Introductory Clinical Reasoning Curriculum

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Abstract

Introduction: Clinical reasoning is a fundamental skill necessary to the practice of medicine. For the novice learner, it is a difficult skill to master and most teachers have a difficult time making the process of clinical reasoning explicit and evident. Based on student feedback, we conducted an extensive review of the topic, identifying key articles and workshops, and created a new clinical reasoning curriculum in the first- and second-year On Doctoring course at the Geisel School of Medicine at Dartmouth. Methods: The curriculum includes a series of two clinical reasoning small-group (eight students) practice skills sessions in the spring for first-year medical students and five such sessions spread across the academic year for second-year medical students. We use a flipped classroom pedagogy in which students review preparatory materials prior to class to enhance case discussion and then practice clinical reasoning skills during class, including forming problem lists, summary statements using semantic qualifiers, differential diagnosis, and an assessment and plan for the case. The interactive skills session is facilitated by one or two faculty members. Results: The curriculum was received favorably by students and facilitators. Faculty facilitators noted improvement in the assessment and plan portions of student case presentations and write-ups. Feedback from our students was positive, with over 90% of students identifying satisfaction with the sessions on their midyear course feedback and close to 80% of students on their year-end course feedback. We are evaluating whether it has resulted in augmented clinical reasoning skills in the third year of medical school. Discussion: Published materials on introductory student clinical reasoning curricula are limited. Our curriculum serves as a model to introduce clinical reasoning to students prior to immersion in their clinical rotations.

Keywords

Differential Diagnosis, Clinical Reasoning, Diagnostic Thinking, Summary Statement, Problem List, Illness Script

Educational Objectives

By the end of this session, learners will be able to:

1. Identify and discuss their goals for the clinical reasoning case session.
2. Review the framework of clinical reasoning.
3. Utilize the following terminology: problem list, summary statement, and semantic qualifiers.
4. Generate a differential diagnosis via the systems approach using the VINDICATED mnemonic.
5. Practice clinical reasoning skills by working through a case in a small group.

Introduction

Clinicians must synthesize, prioritize, summarize, interpret, and provide meaning to their patient’s data in each clinical encounter. The experienced clinician uses clinical reasoning skillfully in day-to-day practice, yet it remains challenging to make the process evident to the novice student. In recent years, there have been many excellent articles written on the subject of clinical reasoning, updating terminology and highlighting frequent biases clinicians are subject to. A few years ago, we received feedback from our
third- and fourth-year students at the Geisel School of Medicine at Dartmouth indicating that they did not feel they had received sufficient training in the process of clinical reasoning leading up to their third year of medical school. Our school has a problem-based learning curriculum embedded in the second-year pathophysiology course during which clinical cases related to organ systems are discussed. Our On Doctoring course, therefore, did not have a formal curriculum on clinical reasoning, although we did feel we were teaching clinical reasoning during evaluation and feedback of case presentations and clinical write-ups.4,7 We conducted an extensive review of the topic and created a 2-year clinical reasoning curriculum in our On Doctoring course to introduce first- and second-year medical students to the concepts and practice of clinical reasoning.

Methods

We introduced our introductory clinical reasoning curriculum in our On Doctoring course in the 2012 academic year. It consists of a series of two clinical reasoning small-group (eight students) practice skills sessions in the spring for first-year medical students and five such sessions spread across the academic year for second-year medical students. We use a flipped classroom pedagogy in which students review preparatory materials prior to class to enhance case discussion and then practice clinical reasoning skills during class, including forming problem lists, summary statements using semantic qualifiers, differential diagnosis, and an assessment and plan for the case. The interactive skills session is facilitated by one or two faculty members.

Our school incorporates the flipped model throughout the preclinical curriculum, so in the spring of their first year, our students can approach this curricular model with familiarity. In the event that the materials cannot be used as part of a flipped model, we suggest delivering the preparatory material in a large-group session, followed by the case. Advantages of this could include concurrent faculty development during the large-group session because small-group facilitators could be in attendance to promote consistency across the small groups.

Preparation

We reserve sufficient numbers of small-group classrooms equipped with projectors. Prior to the session, we provide both students and facilitators with the course syllabus (Appendix A), a lecture slide deck (Appendix B), and the chapter on clinical reasoning from Bates’ Guide to Physical Examination and History Taking.8 The slide deck explains the concepts and vocabulary used in clinical reasoning with a pediatric hypertension case being reasoned through by an expert, to model the process for students. Faculty facilitators receive an additional article by Kessirer2 to gain an understanding and context of teaching a clinical reasoning curriculum. In total, these resources take about 90 minutes to review.

For each of the clinical reasoning small-group case discussions, students are given a copy of Clinical Reasoning Case 1 (Appendix C) with guided questions throughout to generate a thoughtful discussion. This can be distributed to students through a web-based curricular platform prior to the session, as long as students have a copy during the session. Facilitators receive the Instructor’s Guide for Clinical Reasoning Case 1 (Appendix D) with key discussion questions and points to highlight and maintain the students’ focus on discussing the process of clinical reasoning.

Each session takes 90 minutes to complete. The breakdown of the Case 1 session is listed below, and a suggested flowchart of this timing is shared with the small-group facilitators. Please note that the following is a suggested time distribution, but students may require more or less time for each part based on the discussion.

