

## Opinion Paper

Emily A. Abdoler\*, Andrew S. Parsons and Thilan P. Wijesekera

# The future of teaching management reasoning: important questions and potential solutions

<https://doi.org/10.1515/dx-2022-0048>

Received May 14, 2022; accepted November 7, 2022;

published online November 23, 2022

**Abstract:** Management reasoning is distinct from but inextricably linked to diagnostic reasoning in the iterative process that is clinical reasoning. Complex and situated, management reasoning skills are distinct from diagnostic reasoning skills and must be developed in order to promote cogent clinical decisions. While there is growing interest in teaching management reasoning, key educational questions remain regarding when it should be taught, how it can best be taught in the clinical setting, and how it can be taught in a way that helps mitigate implicit bias. Here, we describe several useful tools to structure teaching of management reasoning across learner levels and educational settings. The management script provides a scaffold for organizing knowledge around management and can serve as a springboard for discussion of uncertainty, thresholds, high-value care, and shared decision-making. The management pause reserves space for management discussions and exploration of a learner's reasoning. Finally, the equity reflection invites learners to examine management decisions from a health equity perspective, promoting the practice of metacognition around implicit bias. These tools are easily deployable, and – when used regularly – foster a learning environment primed for the successful teaching of management reasoning.

**Keywords:** clinical reasoning; management reasoning; teaching.

## Introduction

As the clinical reasoning community has placed increasing emphasis on management reasoning in recent years, its relationship to diagnostic reasoning has become clearer. Cook and colleagues defined management reasoning as “the process of making decisions about patient management, including choices about treatment, follow-up visits, further testing, and allocation of limited resources [1].” Inherent in this definition is the iterative nature of the clinical reasoning process; a key component of management reasoning is taking steps toward refining, confirming, or revising a working diagnosis. Likewise, each iteration of the working diagnosis should trigger re-evaluation of next steps in management.

Management reasoning is inherently more complex and imbued with greater uncertainty [2]. Modern medicine often provides a panoply of management options, the value of which varies depending upon the context in which they are situated and according to the preferences of the individual patients and practices of the individual providers involved. For each specific management decision, there are situational factors that clinicians must address and acknowledge, including structural racism and systemic inequities that can improperly and surreptitiously constrain choice. The sheer number of management possibilities and situational particularities likely complicates teaching efforts focused on management reasoning. However, focusing on core skills and concepts rather than the minutiae of particular clinical scenarios offers a possible solution.

Key skills and concepts involved in management reasoning include shared decision-making, interprofessional collaboration, communication, tolerating uncertainty and complexity, choosing high-value care, prioritization, monitoring/adjusting, and applying thresholds [2, 3]. Yet even with the delineation of these skills, how to most effectively teach management reasoning remains unclear. Below, we pose three important questions that need answering to advance understanding of management reasoning education. We propose answers to these questions based on our

---

\*Corresponding author: Emily A. Abdoler, MD, MAEd, Medicine, University of Michigan Medical School, F4171A UH South, 1500 E. Medical Center Drive, Ann Arbor, MI 48109, USA, E-mail: eabdoler@med.umich.edu

Andrew S. Parsons, Medicine, University of Virginia School of Medicine, Charlottesville, VA, USA

Thilan P. Wijesekera, Internal Medicine, Yale University School of Medicine, New Haven, CT, USA

collective expertise studying and teaching management reasoning and describe three new simple and effective teaching tools designed to facilitate the teaching of management reasoning in different educational settings and at different learner levels.

