

# How Doctors Think: How to Embed Clinical Reasoning Skills in an Educational Environment

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## Learning Objectives:

1. Identify key concepts of clinical reasoning
2. Illustrate educational strategies to promote clinical reasoning

## Brief Overview:

Clinical reasoning skills are not usually explicitly taught to learners, yet are fundamental to medical education. This workshop will illustrate how to identify and implement key clinical reasoning practices into the educational environment in the form of ward attending rounds, case presentations and conferences. *JGIM Exercises in Clinical Reasoning* contributors will guide the interactive workshop, which will integrate case-based, large and small group discussion.

## Summary:

Clinical reasoning, an inherent trait of the expert internist, is the essence of diagnosis and the delivery of safe, effective medical care. Clinician educators are faced with the task of not only using diagnostic reasoning to arrive at the correct diagnosis, but also to find a way to convey their reasoning strategies to novice diagnosticians. Clinical problem solving skills of both trainees and seasoned clinicians evolve over time and are skills that can be learned. Physicians use various clinical reasoning skills with each patient encounter, knowingly or not.

This workshop will provide a basic overview of key clinical reasoning concepts that all clinicians use and expand upon ways to identify and promote them within an educational environment. The large group will provide the hands-on practice of dissecting the thinking process of a seasoned clinician as he/she discusses cases, highlighting some of the most commonly used clinical reasoning concepts, including System 1 and 2 theories and common cognitive errors. The workshop builds on adult-learning principles and social cognitive theory and can help clinician educators incorporate explicit medical decision making and clinical problem solving into their noon conferences, morning reports and ward attending rounds. We will provide resource materials and a list of journals accepting exercises in clinical reasoning as well as illustrate specific techniques to embed these concepts into everyday practice on the wards, in clinic, or facilitating case-based conferences.

## Workshop Agenda:

1. Introductions, goals and objectives (5 min)
2. Presentation (15 min): A concise overview of basic clinical reasoning principles, including the dual process theory, diagnostic error and heuristics
3. Large group exercise (25 min): A live demonstration of 2 “think-out loud” clinical problem solving cases based on a monthly presentation at main coordinator’s institution, integrated with comments of the clinical reasoning demonstrated by the discussant from co-presenters and participants. The 2 cases will highlight differing concepts of clinical reasoning, including system 1, system 2, and common cognitive errors.
4. Presentation (10 min): Building from the large group exercise, will reinforce previously taught concepts and expand upon them, highlighting cognitive errors and heuristics and display ways to embed these commonly-used core concepts in an educational environment using “meta-cognition”
5. Small group exercise (25 min): The small group will apply concepts outlined in #4 and brainstorm ways to integrate clinical reasoning into their ward attending rounds, case conferences and morning reports at their own institutions
6. Conclusions and homework (5 min): Presenters will provide concluding remarks and encourage participants to integrate key concepts of clinical reasoning at their home institutions
7. Evaluations (5 min)

## Definitions:

- **Clinical Reasoning:** the process of how we reason through data and arrive at a decision
  - Uses both medical knowledge and experience
- **Illness Script:** Summary of a diagnosis including predisposing factors, pathophysiology, clinical findings (i.e. what does a certain disease “look like”?)
  - Based on experience
- **Problem Representation:** One sentence summary defining the specific case in abstract terms (ex: A 50 year-old female with sudden onset pleuritic chest pain, shortness of breath, and hemoptysis after an orthopedic procedure.)
- **Metacognition:** self-awareness of the thinking process
  - Based on the theory that we learn more from reflecting on our experiences than from the actual experiences themselves
- **Dual Process Theory:** a proposed theory of clinical reasoning in which the mind uses two distinct yet integrated “systems” when making decisions
  - **System 1:** based on unconscious reasoning, intuitive, implicit, automatic, requires little effort, quick
  - **System 2:** conscious reasoning, explicit, controlled, high effort, slow, logical
- **Heuristics:** rules of thumb, mental shortcuts or simple decision-making strategies, highly efficient and usually correct

- Anchoring: occurs when one locks onto a diagnosis early on and fails to re-consider after receiving contradictory information
- Availability: relies on immediate examples that come to mind
- Premature Closure: occurs when a diagnosis is accepted before it is fully confirmed
- Diagnostic Momentum: occurs when one accepts a diagnostic without any skepticism
- Deliberate practice: highly structured activity engaged in with the specific goal of improving performance

## How can we teach clinical reasoning?

### Promote metacognition

- Ask questions that make them think.
  - “Show me how you came to that decision.”
  - “Walk me through your reasoning with ordering that test/study.”
  - “Tell us what made you think about that diagnosis.”
  - “What difference will that test make in your management?”
  - “What are the risks/benefits of the test you want to order?”
  - “What would we do if this test is negative?”
- Help build learner’s illness scripts by asking them to compare and contrast the most likely diagnostic possibilities in the differential.
  - “What are your top 3 differential diagnoses?”
  - Now, let’s go through each one and say why they “fit” or “don’t fit”
  - Now, if you had to pick 1 of these, which would you guess?
- Take a diagnostic time-out.
  - Allow anyone on the team to make this call.

### Promote deliberate practice

- Use mental practice
  - Morning report: “How would management change if this patient were hypotensive, encephalopathic, etc?”
  - Clinical Problem Solving Conference
  - Clinicopathological Conference (CPC)
  - Simulation
    - Ex: you are called to a room where a patient has become acutely short of breath.

