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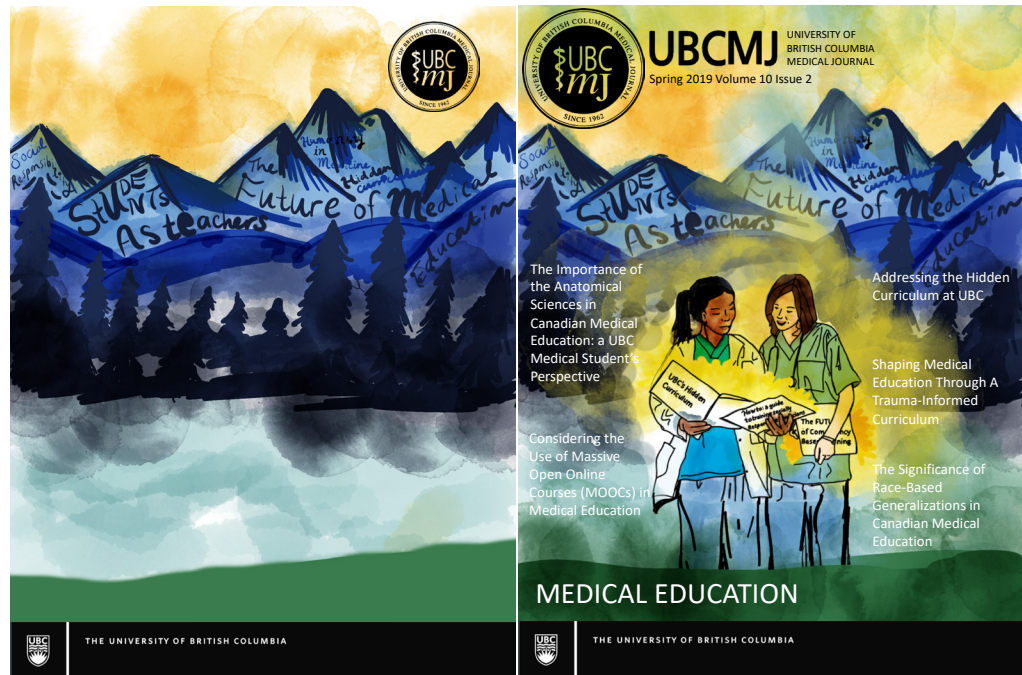
MEDICAL EDUCATION

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On the cover

The journey from medical school to practice as a physician is a dynamic one, filled with ever-increasing knowledge and experiences. New developments in clinical science and in education have stimulated the constant review of both the content and methodology of medical education. In this issue, the ever-changing nature of the medical curriculum is exemplified through creative delivery by online courses, its hidden curriculum exposed, and its foundational sciences given value anew.

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The Medicine Garden

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Horticulture is to medical school as a flower is to a medical professional. Take note, this is no average garden! Medical schools and training programs meticulously control the growing conditions—watering schedule (teaching), soil (curriculum), and sunlight (positive and negative experiences)—to ensure that each seed (medical student) is planted in the most optimal environment. The ultimate goal is for trainees to blossom into beautiful, symmetrical, six-petaled flowers that flourish in residency and bloom until retirement. Have you guessed what this horticulture technique is yet? More widely known by its formal name, the CanMEDS framework is a set of competency standards outlining the seven roles of a well–integrated physician in modern society.[1] However, one might argue that the expectation of a trainee to become a medical expert, a communicator, a collaborator, a leader, a health advocate, a scholar, and a professional is unrealistic.[2] More alarmingly, others have posed that the demand for physicians to hold too many roles contributes to physician burnout.[3] After all, there are no perfect horticulturists, no perfect seeds, and no perfect method. This process is dynamic, as producing medical professionals who can face the contemporary challenges of the healthcare system requires constant refinement.