## When is the best time to teach management reasoning?

Although the optimal time to begin instruction in management reasoning is not well-explored in the literature, the argument that it should be taught early, often, and deliberately is justifiable. The related epidemics of diagnostic error [4] and low-value care [5] create an urgency that have led national organizations such as SIDM (Society to Improve Diagnosis in Medicine) and landmark publications, such as The National Academy of Sciences' "Improving Diagnosis in Healthcare," [6] to call for earlier and enhanced teaching of clinical reasoning. Rencic et al. suggested that diagnostic reasoning can be taught early in medical training by making the process explicit to learners [7]. The same logic should apply to the teaching of management reasoning and for similar reasons. The benefits of teaching early learners the risks of both necessary and unnecessary tests and treatments have been well described [8, 9]. Further, diagnosis and management are part of the same iterative process that encapsulates clinical reasoning; it simply does not make sense to divorce the teaching of these two concepts.

One strategy to teach management reasoning to learners at multiple levels of training is by breaking the process down into its core components. For example, the management script is the mental schema that clinicians develop and use when making management decisions [10, 11]. This process can be subdivided into two steps: management script activation and management option selection [11]. These two steps can be taught and assessed using a management script template (Figure 1), either in the clinical environment or in case-based small group discussions. Management script activation asks learners to identify the full menu of management options that should be considered for a healthcare problem at any stage [11] and is represented in the first column of Figure 1. This step is particularly useful for early learners and can be completed in concert with the explicit formation of a problem representation, updating both in tandem as new clinical information is obtained. Analogous to the illness script, this first step represents the organization of a clinician's knowledge with respect to management

includes a wide range of interventions including laboratory studies, imaging, procedures, specialty consultations, medications, and monitoring [11].

The step of management option selection is more complex and therefore more applicable to learners with more clinical experience, requiring consideration of uncertainty, thresholds, high-value care, and shared decision-making [3]. The new teaching tool visualized in Figure 1 builds upon the management script template [11] by asking learners to select interventions from their management menu of options based on these four concepts, each fundamental to effective management decision-making. Teaching management reasoning in this manner emphasizes a deliberate patient-centered care model where the interventions considered always outnumber those performed [12].

## How is management reasoning taught in the clinical setting?

Moving the clinical care team from discussions of diagnosis to those of management can seem difficult. The initial steps in the diagnostic process – history-taking and physical examination – can be time-consuming, and synthesizing collected information to prioritize a differential diagnosis can be challenging for learners at all levels. Because diagnosis informs management, clinicians may be hesitant to initiate interventions without a clear diagnostic label; teams may feel compelled to litigate the differential diagnosis, leaving little time for nuanced management discussions. However, advancing conversations to management is valuable for many reasons, a principle that should be reinforced to learners on the clinical team.

Diagnostic uncertainty, the subjective perception of an inability to provide an accurate explanation of a patient's health problem [13], is prevalent among clinicians [14]. Prolonged discussions on diagnosis do not necessarily reduce uncertainty and can even cause diagnostic delays; in contrast, initiating testing or monitoring for a treatment response may actually increase the probability of – and expedite – an eventual diagnosis [15]. Unlike diagnostic reasoning that has been proposed to frequently occur through System 1 pattern recognition [2], management reasoning may naturally lend towards a more System 2-based analytical process [1, 10] as clinicians consider the various intervention, disease, patient, provider, and system factors around management decisions [3]. Because of this inherent nuance and uncertainty, management reasoning likely takes dedicated time.

Types of Interventions	Potential Management Options	Considerations	Selected Management for this Patient
Labs	CBC, BMP, UA with reflex culture, blood cultures	<b>Uncertainty:</b> Lack of clarity due to ambiguity and complexity	CBC, BMP, UA with reflex culture
Imaging	Renal Ultrasound CT abdomen (with or without contrast)		None (unless symptoms do not improve)
Procedures	Foley catheter placement	<b>Thresholds:</b> Probability of diagnosis needed to perform	None (unless unable to urinate)
Specialists	Infectious Diseases consultation Urology consultation	<b>High value care:</b> Appropriateness of intervention based on	None (unless symptoms do not improve)
Medications	Fluroquinolone (IV or PO) Cephalosporin (IV or PO)		IV Ceftriaxone in the ED followed by prescription for PO levofloxacin to complete outpatient course
Monitoring	Hospital admission Follow-up PCP appointment Follow-up phone call from ED (for symptoms and urine culture results)	<b>Shared decision-making:</b> Collaboration with patient and other key stakeholders	Follow-up PCP appointment Follow-up ED phone call