## Recommended Readings and References:

### Our Top Picks: Fundamentals of Clinical Reasoning

1. Kahneman D. Thinking Fast and Slow. Farrar, Straus and Giroux; 2011
2. Berner ES, Graber ML. Overconfidence as a cause of diagnostic error in medicine. *Am J Med.* 2008;121(5 Suppl):S2-23.
3. Croskerry P. A universal model for diagnostic reasoning. *Acad Med.* 2009; 84:1022-28. [PMID:19638766](#).
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### Our Top Picks: How To Teach This Stuff

1. Bowen JL. Educational strategies to promote clinical diagnostic reasoning. *N Engl J Med.* 2006;355:2217-25. [PMID:17124019](#).
2. Graber ML. Educational strategies to reduce diagnostic error: can you teach this stuff? *Adv Health Sci Educ Theory Pract* 2009;14(suppl 1):63-9. [PMID:19669922](#)
3. Kassirer JP. Teaching clinical reasoning: case-based and coached. *Acad Med.* 2010;85(7):1118-24. [PMID:20603909](#)
4. Rencic J. Twelve Tips for teaching expertise in clinical reasoning. *Med Teacher* 2011;33:887-892.

### On the Go: Videos/Online Materials

1. Groopman J, Hartzband P. Thinking about our thinking as physicians. *ACP Internist* 2011; October. <http://www.acpinternist.org/archives/2011/10/mindful.htm>.
2. Centor, R. Lecture on "Learning to Think Like a Doctor." UAB Education Summit 2012 <http://tinyurl.com/mbx3qn7> <http://tinyurl.com/jvgx5nu>
3. Vick Clark, A. Lecture on "Introduction to Clinical Reasoning" video. UAB Internal Medicine Residency 2013. <http://tinyurl.com/ml3sb43>
4. Centor R. Blog posts January 2012. [www.medrants.com](http://www.medrants.com)

### Resources for Teaching Using a Case-based Approach

1. Bhatnagar D, Morris JL, Rodriguez M, Centor RM, Estrada CA, Willett LL. A Middle-Age Woman with Sudden Onset Dyspnea. *J Gen Intern Med.* 2011;26:551-4.
2. Vick A, Kraemer RR, Morris JL, Willett LL, Centor RM, Estrada CA, Rodriguez JM. A 60-Year-Old Woman with Chorea and Weight Loss. *J Gen Intern Med.* 2012;27:747-751.
3. Henderson MC, Dhaliwal G, Jones SR, Culbertson C, Bowen JL. Doing what comes naturally. *J Gen Intern Med.* 2010;25(1):84-7. [PMID:20087787](#).
4. Schleifer JW, Centor RM, Heudebert GR. NSTEMI or not: a 59-year-old man with chest pain and troponin elevation. *J Gen Intern Med* 2013;28:583-90. [PMID:23054926](#)
5. Saukkonen et al. Case records of the Massachusetts General Hospital. Case 9-2014. A 34-year-old woman with increasing dyspnea. *N Engl J Med.* 2014 Mar 20;370(12):1149-57.
6. Liebling, P. D., Baudendistel, T. E., Wolf, A. M. and Sandhu, A. (2013), The heart of the matter. *J. Hosp. Med.*, 8: 346–350.

7. Burski CM<sup>1</sup>, Miller CS, Centor RM. Formerly obese, now thin and confused: the utility of mnemonics in the approach to altered mental status. Am J Med Sci. 2013 Dec;346(6):499-502.

#### **Additional References:**

1. Graber ML, Franklin N, Gordon R. Diagnostic error in internal medicine. *Arch Intern Med* 2005;165:1493-9. [PMID:16009864](#)
2. Graber M, Gordon R, Franklin N. Reducing diagnostic errors in medicine: what's the goal? *Acad Med*. 2002;77(10):981-92.
3. Elstein AS. Clinical reasoning in medicine. IN: Higgs JJM, ed. *Clinical Reasoning in the Health Professions*. 1995.
4. Rajkomar A, Dhaliwal G. Improving diagnostic reasoning to improve patient safety. *Perm J*. 2011;15(3):68-73
5. Tversky A, Kahneman D. Availability: a heuristic for judging frequency and probability. *Cognitive Psychology* 1973. p. 207-32
6. Norman G. Diagnostic errors and dual processing. *Adv Health Sci Educ Theory Pract*. 2009. Suppl 1:37-49. [PMID:20078760](#).
7. Vick A, Estrada CA, Rodriguez JM. Clinical reasoning for the infectious disease specialist: a primer to recognize cognitive biases. *Clin Infect Dis*. 2013 Aug;57(4):573-8.
8. Marie-Claude Audétat, et al, What is so difficult about managing clinical reasoning difficulties? *Med Education* 2012;46:216-227. [PMID: 22239335](#)
9. Delany C, Golding C. Teaching clinical reasoning by making thinking visible: an action research project with allied health clinical educators. *BMC Med Educ*. 2014 Jan 30;14(1):20.
10. Audétat MC, Laurin S, Sanche G, Béïque C, Fon NC, Blais JG, Charlin B. Clinical reasoning difficulties: a taxonomy for clinical teachers. *Med Teach*. 2013;35(3):e984-9.
11. Audétat MC<sup>1</sup>, Dory V, Nendaz M, Vanpee D, Pestiaux D, Junod Perron N, Charlin B. What is so difficult about managing clinical reasoning difficulties? *Med Educ*. 2012 Feb;46(2):216-27.