. Higgs J, Jones MA, Loftus S, Christensen N, editors. *Clinical reasoning in the health professions*. Third. Elsevier Health Sciences; 2008. 519 p.
2. JR, Snell L, Sherbino J Editors. *CanMEDs 2015 physician competency framework*. 2015 p. 1–30. Available from: <http://www.royalcollege.ca/portal/page/portal/rc/canmeds/re-sources/publications>
3. Institute of Medicine (US) Committee on Quality of Health Care in America. *To err is human: building a safer health system* [Internet]. Kohn LT, Corrigan JM, Donaldson MS, editors. Washington (DC): National Academies Press (US); 2000 Available from: <http://www.ncbi.nlm.nih.gov/books/NBK225182/> [Accessed Jul 20, 2022].
4. Young ME, Thomas A, Lubarsky S, et al. Mapping clinical reasoning literature across the health professions: a scoping review. *BMC Med Educ*. 2020 Apr 7;20(1):107. <https://doi.org/10.1186/s12909-020-02012-9>
5. Young M, Thomas A, Lubarsky S, et al. Drawing boundaries: the difficulty in defining clinical reasoning. *Acad Med*. 2018 Jul;93(7):990–5. <https://doi.org/10.1097/ACM.0000000000002142>
6. Graber ML. The incidence of diagnostic error in medicine. *BMJ Qual Saf*. 2013 Oct 1;22(Suppl 2):ii21–7. <https://doi.org/10.1136/bmjqs-2012-001615>
7. Monteiro SM, Norman G. Diagnostic reasoning: where we've been, where we're going. *Teach Learn Med*. 2013 Jan 1;25(sup1):S26–32. <https://doi.org/10.1080/10401334.2013.842911>
8. Graber ML, Ruzs D, Jones ML, Farm-Franks D, Jones B, Glück JC, et al. The new diagnostic team. *Diagnosis*. 2017 Dec 1;4(4):225–38. <https://doi.org/10.1515/dx-2017-0022>
9. Durning SJ, Artino ARJ, Schuwirth L, van der Vleuten C. Clarifying assumptions to enhance our understanding and assessment of clinical reasoning. *Acad Med*. 2013 Apr;88(4):442–8. <https://doi.org/10.1097/ACM.0b013e3182851b5b>
10. Braddock III CH, Edwards KA, Hasenberg NM, Laidley TL, Levinson W. Informed decision making in outpatient practice time to get back to basics. *JAMA*. 1999 Dec 22;282(24):2313–20. <https://doi.org/10.1001/jama.282.24.2313>
11. Szulewski A, Howes D, van Merriënboer JJG, Sweller J. From theory to practice: the application of cognitive load theory to the practice of medicine. *Acad Med*. 2021 Jan;96(1):24–30. <https://doi.org/10.1097/ACM.0000000000003524>
12. Chapman EN, Kaatz A, Carnes M. Physicians and implicit bias: how doctors may unwittingly perpetuate health care disparities. *J Gen Intern Med*. 2013 Nov 1;28(11):1504–10. <https://doi.org/10.1007/s11606-013-2441-1>
13. Mylopoulos M, Kulasegaram K, Woods NN. Developing the experts we need: Fostering adaptive expertise through education. *J Eval Clin Pract*. 2018;24(3):674–7. <https://doi.org/10.1111/jep.12905>
14. Lingard L. Paradoxical truths and persistent myths: reframing the team competence conversation. *J Contin Educ Health Prof*. 2016 Summer;36:S19. <https://doi.org/10.1097/CEH.0000000000000078>
15. Crisancho S, Field E, Lingard L. What is the state of complexity science in medical education research? *Med Educ*. 2019;53(1):95–104. <https://doi.org/10.1111/medu.13651>
16. Young ME, Dory V, Lubarsky S, Thomas A. How different theories of clinical reasoning influence teaching and assessment. *Acad Med*. 2018 Sep;93(9):1415. <https://doi.org/10.1097/ACM.0000000000002303>
17. Young ME. Crystallizations of constructs. *Perspect Med Educ*. 2018 Jun 1;7(1):21–3. <https://doi.org/10.1007/s40037-018-0422-0>
18. Sherbino J, Dore KL, Wood TJ, et al. The relationship between response time and diagnostic accuracy. *Acad Med*. 2012 Jun;87(6):785–91. <https://doi.org/10.1097/ACM.0b013e318253acbd>
19. Norman G, Young M, Brooks L. Non-analytical models of clinical reasoning: the role of experience. *Med Educ*. 2007;41(12):1140–5. <https://doi.org/10.1111/j.1365-2923.2007.02914.x>
20. Graber ML, Wachter RM, Cassel CK. Bringing diagnosis into the quality and safety equations. *JAMA*. 2012 Sep 26;308(12):1211–2. <https://doi.org/10.1001/2012.jama.11913>
21. Platts-Mills TF, Nagurny JM, Melnick ER. Tolerance of uncertainty and the practice of emergency medicine. *Ann Emerg Med*. 2020 Jun 1;75(6):715–20. <https://doi.org/10.1016/j.annemergmed.2019.10.015>
22. Peters A, Vanstone M, Monteiro S, Norman G, Sherbino J, Sibbald M. Examining the influence of context and professional culture on clinical reasoning through rhetorical-narrative analysis. *Qual Health Res*. 2017 May 1;27(6):866–76. <https://doi.org/10.1177/1049732316650418>
23. Cook DA, Sherbino J, Durning SJ. Management reasoning: beyond the diagnosis. *JAMA*. 2018 Jun 12;319(22):2267–8. <https://doi.org/10.1001/jama.2018.4385>
24. Connor DM, Durning SJ, Rencic JJ. Clinical reasoning as a core competency. *Acad Med*. 2020 Aug;95(8):1166–71. <https://doi.org/10.1097/ACM.0000000000003027>