**Figure 1:** Management script template integrating four core concepts, as adapted from parsons and colleagues [11]. To utilize this tool, the learner lists all potential management options for a health care problem being considered (first column), then weighs key considerations (second column), before selecting which management options they would like to pursue for this patient. In this example, the learner is applying the template to create a management plan for a young woman presenting to the emergency department with fevers, dysuria, and flank pain concerning for pyelonephritis. BMP, basic metabolic panel; CBC, complete metabolic panel; CT, computed tomography; ED, emergency department; IV, intravenous administration; PCP, primary care provider; PO, oral administration; UA, urinalysis.

To promote learner engagement in management reasoning, we encourage use of a “management pause” – which was previously described at a medical education conference [16] and promoted in a podcast [17] – for decisions that may be high stakes or occur at critical transitions of care. Modeled after the “diagnostic pause” [18], the management pause includes, but is not limited to, questions shown in Figure 2. Asking the learner why they chose an intervention is an open-ended question that allows them space to outline the intervention’s advantages and provides dedicated time for the educator to understand how the learner is prioritizing their proposed intervention(s). Next, naming potential downsides to the proposed intervention(s) can serve as a forcing function to highlight or catch risks or burdens for patients. Widening potential alternatives [19] to the proposed intervention(s) can be a strategy for minimizing confirmation bias, promoting evidence-based medicine, and interrogating the breadth of a learner’s management script. Finally, asking the patient their perspective is crucial for shared decision-making, a central aspect of management reasoning [3] and a practice that can bolster patient trust and adherence.

Using the management pause begins with encouraging learners to be honest and comfortable with their answers. Then, supervising clinicians can better highlight exemplary decision-making, identify knowledge gaps, and provide targeted teaching in management reasoning before moving forward with a care plan together. Clarifying the decision-making process can also illuminate a learner’s comfort with uncertainty and risk, which can be helpful in determining the level of supervision needed in the future [20]. Use of the management pause is appropriate for any learner presenting on team rounds, as its open-ended nature allows the educator to provide feedback targeted to the learner’s educational level.

Management Pause
1. Why are we choosing this intervention for this patient?
2. What are the potential downsides?
3. What are potential alternatives & why are we not choosing them?
4. Have we asked the patient for their perspective?

**Figure 2:** 4 key questions of the management pause.

## How can management reasoning be taught in a way that helps promote mitigation of implicit bias?

The practice of medicine is a reflection of the society in which we live, mirroring and often magnifying the biases and racism that oppress marginalized groups of people. Beyond institutional racism and the systemic inequities of medicine in general, the clinical decision-making of individual practitioners is known to be negatively impacted by implicit bias [21]. Teaching management reasoning is thus a natural and important juncture to highlight how individual bias and systemic inequity can play into clinical decisions. Similar to the “management pause,” the “equity reflection” – previously shared at a conference [16] and in a podcast [17] – invites learners to assess their proposed management plans through the lens of inequity by exploring if and how it differs from the highest value care. The equity reflection can proceed along one of two lines of questioning, as shown in Figure 3.

This simple exercise, used most easily in a clinical context or in clinical case discussions, has the potential to meet several of the key features of teaching implicit bias recognition and management [22, 23]. If deployed regularly on team rounds, the equity reflection will become a normalized part of management discussions, possibly helping create the safe learning environment essential for these educational moments [22, 23]. In openly considering how the healthcare system and individual practitioners can introduce bias into decision-making, the equity reflection may enable learners to move from feelings of unproductive self-blame [23] to action. Moreover, the tool may help build a practice of metacognition and self-reflection [22, 23] learners can carry with them as they approach independent practice. The second line of questioning in particular invites learners to consider the patient’s perspective in a very personal way while also reflecting on and accepting how the particular patient’s preferences might be different from their own. By developing this awareness and agency in trainees, the goal is that they become champions for system-wide changes to produce more equitable institutions. While it may be most

appropriate for more advanced trainees (who have a better sense of the standard of care for various diagnoses), all learners on team rounds will benefit from the discussion.