The CanMEDS framework was established in the 1990s by the Royal College of Physicians and Surgeons of Canada and more recently updated in 2015 to incorporate milestones for Canadian residency programs.[4] Each role in the CanMEDS framework lays out a fundamental building block of the modern Canadian physician as informed by broad stakeholder consultation. Similarly, the CanMEDS–Family Medicine 2017 framework by the College of Family Physicians of Canada uses seven leaves on a tree to paint the overall roles and responsibilities of a well–rounded Canadian family physician.[5] Trickling downstream of the Colleges, a similar evolution of newer teaching methods and curriculum renewal has occurred at Canadian medical schools to nurture the various CanMEDS roles.[1] Active learning has replaced much of the eight–hour lecture day in medical school, with students taking part in case–based or problem–based learning, small group activities, interprofessional seminars, and community–oriented experiences. The trainee therefore takes on multiple roles throughout the day while learning in the classroom, conducting research, or taking on a leadership role by facilitating his or her small group activity. These activities mimic the expectations and routines of a competent physician in the workplace. Learning objectives in and out of the classroom also nourish the skills and attitudes necessary to face the challenges of contemporary medicine. For example, students may be in a small group focused seminar discussing the basics of genetic testing or learning how to have a dialogue regarding end–of–life care.

It is, without a doubt, not an easy task to ensure that all medical trainees achieve the competencies laid out by the seven pillars of CanMEDS. Simultaneously, one should appreciate the beauty of the inevitable asymmetry in a flower's petals, regardless of how much watering and fertilizer it receives. This issue of the University of British Columbia (UBC) Medical Journal explores medical education throughout Canada, featuring pieces from renowned faculty members at UBC who take part in the effortful process of developing a modern medical school curriculum. Dr. Cheryl Holmes discusses the unofficial lessons from medical education in her piece "Addressing the Hidden Curriculum at UBC." Dr. Clarissa Wallace shares her insights from educators and philosophers on the importance of learning by teaching, while Dr. Gurdeep Parhar explores how UBC is tackling the contemporary issue of training socially responsible physicians. Finally, Dr. Roger Wong examines how the emphasis of active learning has led to a refinement in assessment tools in medical education. It is our hope that these curated pieces, along with a record number of thought–provoking Commentaries, will help us objectively, critically, and courageously discuss these issues to move the field of medicine forward.

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Addressing the Hidden Curriculum at UBC

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Abstract

The hidden curriculum, a set of unspoken rules and conventions in medical practice, is a much more powerful force influencing professional behaviours of learners in the health professions than what they learn in the classroom. In this commentary, I explore the effect of the hidden curriculum on the learning environment. Findings from a hidden curriculum study from the UBC Faculty of Medicine are used to illustrate what medical students can do to manage the more distressing aspects of the hidden curriculum.

What is meant by the hidden curriculum in health professions training?

In medical education, the formal curriculum can be described as the structured intentional curriculum found in documents, such as course syllabi, lecture handouts, case–based learning materials, and clinical skills materials, to name a few. The informal curriculum refers to the more unplanned, unscripted, and often opportunistic learning that occurs during delivery of the formal curriculum and in delivery of teaching with patient care, such as in physician offices, in clinics, and on the hospital wards. The hidden curriculum refers to the "cultural mores" of the profession that are transmitted but not openly acknowledged through formal and informal teaching encounters.[1] Gofton and Regehr[2] describe the hidden curriculum as "a set of influences, defined by the organizational culture and enacted by the members of the organization, which shape the attitudes and values of the trainee."

On the positive side, the hidden curriculum plays a key role in transmitting the values, ideals, and conditions required to become a physician. Implicit in the medical profession's "social contract" with society is the public's expectations of the medical profession, such as competence, altruistic service, morality, integrity, honesty, accountability, trust, shared responsibility for health, and a balanced lifestyle.[3]

Yet the hidden curriculum also has a more pernicious side, whereby professionalism lapses and unethical behaviours are normalized, particularly in the clinical setting. This erosion of humanism is prominently represented in the literature whereby the hidden curriculum is perceived to enact, through mistreatment and negative role–modeling, a "stamping out of the innate humanistic tendencies of medical students."[4] Feudtner and Christakis studied Year 3 medical students and provided a chilling insight into the ethical dilemmas and distress experienced by new clerks as they experienced pressures to fit into their medical teams on the wards.[5]

The literature describes three approaches to redress the pernicious aspects of the hidden curriculum: 1) focus on the learners; 2) train faculty to behave more professionally; and 3) change the institutional culture. In this commentary, I will focus on what students can do to manage the hidden curriculum based on research at UBC, while acknowledging that managing the hidden curriculum is a collective responsibility.

