

# The End of the Lecture? Rethinking Pre-clerkship Medical Education in a Post-Online Era

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For much of the past 100 years Canadian pre-clerkship medical education's core format has remained relatively unchanged. Transformed post 1910 by the fateful Flexner report, medical students would attend lectures taught by expert physicians or researchers, and supplemented by hands-on learning in anatomy, histology, pathology, and other laboratory medicine aspects.<sup>1</sup> Students would also receive instruction in physical exams and a burgeoning social medicine curriculum.<sup>1</sup> Over the decades since then there has been a proliferation of medical knowledge, with an increasing volume of treatments, pathways, and overall content to cover. The 2001 version of First Aid for the United States Medical Licensing Exam (USMLE) Step 1, representing a third-party's best effort to cover all the core knowledge tested after pre-clerkship, was 481 pages, up from approximately

200 pages in the 1990s.<sup>2,3</sup> In 2001, the same paperback review book had grown to 848 pages.<sup>4</sup> Canadian medical students are not required to write the USMLE, yet this same knowledge proliferation has diffused worldwide creating a challenge for new generations of medical learners. Concurrently, an increased focus on clinical experience and social determinants of health has created conflict in curriculum time allotment.<sup>5</sup> It was in this setting that, in March 2020, SARS CoV-2 disrupted medical education in Canada. As lectures shifted online to "stop the spread," the era of the sizable in-person lecture was interrupted. For the past two years medical education has been marked by transitions, from in-person to online, from online to hybrid delivery, and in some locations, back to in-person.<sup>6</sup> These shifts changed lecture delivery and attendance patterns profoundly. Suddenly lectures could be accessed

from anywhere with an internet connection, and recorded lectures accessed asynchronously. At the same time, the question of the relevance of lectures presents itself once again.

Is the traditional didactic lecture the most efficient way to teach medical knowledge? No, and rethinking their utility will allow for a better, more flexible, pre-clerkship medical education focused on active learning.

The disadvantages of lectures are numerous. Famously described as far back as 1927 as “that mysterious process by means of which the contents of the professor’s notebooks are transferred by means of the fountain pen to the pages of the student’s notebooks without passing through the minds of either.” The process of traditional lecturing remains popular due to its cost advantages and ability to leverage one lecturer to teach many students, but does not reflect advances in adult learning theory, which indicates attention wanes after 10-15 minutes.<sup>7,8</sup> One suggested improvement, increasingly seen in medical education, is the incorporation of active learning; interspersing didactic instruction with questions and case studies.<sup>9</sup> While already an improvement over the unidirectional traditional lecturer to student model of lecturing, a further improvement would be to remove the traditional lecture entirely. Instead of lectures, the core curriculum time could be reduced by curating resources for students to teach themselves, as adult learners, with lecturers leading large interactive sessions. team-based learning sessions, where one facilitator leads multiple small groups through cases, answering questions as needed or even preferably, small group sessions, would be much more conducive to actual learning.<sup>10</sup>

In this more individualized form of medical education, the role of the established medical or research expert, the prior lecturers, can mutate into more of a facilitator role. Gone are the days of the researcher explaining which drugs are used for asthma attacks and long lists of definitions read verbatim in psychiatry lectures. Instead, the lecturer can present interactive cases and questions aimed at increasing learning and testing medical students’ abilities to apply their knowledge to problems, mimicking the real-world practice of medicine in precious instructional time.

This format is not merely theoretical, being used in Canada at the McMaster school of Medicine, where most pre-clerkship classes are replaced by small-group learning, forcing students to interact actively with the material.<sup>11</sup> Even in the more test-based American medical education system, some medical schools have eliminated traditional lectures.<sup>12</sup>

While this evolving landscape existed prior to SARS CoV-2 disruptions, the potential to learn from the online aspects of the curriculum changes is a new development. Medical student lecture attendance was improved by online lecturers, which boost higher attendance than in-person equivalents.<sup>13</sup> Shuttered away from school, medical students increased their reliance on external resources, stating that these improved their time efficiency, ability to pace themselves, and reduced academic anxiety.<sup>14</sup> In an era of ever-increasing demands on student time and increase in medical knowledge, this increased efficiency is pivotal. This highlights past findings that more medical students (14.38%) reported never using instructor-guided resources than reported never using online resources (11%) in the context of physiology education.<sup>15</sup> These patterns, transmitted to following years via the social transmission of knowledge acquisition, will lead to new cohorts of learners who rely increasingly on these external resources and eschew traditional lectures. Adopting true active learning by replacing lectures with interactive team-based learning sessions where inadequate numbers of lecturers are available, or true small group sessions where there are ample numbers of facilitators on hand, will improve student learning while improving the ability of students to develop reasoning and critical thinking skills. A renewed pre-clerkship medical school curriculum can minimize lecture time, instead relying on the rise of new technologies to improve learning efficiency such as adaptive spaced learning.<sup>16</sup> Students already report heavy utilization of online and non-curricular resources, and retooling curricula to reflect a shift away from traditional lectures would meet the learners where they are, improving student engagement. In 2021, 68.8% of American medical students reported using online videos for medical education, a figure that should be similar in Canada. As medical education emerges into the light from the darkness of SARS CoV-2 isolation, now is the time to rethink a 100-year-old model and instead embrace the advances in learning theory and educational practice to improve the education of tomorrow’s physicians.

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