## Discussion

While a relatively nascent area of scholarship, management reasoning can likely be taught using evidence-informed tools. Just as with diagnostic reasoning, clinical experiences lead learners to develop patterns of management decision-making, but explicit efforts likely are needed to ensure they develop the key skills and internalize the core concepts necessary for clinical decisions to be logical and systematic. Sound management reasoning allows clinicians to appreciate and incorporate the particularities of specific clinical contexts, including patient preferences.

Educators do learners no favors by concealing the complexity of management even as they teach them the intricacies of diagnostic reasoning. However, the nuance of when to teach management reasoning, how to approach management reasoning education in clinical settings, and how to use management reasoning teaching to help mitigate implicit bias has not been well-explored in the literature. The tools introduced in this paper provide potential answers to these important questions. Providing frameworks like the management script and defining core concepts gives learners scaffolds on which to organize and conceptualize their burgeoning medical knowledge, allowing management reasoning to be introduced in a thoughtful way early in the clinical curriculum. As learners engage in clinical case discussions and join clinical teams, regularly deploying tools like the management pause and equity reflection likely can normalize and streamline thoughtful discussions of management reasoning across a developmental spectrum. Further, these tools may help create a safe space for instructors to probe learners’ management reasoning and provide formative feedback.

Much work is needed to determine the broad changes necessary to incorporate management reasoning into curricular programs [2]. However, these three simple but powerful tools can be used by individual educators to teach

Equity Reflection	
1. Are we deviating in any way from the standard of care in this situation? If so:	1. If you were being discharged in the same situation as this patient, is there anything you would want to be done differently than our present plan?
2. In what ways are we deviating?	2. If so, what?
3. Why are we deviating?	3. Why aren't we doing the same for this patient?
4. Instead of deviating, what could we do differently to ensure we are providing the highest value care?	4. If there are barriers, how can we leverage our multidisciplinary team to overcome them?

**Figure 3:** Two lines of questioning for the equity reflection.

management reasoning across the continuum of medical education, regardless of educational or clinical context. The management script template, management pause, and equity reflection have the potential to demystify the nuances of clinical practice, make explicit the implicit decisions that guide management plans, and help train clinicians who will be thoughtful partners in the care of patients. Future empiric studies should evaluate the impact of these tools in a variety of educational settings.

**Research funding:** None declared.

**Author contributions:** All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

**Competing interests:** Emily Abdoler serves as a case reviewer for NEJM Healer. Andrew Parsons serves as a content advisor for NEJM Healer.