Hidden curriculum research at UBC

Based on the literature,[6,7] the UBC Faculty of Medicine Medical Undergraduate Program (MDUP) envisioned a learner–centered approach to the hidden curriculum involving four iterative steps: 1) priming students that there is a hidden curriculum and that all students are prone to incidental adoption of the values transmitted from their learning environment; 2) noticing these moments of enculturation as something to be reflected on; 3) reflecting on experiences in a safe, guided, and group setting; and finally 4) choosing strategies for the future that best reflect each student's own internal values. Based on this model, the MDUP implemented a reflection–based course for medical students transitioning to clerkship with three goals: 1) to sensitize learners to the hidden curriculum; 2) to provide a safe and confidential forum to discuss their experiences; and 3) to co–construct strategies to deal with the pressures in the clinical environment.[8] Students found the group setting helpful and commented on the importance of sharing their experiences and gaining feedback from others.

Informed by previous research,[6,8,9] the MDUP, as part of curriculum renewal[10], instituted the Portfolio program[11] in all four years of the program at all four sites. Modeled after the UBC study on the hidden curriculum, this program creates a safe and confidential forum whereby groups of eight medical students meet regularly with a Portfolio Coach to explore socialization and the hidden curriculum, grounded in clinical experiences. In Years 1 and 2, the sessions are more structured. However, in Year 3, as students' clinical experiences dramatically increase, the sessions become more flexible to allow students space to discuss and process these experiences.

Managing the effects of the hidden curriculum

The Portfolio Program was designed to be a safe space for conversations about ambiguity, uncertainty, death and dying, communication, professionalism, ethical dilemmas, teamwork, professional identity, moral distress, and other issues encountered in the hidden curriculum. After completing our study, students shared with me the following helpful tips, illustrating each step in the MDUP's approach to the hidden curriculum. These tips can be springboards for discussion in the portfolio groups at UBC.

1. Recognize that you are human, and the human condition is that we are hardwired to mimic:

"I was amazed with how much my preceptors' attitudes towards a patients' illness (e.g., frustration with addiction or recurrent abdominal pain presenting to the ED) affected my personal attitude and how difficult those attitudes/prejudices were to correct once established."

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2. Find ways to notice the hidden curriculum and how it is affecting you:

"I recognize that it is incredibly challenging to recognize and address these nuances in our day to day but I have found that they are both consciously and unconsciously noted by learners and carried forward. Preceptors can make an incredible difference in a learner's attitude towards a specialty, profession, disease, social class, and colleague simply by recognizing their nonverbal cues, inflection, etc. and addressing them in a conversation with the learner. This is especially true in early clerkship where a student's professional identity is far from established."

This may actually be the hardest step; noticing when you are experiencing the hidden curriculum. Some students solved this for themselves by taking their own emotional temperature:

"A significant tool that the hidden curriculum course provided me with was the capacity to notice when patients were being treated a way I didn't agree with or when an environment was unnecessarily unpleasant. Once I notice these things, I try to set internal 'alarms.' These 'alarms' serve as personal reminders that I hope to use as tools to recognize signs of burnout or prejudice within myself and correct it early."

3. You can unhide the hidden curriculum by discussing what you are going through with your colleagues and in your portfolio groups:

"Discussing the hidden curriculum with classmates and physicians in a small group empowered me to identify discourse between how preceptors treated patients or how they perceived patients and how I want to practice. As a new clerk, I had no framework within which to place patient–physician interactions and insufficient confidence to questions my preceptors' attitudes, however, discussing the hidden curriculum caused me to realize early in my clinical education that our preceptors are not always right. In other words, I realized things don't have to be certain way. I have the power to recognize issues and ensure that they are not carried forward into my own practice."

4. Even the best preceptors have bad days and you have the power to choose the behaviours that reinforce your best professional identity:

"I have the power to recognize issues and ensure that they are not carried forward into my own practice. Specifically, the patient with borderline personality disorder doesn't have to be seen as a nuisance, and the patient suffering from addiction doesn't have to be viewed as a waste of resources. I do not need to carry the prejudices and perceptions of my preceptors."

In summary, UBC medical students have an opportunity to use portfolio group time as a safe space to co–construct strategies to deal with the powerful forces of enculturation that go against their internal ideals of being a physician. In naming the hidden curriculum and noticing how it affects them personally, students can harness these positive and negative experiences to better prepare themselves to respond in ways that reinforce their best professional identity.