- Part I: Introduction (20 minutes)
- Part II: Additional History & Review of Systems (20 minutes)
- Part III: Physical Exam (20 minutes)
- Oral Presentation (20 minutes)
- Case Debrief (10 minutes)
Facilitator Needs

In addition to the resource distribution previously described, we provided an initial 60-minute faculty development session on clinical reasoning to familiarize all facilitators with the terminology used in the clinical reasoning syllabus. Thereafter, we have had a 20-minute faculty development refresher each year.

We encourage our facilitators to use the *think, pair, share* strategy. We instruct them to have students first think individually about the questions posed and write down their thoughts as sections of the case are read. Next, have students turn to their partners and share their thoughts. Finally, after a few minutes, have students report to the group with the questions or differential they came up with. This strategy helps ensure that every individual participates.

We ask facilitators to have students generate a differential diagnosis and then use the elements of the history and physical to evaluate and reevaluate that differential. To avoid premature closure, we ask that students be encouraged to practice the VINDICATED mnemonic (V = vascular, I = infectious, N = neoplasm, D = degenerative, I = iatrogenic, C = congenital, A = autoimmune, T = toxic, E = endocrine, D = depression) to expand their differential diagnosis. While this is not absolutely necessary to come up with a complete differential for every problem, we believe it will help them to think through many systems and encourage them to think mechanistically about pathogenesis when they are first learning the process of clinical reasoning. Students should be reminded that even seasoned clinicians use this or other systematic strategies to trigger a differential diagnosis in cases that are particularly difficult to put together. We note to our facilitators that the exact name for each letter is not as important as just using each letter to remember a particular category or cause of an illness.

Assessment

We evaluate student clinical reasoning skill through formative and summative feedback at midyear and end-of-year evaluations. Since we introduce our clinical reasoning curriculum in the spring for first-year medical students, feedback is only included at the end of the year for first-year students.

Formative feedback is given to each student in person through a one-on-one feedback session with the student’s small-group faculty facilitator midway through the academic year (for second-year students) and at the conclusion of the year (for first- and second-year students). Our summative feedback incorporates a short rubric (Table) by which our facilitators assess the students’ diagnostic and clinical reasoning on each of their submitted clinical write-ups and in-class oral presentations starting in the spring for first-year students. This is graded on a pass/fail basis where students need to meet expectations by the end of their second year.

<table>
<thead>
<tr>
<th>Table. Rubric for Summative Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meets Expectations</strong></td>
</tr>
<tr>
<td>Assessment consistent with history and physical exam</td>
</tr>
<tr>
<td>Reasonable justification for diagnosis, notes most secondary problems, suggests appropriate diagnostic tests</td>
</tr>
</tbody>
</table>

Results

Feedback from our faculty facilitators indicates that they have seen a significant improvement in the assessment and plan portions of student case presentations and write-ups since the institution of this curriculum. Student feedback is also positive. On midyear and end-of-year course evaluations, about 90% and 80% of students, respectively, identify satisfaction with the sessions. Positive comments emphasize how helpful and important the concepts of clinical reasoning are to the practice of medicine. Constructive comments suggest that students would prefer the content of the sessions to match the same material they are studying in their other coursework and to coordinate more with the problem-based learning curriculum.
Discussion

We have incorporated an introductory clinical reasoning curriculum into the first and second years of our medical curriculum. Students arrive at class prepared to practice and apply clinical reasoning skills deliberately to a clinical case. First- and second-year medical student faculty believe our curriculum has improved their students’ ability to reason through cases and articulate a differential diagnosis as well as assessments and plans. The large majority of first- and second-year students perceive our curriculum as helpful. We plan to assess fourth-year student opinion on the helpfulness of our curriculum and to evaluate whether third- and fourth-year clinical faculty believe our students arrive at their clerkships well prepared to practice clinical reasoning.

Initially, our cases were administered to students in a packet containing all the parts of the case at once. We found this to be ineffective, as students were looking ahead for answers. Therefore, we now share the clinical cases one part at a time. Similarly, in some case formats, we instruct facilitators to impart additional information (e.g., diagnostic test results) only as students request it. This strategy seems to help the students think about the process of clinical reasoning and why gathering appropriate data matters.

We recommend the first case be a simple and straightforward one to enable the students (and facilitators) to remain focused on the process of clinical reasoning rather than the disease process or final diagnosis. As the curriculum proceeds, we introduce more complicated and advanced cases.

We have created cases in multiple fields, including general internal medicine, surgery, obstetrics-gynecology, and pediatrics, to help prepare the students for their clerkships. Faculty development remains essential to maintain an understanding of a common language with the students and a focus on the process of clinical reasoning rather than discussion of the correct answers.

Given our concurrent problem-based learning curriculum, we find it important to explicitly frame how our curriculum differs and how the two enhance one another. Many students still feel our curriculum is similar to our problem-based learning course at our institution. With improved framing (i.e., comparing the goals of each curriculum), this sentiment has lessened over time.

The creation and facilitation of this curriculum have been fun and personally rewarding. Making the process of clinical reasoning explicit for novice students and introducing it in their first year of school have improved our student case presentations and write-ups. The faculty have been engaged and embraced what, to most of them, was new terminology.

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References


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