The importance of the anatomical sciences in Canadian medical education: A UBC medical student's perspective

James Cairns[1]
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Abstract

In the pre–clerkship years of medical school, morphological sciences, including gross anatomy, neuroanatomy, histology, radiology, and pathology, are taught as part of an integrated curriculum along with small group case–based learning sessions (CBL), didactic lectures, small and large group seminars, and family medicine and clinical skills sessions. There is a large amount of material that students must learn in the pre–clerkship years of medical school and a limited number of hours each week in which to schedule all the necessary activities for the different components of the integrated medical school curriculum. This commentary reviews evidence that highlights the importance of anatomy, histology, pathology, and radiology in developing the clinical skills of trainees transitioning into clinical learning environments. In addition, this commentary will briefly highlight methods by which the University of British Columbia (UBC) has integrated these subjects into their new curriculum with increasing pressure to decrease curricular time devoted to the anatomical sciences. Regardless of medical students' backgrounds and previous degrees, a strong foundation in anatomy, histology, pathology, and radiology is important for trainees to develop their clinical acumen in diagnosing, treating, and managing the wide variety of clinical presentations they will encounter in their clerkships, residencies, and future clinical practices.

The overall structure and framework of Canadian medical school curricula

Over the last decade UBC and other Canadian medical schools have designed and implemented new curricula, which are now based on "spiral models" that integrate several subjects and content areas into longitudinal curricula over three or four years of medical training. Many medical school curricula are based on standards put forth in the historic 1910 Flexner report entitled, "Medical education in the United States and Canada."[1] The contents of this report laid the framework for the classical model of two years of basic science training followed by two years of clinical training (called "clinical clerkship") still seen in practice in most medical schools across Canada.[1] Despite the large increase in knowledge in medical sciences over the last several decades, the overall structure of medical school composed of two years of pre–clinical training followed by two years of clinical clerkship has remained relatively unchanged in Canadian medical schools over the last century.[2,3]

Canadian schools are also faced with the challenge of providing their trainees with foundational knowledge and expertise in areas including: population and public health, healthcare policy development, medical technology, and psychosocial determinants of health.[4] These are also necessary areas of training for future professionals in modern interdisciplinary healthcare systems.[4] However, it is important to acknowledge that medical trainees still need to develop a solid foundation and understanding of applied anatomy, radiology, histology, and pathology in their medical school and residency program training.[5] The amount of material and domains in which students must demonstrate proficiency is increasing, and this in turn, has been reflected by the implementation of competency–based training programs across the country. In Canada, competency–based medical school and residency programs are based on developing proficiency in the seven core CanMEDS domains. The CanMEDS framework put forth by the Royal College of Physicians and Surgeons of Canada (RCPSC) was updated twice in 2005 and 2015 to reflect changing competencies that medical school graduates need for clinical practice.[6-8]

The previous and current medical school curricula at UBC

At UBC, a curriculum update occurred in 2015 when the "block–based curriculum" was replaced with a revised "spiral curriculum." The previous curriculum saw medical students learning about various organ systems in discrete units with the relevant anatomy, histology, pathology, and radiology of organ systems taught in parallel with small group sessions, lectures, seminars, and clinical skills sessions. The new curriculum at UBC organizes the curriculum by weekly clinical topics, such as pneumonia and sepsis. Morphological sciences like anatomy and histo–pathology labs are still present, but are integrated with CBL sessions, lectures, seminars, clinical skills, and family medicine sessions to make up the overall activities for each week. Since pre–clerkship is organized around different clinical practice themes, students will revisit various subjects repeatedly throughout the first two years of their training. Each subsequent encounter with topics becomes increasingly more complex and requires integration of different ideas, skills, and knowledge as compared to previous encounters with the material. Both "block–based" and "spiral" curricula have strengths and weaknesses in teaching subject matter to students and, ultimately, individual students have differing learning preferences. With a finite amount of curricular time, increasing amounts of material that students must learn, and limited resources (financial and non–financial), the amount of time devoted to the anatomical sciences in medical education has decreased over time.[9-11]