The hidden curriculum is a collective responsibility

In conclusion, the most powerful antidote to the more negative aspects of the hidden curriculum is to empower students through guided group reflective experiences so they can choose to act differently, hopefully changing the culture of medicine. As Graber[12] writes, "we look with great hope at the possibility that the next generation of clinicians will 'get it.'" As clinicians and medical students, the risk of ignoring our role in the hidden curriculum is that we perpetuate its harmful effects on our and others' professional identity formation. Thus, it is our collective responsibility to monitor and address our own resiliency and how we contribute to medicine's hidden curriculum.

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Student as Teachers

Clarissa Wallace[1]

Abstract

The wave of democratization in teaching of the past 30 years is now sweeping medical education. Residents routinely develop teaching skills in Residents as Teachers Programs across Canada, but medical students are increasingly called to teach as well. Just as each student must filter a wealth of positive and negative clinical experiences to develop good behaviour as a physician, so they would do well to view teaching through a lens of awareness and selectivity to make conscious choices of right teaching practices.

Students as teachers

In the teaching philosophy of Freire, "whoever teaches learns in the act of teaching, and whoever learns teaches in the act of learning."[1] The reciprocation of teaching and learning among students and teachers, or students and patients, has been an integral part of the medical profession throughout history. The etymology of the word doctor from the Latin verb docere "to teach" is a reminder that the act of teaching, both of patients and of apprentices, is a defining quality of the physician's role.[2]

Students now routinely assume the role of peer and near–peer teacher. Case–based learning and other forms of collaborative learning have become the norm rather than the exception in Canadian medical schools. Beyond this small group approach, there is growing literature on students as teachers in a broader context showing many benefits of student–led learning.

"Teaching others those things, that one has learnt not long before, consolidates one's knowledge and prepares for future cognitive development…the near–peer teacher has excellent recall of how to make that 'aha' happen, how it recently happened for them."[3]

In addition to the advantage of this "cognitive congruence", peer teaching affords a safer and more relaxed learning environment, while fostering self–esteem and intrinsic motivation for future teaching.[4]

Furthermore, "evidence suggests that if teachers support students' autonomy, competence, and relatedness, they will thrive in educational settings, they will take responsibility for their learning and also act in a more autonomy–supportive way in their interactions with patients."[5]

Learning occurs by doing. For many residents and established physicians in clinical practice, development of a teaching practice has happened at a minimally conscious level, lacking significant or at least deliberate reflection. Early exposure to basic principles of teaching, through interaction with teaching mentors, fosters a more purposeful and stronger teaching ethic; a right way to approach teaching from both pedagogical and philosophical perspectives.

"It is essential that, in preparing to teach, the prospective teacher must realize that a correct way of thinking is not a gift from heaven, nor is it to be found in teachers' guide books. On the contrary, a correct way of thinking that goes beyond the ingenuous must be produced by the learners in communion with the teacher responsible for their education."[6] The teacher acts as a catalyst in the transformation.

The most important role for the teacher then, is not as a source of knowledge and skill, but as a developmental guide to the student and student–teacher. But what is this "correct thinking" toward which we should be guided? The good teacher is expected to possess the attributes of an ethical and good person, but there are additional features of right thinking which seem vital to a good teacher and doctor.

Right thinking for teaching

1. Humility. "The average teacher explains complexity; the gifted teacher reveals simplicity," according to online aphorist Robert Brault.[7] A teacher who believes in learning makes his subject more accessible to share the beauty and joy of concepts, not less accessible as a covert method of self–aggrandizement.

The practice of humility should come easily to the beginner but is often eroded by the growth of expertise. No matter how much one knows, there will always be far more unknown, not to mention that at least some of what one firmly believes will ultimately prove to be false. Socrates, though now infamous for his association with excessive questioning, taught that life is about learning, and that we learn through speaking in dialogue with others.[8]

2. Openness to contradiction and correction, except in matters of universally accepted ethical principles. It follows that we must be open to opposition and even to outright negation of something that we believe to be true, whether it be in the realm of knowledge or of ideology. **To teach, we must listen.**

With respect to knowledge and skill, school and the heavy responsibilities of early practice often instil a desperate need to never be or do wrong. Each of us must break this "perfection trap" at some point. Our best safeguard against doing harm through error is to attend to, rather than ignore, both the inner voice of uncertainty, and the voices of others raised in constructive contradiction. Though uncomfortable, these moments of correction are times of intense learning for doctors and teachers.