**Informed consent:** Not applicable.

**Ethical approval:** Not applicable.

## References

- Cook DA, Sherbino J, Durning S. Management reasoning: beyond the diagnosis. *J Am Med Assoc* 2018;319:2267–8.
- Cook DA, Durning SJ, Sherbino J, Gruppen LD. Management reasoning: implications for health professions educators and a research agenda. *Acad Med* 2019;94:1310–6.
- Wijesekera TP, Parsons AS, Abdoler EA, Trowbridge RL, Durning SJ, Rencic JJ. Management reasoning: a toolbox for educators. *Acad Med* 2022;97:1724.
- Graber ML, Carlson B. Diagnostic error: the hidden epidemic. *Physician Exec* 2011;37:1218–49.
- Shrank WH, Rogstad TL, Parekh N. Waste in the US Health Care System: estimated costs and potential for savings. *J Am Med Assoc* 2019;322:1501–9.
- Committee on Diagnostic Error in Health Care, Board on Health Care Services, Institute of Medicine, The National Academies of Sciences, Engineering, and Medicine. *Improving diagnosis in health care*, Balogh EP, Miller BT, Ball JR, editors. Washington (DC): National Academies Press (US); 2015.
- Rencic JJ, Trowbridge RL, Durning SJ. Developing a curriculum in clinical reasoning. In: Trowbridge RL, Rencic JJ, Durning SJ, editors. *Teaching clinical reasoning*. American College of Physicians; 2015:64–90 pp.
- Leen Hunderfund AN, Dyrbye LN, Starr SR, Mandrekar J, Naessens JM, Tilburt JC, et al. Role modeling and regional health care intensity: U.S. medical student attitudes toward and experiences with cost-conscious care. *Acad Med* 2017;92:694–702.
- Steele C, Cavea D, Berk J, Riddell R, Kumra T, McGuire M, et al. Novel first-year curriculum in high-value care. *Clin Teach* 2019;16:513–8.
- Abdoler EA, O'Brien BC, Schwartz BS. Following the script: an exploratory study of the therapeutic reasoning underlying physicians' choice of antimicrobial therapy. *Acad Med* 2020;95:1238–47.
- Parsons AS, Wijesekera TP, Rencic JJ. The management script: a practical tool for teaching management reasoning. *Acad Med* 2020;95:1179–85.
- Keijzers G, Cullen L, Egerton-Warburton D, Fatovich DM. Don't just do something, stand there! the value and art of deliberate clinical inertia. *Emerg Med Australasia (EMA)* 2018;30:273–8.
- Bhise V, Rajan SS, Sittig DF, Morgan RO, Chaudhary P, Singh H. Defining and measuring diagnostic uncertainty in medicine: a systematic review. *J Gen Intern Med* 2018;33:103–15.
- Wijesekera TP, Sanders L, Windish DM. Reflections on diagnosis and diagnostic errors: a survey of internal medicine resident and attending physicians. *J Gen Intern Med* 2020;35:614–5.
- Phadke VK, Jagannath AD, Patel AA, Sherman SV. Over the threshold: an exercise in clinical reasoning. *J Gen Intern Med* 2022;37:1290–4.
- Parsons A, Abdoler E, Daniel M, Warburton K, Gruppen L, Durning S. Management reasoning: practical strategies for teaching using the example of a struggling learner. In: *Association for medical education in Europe 2021 convention, virtual*; 2021.
- Abdoler E, Dhaliwal G, Heublein M, Kryzhanovskaya E. #3 management reasoning. In: *The curbsiders teach podcast*; 2021. Available from: <https://thecurbsiders.com/teach> [Accessed 28 Dec 2021].
- Huang GC, Kriegel G, Wheaton C, Sternberg S, Sands K, Richards J, et al. Implementation of diagnostic pauses in the ambulatory setting. *BMJ Qual Saf* 2018;27:492–7.
- Heath C, Heath D. *Decisive: how to make better choices in life and work*. New York: Random House; 2013.
- Gielissen KA, Ahle SL, Wijesekera TP, Windish DM, Keene DE. Focus: medical Education: making sense of trainee performance: entrustment decision-making in Internal Medicine program directors. *Yale J Biol Med* 2020;93:403–10.
- Green AR, Carney DR, Pallin DJ, Ngo LH, Raymond KL, Iezzoni LI, et al. Implicit bias among physicians and its prediction of thrombolysis decisions for black and white patients. *J Gen Intern Med* 2007;22:1231–8.
- Sukhera J, Watling C. A framework for integrating implicit bias recognition into health professions education. *Acad Med* 2019;93:35–40.
- Gonzalez CM, Lypson ML, Sukhera J. Twelve tips for teaching implicit bias recognition and management. *Med Tech* 2021;43:1368–73.