The importance of the morphological sciences in medical school

Several studies have cited reasons for the noted decline in curricular time devoted to anatomical sciences. Consistent themes that have emerged from studies include the fact that the duration of medical school has remained static at three to four years in length, but the amount of material that students must learn in this time period has increased, cutting into time previously devoted to the anatomical sciences.[12] Additionally, resources required to run large labs has placed increasing financial and non–financial pressures on medical schools that may have contributed to a decline in curricular time devoted to these subjects in recent years.[9]

Studies looking at the role of morphological sciences in medical education have found that training in subspecialties like surgery and radiology requires a deeper understanding of sciences like anatomy, but all specialists in medicine can benefit from comprehensive training in the anatomical sciences.[13] A recent literature review conducted by

[1]MD Student, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence to
James Cairns (j.cairns@alumni.ubc.ca)

Hefler and Ramnanan addressed the question of whether anatomical sciences in medical schools support the development of core CanMEDS competencies of trainees.[14] The review found 71 studies linking relevant descriptions of CanMEDS traits to medical education in anatomy and related morphological sciences.[14] Furthermore, medical training in the anatomical sciences was linked to the development of skills in the domains of "Medical Expert" (31 studies), "Collaborator" (12 studies), and "Scholar" (11 studies).[14] Most papers found in the review were descriptive in nature, collected data using student surveys, and were not randomized controlled studies.[14]

Despite methodological shortcomings of some studies, it was noted that exposure to anatomical sciences, like gross anatomy, improves the clinical reasoning, physical exam skills, surgical skills, and ultrasound techniques of trainees.[14] Evidence has shown that a multidisciplinary approach to teaching morphological sciences in medicine leads to students having a better appreciation of the scope of practice of other healthcare providers, like nurses and physiotherapists, and can improve the professional identity of healthcare trainees.[15] Research has shown that anatomical sciences can also improve the research and teaching abilities of medical students.[16] Nnodim found that students who were involved in teaching anatomy to their peers performed significantly better on their practical exams as compared to a control group.[16]

Methods used to integrate anatomical sciences into the revised UBC medical school curriculum

Schools across Canada have rolled out revised curricula to address the new competency–based requirements of medical graduates. A strategy used by UBC to continue to provide anatomical sciences training to students is to combine subjects like histology and pathology into integrated histo–pathology laboratories.[17] Students first learn about the normal structure of tissues and organs and then learn about important pathologies that occur in the same tissues.[17] The goal of the integrated histo–pathology curriculum is to allow students to better appreciate the architecture of tissues in order to develop a deeper understanding of the effects that pathologies have in the same tissues.[17] Feedback from first year UBC students was mainly positive regarding the integration of anatomical sciences, and most students agreed that integrating pathology with histology highlighted the clinical relevance of histology to their training.[17]

Medical schools also used a similar integration approach to teach students other core sciences, like gross anatomy and radiology. UBC has taught gross anatomy through cadaver dissection and radiology in integrated lab sessions since 2011.[18] UBC also developed a radiology app for mobile phones and is using an anatomy visualization table to correlate 2D and 3D images of anatomical structures in CT scans with material students encounter during anatomy labs.[18] The utilization of technology in integrated anatomy–radiology labs is intended to improve medical students' understanding of anatomical relationships.[18] It aims to give students an appreciation of the applications of gross anatomy and radiology in future clinical practice, where they will be interpreting the results of various imaging modalities to make treatment and management decisions in consultation with their patients.[18]

Conclusion

These are a few strategies being used to maintain anatomical sciences in the revised UBC medical curriculum, and it will be interesting to see what novel strategies educators will develop to optimize teaching of these subjects in the future. With increasing pressures on schools to teach more material in a finite time period and decreasing curricular time devoted to the anatomical sciences, it will be important for educators to continue to provide a solid foundation in the morphological sciences. The importance of anatomy in the development of clinical skills of future physicians cannot be overstated, and with new competency–based programs, the necessity of good anatomical sciences teaching in medical education is arguably more important now than ever before.

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