In matters of ideology, a good teacher will be vigorous in defense of the rights of all individuals as enshrined in the UN Universal Declaration of Human Rights. These rights are frequently violated, and yet their intrinsic value is not a matter of personal opinion or belief but of established global principle.

But beyond these "inalienable rights," each of us must recognize and acknowledge our biases in order to avoid moving from education to a practice of indoctrination. Information delivery is a simple presentation of fact. Education presents facts in a biasing context by adding opinion or ethical perspective as guidance. However, there is danger in further extrapolation of this continuum to the abuse of education as indoctrination. "Indoctrination is the act of presenting only a biasing context or an explicit political position to the public."[9]

Teachers and students must recognize and reject indoctrination and miseducation presented in the guise of learning. Those who imply that, "if you are not with us, you are against us" are tyrants, not teachers. To welcome contrary views is vital to teaching and learning.

3. Curiosity. Curiosity is the attitude that saves us from arrogance at the personal level and dogmatism at the societal level. Preserving a desire to see or learn what is strange, unknown, and foreign is a requirement for civil society, as well as for service to individual patients, many of whom have conditions which cannot and should not be easily categorized and dispatched.

A teacher without curiosity lacks creativity. It is often through new and imaginative connections across disciplines that truly innovative ideas are born. The potential for these new insights keeps us open to learning from all others and in all fields, always ready for the jolt of

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surprise and joy of concept(ion).

4. Authenticity. We teach so much more than the knowledge we intend to impart. "To teach right thinking is not something that is simply spoken of or an experience that is merely described…but something that is done and lived while it is being spoken of, as if the doing and living of it constituted a kind of irrefutable witness of its truth."[10]

If we as teachers "talk the talk" but don't "walk the walk," we are teaching hypocrisy. To be authentic, we must first be self–aware and then be willing to reflect on our teaching practice as a demonstration of who we are and what we believe.

5. Connection and compassion. Consider the "platinum rule" of teaching from Dr. Janet Riddle: "treat your students as you would like them to treat your patients."[11] Could we not also say, that we should treat both students and patients as we ourselves would like to be treated as patients? As educators, our behaviours help to weave the fabric of the future. Let us not be the doctors and educators who "might treat [the] society under study as though [they] are not participants in it."[12]

Ironically, clinical work may encourage us to distance ourselves from our patients, not to be "over–involved" or "let it get to you." For many, the most profound learnings of medicine are at the emotional level, rarely described or explained, and often unacknowledged. On this level, there is no student–teacher, or doctor–patient dichotomy, only our common humanity.

6. Unconditional positive regard. As teachers, our duty is to make clear to each student and each patient that they need not "earn" our positive regard. Small marks of natural respect reassure patients and students of their intrinsic value and their "right to be here."

7. Willingness for transformation. In the dialogue of teaching and learning, both the student and the teacher are changed, not just in the revision of their opinions but in themselves as people.

To practice both teaching and medicine, each of us must prove worthy of the trust of our students and patients. In accepting this trust as a profound gift, we become obligated to manifest our best possible selves, and therein lies personal growth.

Conclusion

Students, student–teachers, professors, doctors, and doctors of the future let us work toward further democratization of medical teaching. Let us strive for "right thinking" as an expression of our love for both medicine and teaching as acts of shared discovery, compassion, and freedom.

