

# Identifying Gaps in Clinical Decision Making Education in Medical School

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## Abstract

Clinical decision making (CDM) is a skill that is developed over the course of a medical doctor's career. It is the ability to collect pertinent information from a patient, synthesize the information to establish a diagnosis, and develop a personalized treatment plan. Various medical school curricula have attempted to integrate CDM into their curricula using surrogates such as problem/case-based learning. However, studies have shown that these pre-clinical CDM surrogates do not adequately prepare medical students for their clinical rotations. In this review we examine the various mediums through which CDM is currently integrated into medical school curricula as well as its impact on students in their clinical years. We will also discuss possible solutions to these issues and demonstrate the need for further research in this area of medical education in order to optimize pre-clinical training for future physicians.

## Introduction

Clinical decision making (CDM) is a skill developed through experience over the entirety of one's medical career. Learning through repetitive clinical exposure, a physician can refine their skills and improve their own abilities as a healthcare practitioner. As learners in medical school, CDM is taught through the formulation of hypotheses, diagnoses, and management plans in a systematic and structured process. With time, clinicians will often transition to pattern recognition or direct automatic retrieval rather than hypothetico-deductive reasoning.<sup>1</sup> Where experienced physicians form rapid hypotheses and diagnostic plans based on patient presentations, novices have difficulty moving beyond collection of data to consider possible diagnoses.<sup>1</sup> These limitations of students create an opportunity to enhance teaching of CDM in the pre-clinical years of medical school. Although many medical school curricula have created opportunities to practice CDM in pre-clerkship years, there are still limitations in a student's learning and mastery of this skill. The purpose of this review is to examine the current CDM curriculum in Canada and its ability to prepare students for clinical placements. Using this information, we will provide possible solutions and areas of improvement in the pre-clinical teaching of CDM, as well as areas for further investigation for curricular redevelopment.

## Current Educational Patterns

One approach to teaching CDM is the use of problem-based learning (PBL) and case-based learning (CBL). PBL, and now CBL, are an effort to introduce the formation and testing of clinical hypotheses into the pre-clinical curriculum.<sup>1</sup> They provide students an opportunity to be presented with a "real-life" case and work through a differential diagnosis, lab tests, etc., to manage the care of a patient. These cases follow the serial-cue approach.<sup>2</sup> This method provides learners with pieces of information in a serial fashion. Therefore, this mandates students to collect data, create a differential, and constantly re-rank their suspected diagnoses with each successive piece of information provided. This process of CDM education has been implemented in the University of British Columbia MD Undergraduate Program,

as well as in most Canadian medical programs. PBL/CBL curricula are limited by student knowledge of epidemiological data of various diseases, as well as of key clinical patterns for recognition of diseases. Furthermore, the initial "anchor" of the clinical case unduly influences final opinions of students, and studies have shown the shift in probabilities following this initial clinical factor may often be insufficient to result in the determining the final diagnosis.<sup>1</sup> In pre-clinical learning, learners may find it difficult to account for various statistical probabilities and to synthesize these probabilities based on a series of clinical signs/symptoms. There are also other difficulties with the serial-cue format. A study conducted by Bergus et al. found that final opinions of clinical diagnoses are affected by the order of presentation.<sup>3</sup> Information presented later in a case is given more weight than information presented earlier.<sup>3</sup>

An alternative to the serial-cue approach is the whole-case approach or clinical vignette. Schmidt and Mamede found that a whole-case approach, where more information is introduced at the start, is more effective due to the reduction in cognitive load on working memory.<sup>2</sup> Also, most examinations in medical school involve the use of clinical vignettes. By using a serial-cue approach to teaching CDM and pattern recognition, it establishes a dichotomy between what students learn in the classroom and how they are tested on major examinations. A study by Ilgen et al. found that clinicians and students encouraged to answer questions based on their first impression on standardized clinical exams performed better than those working under a "direct search" involving analytically weighing possible options and correct diagnoses.<sup>4</sup> Another study found that diagnostic accuracy was significantly lower on serial-cue format for clinical problems in all levels of expertise, but particularly in students.<sup>5</sup> There was a 72% lower accuracy compared to the whole-case format.<sup>5</sup> This result was attributed to an inability to collect critical information in the serial-cue format. Therefore, it seems reasonable to question whether examination techniques using whole-case clinical vignettes is reflective of the goal of CDM education through PBL/CBL. An alternative could also be adjusting the methods of examination to gauge a student's CDM capabilities to then better reflect the serial-cue method of learning. If PBL/CBL is not sufficient to equip students with adequate CDM skills pre-clerkship, alterations in their structure or creation of supplementary teaching tools may foster more positive outcomes.

