

YALE SCHOOL OF MEDICINE

Teaching and Learning Center

Teaching Clinical Reasoning Practical Tips

Clinical Reasoning (CR) is the complex process by which clinicians gather and process information to generate a differential diagnosis and plan of management. Seasoned clinicians can do this rapidly and intuitively, using their stored knowledge on patterns of diseases (illness-scripts) using the so-called non-analytic type of reasoning. Novices, lacking knowledge and experience, use an analytic method of reasoning, slowly and deliberately gathering data to confirm their working hypothesis. Bayesian Methods of teaching CR use a probabilistic approach based on the Bayes theorem, which states that the post-test likelihood of an event (diagnosis) is equal to its pre-test likelihood multiplied by the likelihood ratio of a test result.

YSM Modified Bayesian Method of teaching CR is a step-by-step, serial-cue approach to a case, allowing the student to slowly reason through the case. The goal of the method is to *make this complex process explicit to the student*. This is thought to help novices *acquire new knowledge in a clinically relevant fashion*.

How to prepare for a clinical reasoning case discussion

1. Define learning objectives. It helps to keep those broad in order to avoid “giving the answer” to the case. Ex.: “Create a differential diagnosis for acute pelvic pain”, rather than: “Discuss the pathophysiology of ectopic pregnancy”.
2. Identify and communicate to students ahead of time what they need to do to prepare for the session: read a book chapter or article, view a podcast, attend specific lectures, etc.
3. Prepare a case vignette. The complexity of the case will depend on the level of the learners. Add information about history, physical exam and investigations findings in a step-by-step fashion, including pertinent negatives. You will share that information with the students at each appropriate step (see below).
4. Prepare a faculty handout that includes broad and specific objectives, the case vignette and subsequent information, a timeline, suggestions for prompts and advanced organizers, and discussion of pathophysiology as needed. This helps to ensure group consistency in the material covered and the method used. If you are leading a single large group session yourself, you may not have to be as detailed in the handout, but it would still be helpful for you to think about those details ahead of time rather than “improvise”.
5. Consider preparing a set of standard slides that faculty may choose to use as the group works on the case. This is particularly helpful to show lab data and imaging studies that students can be asked to comment upon.
6. Prepare a students’ version of the “case with answers” that they may access after the session, if desired. That version is similar to the faculty handout, without the suggestions for prompts and timeline.

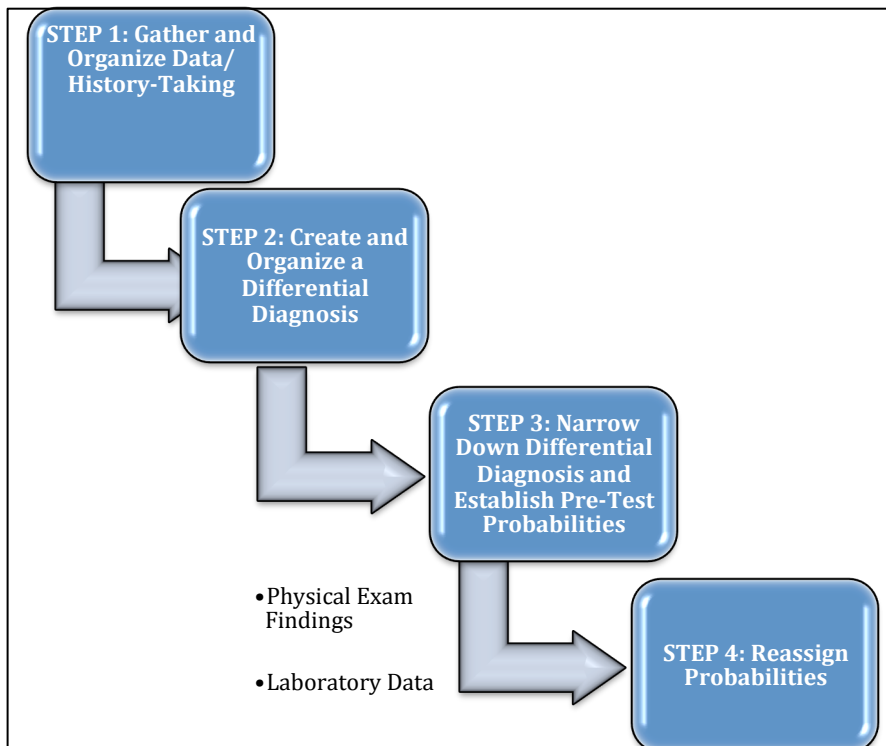
Outline of the Modified Bayesian Method:

Step 1: Gather and organize data. Students read a clinical vignette and, as a group, summarize relevant information. Faculty lead students to ask for additional information from the patient’s history as they start brainstorming about possible diagnoses. Faculty may use prompts to stimulate thoughts and discussion among students (“What other information would be helpful? Why would you like to know this? What are you thinking about?”). Additional data on the case is given to the students at the end of this discussion, after which they summarize the current complaint and HPI in one brief, precise sentence. (*Ex.: 24 year-old G1P1 presents with acute right lower quadrant pain of 12-hour duration, accompanied with nausea and vomiting. Her PMH is unremarkable. She is sexually active and uses condoms for contraception.*)

Step 2: Create and organize a differential diagnosis. Students are guided to organize the information obtained and their possible diagnoses in a logical manner using an “advanced organizer”, a simple way to represent a complex group of facts. During this part of the discussion, pathophysiology of various disorders is discussed and the students start to form illness scripts. (*Ex.: Organizer could be “organ-based” differential diagnosis of acute pelvic pain: GI, GU, musculo-skeletal. Pregnant or non-pregnant.*)

Step 3: Narrowing down the differential diagnosis and establishing pre-test probabilities. Students are asked to narrow down their list of differential diagnoses and agree on the 5 most likely. As a group, they attribute a probability to each choice (pre-test probability) for a total of 100 or they may rank them in order of likelihood. This exercise guides the students in committing to diagnoses based on the data they have obtained and guides further management accordingly. The ranking should be based on data such as the prevalence of each condition and the association of specific symptoms or groups of symptoms with those conditions.

Step 4: Reassign probabilities. In a serial-cue format, the group asks for and is given physical exam findings data, after which they review their diagnostic probabilities (initial post-test probability). They then decide which tests and investigations to order. Further data are revealed and the students reassign their diagnostic probabilities with the expectation of arriving at one final diagnosis. At this stage, the concept of uncertainty is introduced if appropriate. After students have reached a consensus on a final diagnosis, the rest of the workshop is spent discussing pathophysiology of the condition(s).



References:

1. Rencic J, Kopelman R, Wiese J. Teaching clinical reasoning on the inpatient service. In: J Wiese (Ed.), *Teaching in the Hospital* (pp. 67-106). Philadelphia, PA: American College of Physicians, 2010.
2. RL Trowbridge, JJ Rencic, SJ Durning (Eds.), *Teaching Clinical Reasoning: ACP Teaching Medicine Series*. Philadelphia, PA: American College of Physicians, 2015
3. Eva KW. What Every Teacher Needs to Know About Clinical Reasoning. *Medical Education* 2005; 39(1): 98-106.

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CLINICAL REASONING - Worksheet

Based on your complete history, what are the (5) most likely causes for your patient's chief complaint?

1. _____ pre test probability (%) _____
2. _____ pre test probability (%) _____
3. _____ pre test probability (%) _____
4. _____ pre test probability (%) _____
5. _____ pre test probability (%) _____

Based on physical examination results, reassign the probabilities and/or change your list of (5) most likely diagnoses for your patient's chief complaint.

1. _____ post test probability (%) _____
2. _____ post test probability (%) _____
3. _____ post test probability (%) _____
4. _____ post test probability (%) _____
5. _____ post test probability (%) _____

Based on laboratory data, reassign the (post test) probabilities one final time.

1. _____ post test probability (%) _____
2. _____ post test probability (%) _____
3. _____ post test probability (%) _____
4. _____ post test probability (%) _____
5. _____ post test probability (%) _____

Final diagnosis and treatment option:

Diagnosis for your patient's symptoms? _____

Treatment option? _____