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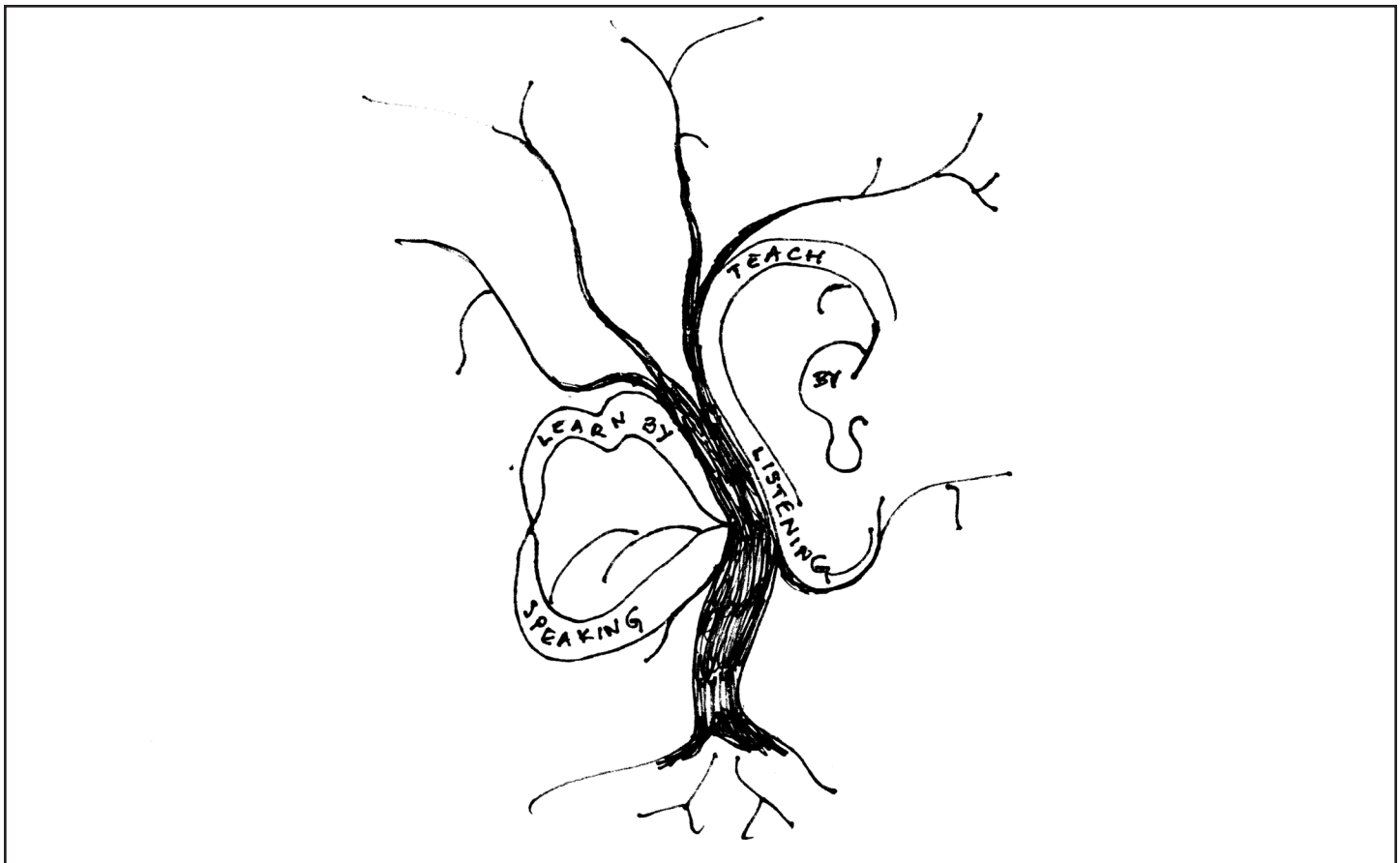
How Can Medical Education Train Socially Responsible Physicians?

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In 2010, a Working Group on Social Responsibility and Accountability was formed to inform the UBC MD undergraduate program's curriculum renewal. Based on 'The Future of Healthcare in Canada' report[1] and the 'Stakeholder Input' report[2] this working group identified eleven key themes that would direct the creation of a medical curriculum to develop socially responsible physicians (Figure 1).

Figure 1 | Social Responsibility and Accountability Framework

As represented in Figure 1, Social Responsibility, protected by a circle around it, symbolizes the sacredness of this core value to the medical profession. Spreading out, and supported by the notion of social responsibility, are eleven themes that were identified to be the focus of the MD Undergraduate Curriculum. The outside circle of Social Accountability represents the interface with all external stakeholders. For example, Social Accountability acknowledges how a faculty of medicine displays and demonstrates that its medical curriculum is meeting its social responsibility mandate while incorporating stakeholder feedback.

Social Responsibility Themes

Health Disparity

The Institute of Medicine's 'Unequal Treatment: Confronting racial and ethnic disparities in health care' (2003) noted that racial and ethnic minorities received lower quality of health care even after controlling for access issues.[3] This report recommended that cross–cultural curricula needed to be integrated early into health professional training.

The framework proposes that medical students be provided frequent opportunities to gain an understanding of health disparities through didactic lectures which outline the basic foundations, small group learning sessions which encourage discussion, and clinical experiences which invite student engagement with diverse communities. In addition to an increased awareness and sensitivity to social determinants of health, medical students need to understand their own capacity and responsibility to impact these health disparities during their training and subsequently in independent clinical practice.