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## Variation in Learners' Experiences

Students are faced with a large variety of patient presentations throughout their rotations in clerkship. The difficulty surrounds the ability to absorb all this knowledge under the guidance of their preceptor. Over the course of clerkship, students may encounter a different number of patients with potential variations in diseases. The one constant is the clinical preceptor's supervision; however, this guidance can vary between specialties as well as between geographic sites. This assumes students are placed with a single preceptor for each of their rotations. Yet, even with more than one supervisor per rotation, students may find it difficult to adjust to various teaching styles in such a short period of time, especially if the preceptors themselves are not engaged in educating the student. Wimmers et al. found that students claimed the role of clinical supervisor to be more important than the number of patients and variety of cases.<sup>6</sup> Students at 12 hospitals recorded their patient encounters in logbooks, and analysis was done while accounting for site variability. It was found that neither an increased number of patient encounters nor a focus by programs on "must-see" clinical encounters in a clerkship rotation led to improved competence.<sup>6</sup> Asking students to keep a tally of these cases without paying attention to the quality of supervision does not contribute towards improving student learning.<sup>6</sup> This illustrates the importance of effective preceptors in a student's clerkship years. Many clinicians are not trained to provide effective feedback.<sup>7</sup> They are expected to train their students to be effective clinicians, often without any framework to guide them.<sup>7</sup> For example, clinical educators can allow students to preemptively prepare for an encounter. Asking learners to assess a patient without providing an opportunity to activate previous knowledge has limited clinical value and likely reduces knowledge gain.<sup>8</sup> Secondly, effective preceptors should provide students with adequate time to evaluate the patient as well as an opportunity to read and reflect on the data through creation of an assessment/plan. Ultimately, faculty needs to assist clinicians in creating supportive and effective learning environments for students. Faculty development should thus focus on instructing preceptors on these aspects to enhance clinical teaching. Learners should also take an active role in their education rather than limiting their expectations to passive knowledge transfer. Kassirer suggests that clinical cognition requires the power of observation, willingness to question, and ability to learn from others.<sup>9</sup> By exploring the rationale behind their preceptor's CDM and questioning areas of uncertainty when comparing care decisions, students will be exposed to a more diverse pool of information and knowledge to assist in improvement of their own CDM abilities.

## Areas for Improvement

Medical school curricula tend to focus on developing basic CDM skills in their students. However, there are other practical skills involved in CDM that are lacking in many curricula. One such area of weakness in pre-clerkship students is effective case prioritization.<sup>10</sup> Prioritization is a skill that is developed throughout an individual's medical training. It revolves around the CDM ability to determine which patient is in more critical condition and should be seen first. Often neglected, clinical prioritization and recognition of an individual's limitations are also part of the CDM process. McGregor et al. interviewed several medical students who all admitted that they would often see whomever paged them first rather than prioritizing based on the clinical need of their patients.<sup>10</sup> Commencing clerkship with limited knowledge in this area

can cause serious harm to a patient. Several efforts have been made to teach medical students prioritization in clerkship, but they have proven to be quite ineffective.<sup>11</sup> With the intention to deliver safe medical care, prioritization should be a skill that is integrated into pre-clerkship and clerkship curricula to assist medical students in this learning process.

A possible solution to address the gap in CDM education discussed in this review includes an emphasis on decision making as a graduation competency for undergraduate medical education. The Royal College of Physicians and Surgeons of Canada emphasizes the use of CanMEDS competencies for post-graduate programs. The Medical Council of Canada provides similar objectives for undergraduate medical education curricular design, with the expectation that similar principles should be achieved by all students through different aspects of their medical curricula. Due to the lack of formality in the education of decision making, "Decision Maker" could be added as a CanMEDS and undergraduate graduation competency. This change would encourage medical schools to dedicate curricular time to the improvement of decision making skills. As cited by Schwartz, education in decision making should involve three specific areas: 1) competency in CDM in the interest of the patient; 2) knowledge and skills required to facilitate the decisions of others—notably patients and their families; and finally 3) competency to encompass the knowledge and skills necessary to understand decisions involving health policy and allocation of healthcare resources on the public scale.<sup>12</sup> These skills could also be further enhanced with supplemental resources such as clinical vignette cases for each clinical topic, dedicated lectures regarding the above three domains, or complete integration into clinical and non-clinical teaching in the medical school curriculum.

## Conclusion

Medical education is a fluid system that is constantly changing based on the needs of students and society. Although CDM is being introduced in pre-clerkship curricula, it still has its shortcomings. It is important to assess these disparities and work towards altering them to provide students with an effective learning experience as they enter clinical practice. If a candidate is taught the schemata of good organization of clinical knowledge at an early point in their training, it can be expected that he/she will demonstrate significant improvement in these skills in their subsequent training.<sup>13</sup> CDM proficiency is a valuable tool that enables students to consider a wide range of diagnostic possibilities and narrow the differential intelligently, as well as to reduce misdiagnoses and adverse outcomes, and provide effective patient care. Therefore, early interventions to improve the CDM abilities in medical students and establishing a focus on decision making as a core competency can have a significant impact on a student's clinical proficiency as they progress through their career.

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