Diversity

It has been well recognized that the delivery of quality healthcare to diverse patient populations is suboptimal.[4,5] One strategy to address this has been to increase the diversity of the physician population to meet the needs of diverse communities.[6]

While gender, ethnic minority, and students from non–traditional academic backgrounds have improved overall medical student diversity,[7,8,9] there remains an underrepresentation of students from lower income families[10] and from Aboriginal communities in Canadian medical schools.

Also absent is a representation of female role models in academic leadership positions. Similarly, there remains a lack of ethnic diversity in faculty and leadership.[11] It is proposed that initiatives to connect medical students with diverse leadership and to enhance the mentorship of students belonging to underrepresented groups will lead to more inclusive health and education organizations.

Changing Demographics

The Census of 2016[12] indicates that there are more seniors living in Canada than there are children. Also indicated is an increase in ethnic diversity through the growing immigrant population in Canada.[13] Both of these shifts in demographics will significantly affect the practice of future physicians. It is proposed that to better train medical students in healthy aging, chronic disease management, global health, and cultural safety, these content areas should be emphasized in didactic sessions and in problem/case–based learning. These topics can also be integrated in clinical experiences that are strategically organized for students to experience practicing with society's changing demographics.

Aboriginal Peoples' Health

For future physicians to address the significant health disparities amongst First Nations, Inuit, and Métis peoples[14] in Canada, the medical curriculum needs to include the history of colonization, residential schooling, and intergenerational trauma as well as the social determinants of health including housing, employment, income, environment, and education. It is anticipated that educational priorities as identified by Indigenous communities, with an educational curriculum developed by Indigenous scholars, will be implemented throughout medical training in a safe and effective manner.

Rural and Remote Health Care

It is recognized that recruiting and retaining sufficient physicians in rural and remote areas of Canada is a significant healthcare challenge,[15] that has been further aggravated by an urban–centric educational paradigm in both the recruitment and training of physicians.[16]

It is proposed that early exposure to rural clinical practice and then repeated exposure later in training leads to a better understanding of the opportunities and realities of rural practice. Medical students should also have interactions with rural medicine role models.

Global Health

Improving medical students' global health education will strengthen

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students' abilities in communication, collaboration, and advocacy. While reminding the medical students of their obligations of global citizenship, medical education should improve the medical students' knowledge and skills that will enhance their clinical practice both locally and internationally. While considerable resource and logistical challenges exist, students need increased learning opportunities for clinical rotations in developing countries and for increased engagement with recent immigrant and refugee patient communities in well resourced countries.

Generalist and Specialist Training

While it is well understood that family physicians improve health outcomes[17] there remain forces that discourage students from choosing family medicine as a career.[18,19] It is proposed that medical students be provided ongoing valuable rural practice clinical experiences. It is also critical to recognize that physicians with highly specialized skills are crucial to ensuring positive health outcomes.[20] Medical students need exposure to both generalist and specialist high quality practices early in their training so that they can make informed career choices. This is best achieved through a combination of rich mandatory clinical rotations and a wide offering of electives in both generalist and specialist practices.

Collaborative Care

There is considerable research evidence that ideal collaboration provides better health outcomes, while dysfunctional health care teams lead to negative outcomes.[21,22] To train socially responsible physicians, medical students need to spend time in interprofessional education (IPE), which has been defined as "occasions when members or students of two or more professions learn with, from, and about each other to improve collaboration and the quality of care and services."[23] Curriculum topics such as professionalism, ethics, resiliency, patient safety, and conflict resolution are appropriate for small group learning sessions with students from a variety of health education programs. During the clinical years, medical students would benefit from interacting with the entire health professional team to provide patient care.

Research and Scholarship

Medical students should be given opportunities to participate in socially responsible research to create and translate health knowledge to address society's most complex and significant health concerns. This should include opportunities for ethical community driven participatory research. Rather than doing this on their own extracurricular time, medical students need protected time to engage in scholarly research for which they will be granted academic credit.

Health Promotion and Disease Prevention

Socially responsible physicians recognize that health improvement and disease prevention is not only more cost effective than the treatment of disease, but is also consistent with the notion that disease occurrence should be avoided whenever possible. Medical education needs to include sessions on healthy lifestyles, screening for diseases, as well as the role of physicians during large–scale emergencies and epidemics.

Patient–Centred Care

For medical students to become socially responsible, the curriculum needs to emphasize high levels of competency in communication, empathy, and cultural safety so that truly patient–centred care can be practiced.

Medical students should also be provided opportunities for work–life balance, mindful practice, and self–reflection. The importance of the therapeutic alliance and relationship–based care need to be highlighted throughout the medical curriculum. There needs to be protected time to learn and practice resiliency strategies.

Conclusion

The framework proposes that a socially responsible physician, while performing each of the CanMEDS competency framework[24] roles of Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, and Professional, must understand that meeting society's needs is not secondary to being a competent physician.

It is the role of medical education to both assist medical students to achieve CanMEDS competencies, and to nurture their development into socially responsible physicians.

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The Future of Competency-Based Learning and Workplace-Based Assessment in Medical and Health Education

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Medical and health education is constantly evolving to meet changing societal needs. This is a process that takes time, dedicated energy, and appropriate resources. In Canada, the Future of Medical Education in Canada (FMEC-MD) report recommends transformative changes in undergraduate medical education, beginning with a competency–based approach, and addressing the key areas of leadership, community needs, admissions process, scientific basis, prevention and public health, hidden curriculum, learning context, generalism, and inter/intra–professional practice.[1] Along the continuum of health education, the Future of Medical Education in Canada Postgraduate Project (FMEC-PG) report on residency education makes similar recommendations.[2] Specifically, the renewal of postgraduate curricular structures and assessment methodologies are well under way for family medicine residency training (Triple C competency–based curriculum) and specialties residency training (Competence By Design).[3,4] The implementation of the latter follows a phased approach across the 17 medical schools in Canada, beginning with two specialties in 2017, six in 2018, and ramping up to twelve in 2019.[5] More specialties will be implemented in years to come, and complete implementation is anticipated to span across a decade. The transformation to competency–based learning provides a unique opportunity to seamlessly align undergraduate and postgraduate medical education, which in turn empowers students to progress and transition successfully into the various phases of their career trajectories. Similarly, the Future of Medical Education in Canada Continuing Professional Development Project (FMEC-CPD) report also recommends a competency–based approach for post–training, lifelong learning.[6] The status quo of time–based learning has therefore begun to shift to competency–based learning, representing a much–needed paradigm shift. The overall goal of these transformative changes is to achieve the newly expanded "quadruple aim" in health care: enhancing individual patient experience, improving population health, reducing costs, and, the most recent addition, improving the work life of health professionals.[6]

Competency–based learning has also been adopted in health professional education, and the terminology used to describe the competencies is consistent with that used in medical education. The Essential Competency Profile (ECP) in physiotherapy elicits exit competencies upon the completion of training of physiotherapists and physiotherapist assistants in Canada.[7] The essential competencies of practice for occupational therapists in Canada have been developed by the Association of Canadian Occupational Therapy Regulatory Organizations.[8] The Canadian Association of Genetic Counsellors has developed core competencies for training that include knowledge–based competencies and practice–based competencies.[9] The National Audiology Competency Profile lists the competencies required for training in audiology and speech–language pathology using the same framework as in medical residency education.[10] The Canadian Midwifery Regulators Council has published general and specific core competencies for midwifery education in Canada.[11] In nursing education, a competency–based conceptual framework has been well–defined and adopted for some time, including competencies covering the domains of professional responsibility and accountability, knowledge–based practice, ethical practice, service to the public, and self–regulation.[12] Dental education is premised on a list of 47 essential competencies upon completion of training, which are defined by the National Dental Examining Board of Canada.[13] Finally, the key and enabling competencies for pharmacist training in Canada are well–defined by the National Association of Pharmacy Regulatory Authorities.[14] The competency–based approach in the training of medical and health professionals offers a unique opportunity for alignment and collaboration in interprofessional education, especially in a realistic workplace environment and early in training.

This article highlights how competency–based learning (which is a form of outcome–based learning) and workplace–based assessment (WBA) can strategically transform medical and health education.

Competency and outcome–based learning

Competency–based learning is an approach to preparing learners for practice that is fundamentally oriented to graduate outcome abilities and organized around competencies derived from an analysis of societal needs.[15] It de–emphasizes pure time–based training; that is, the training duration may be lengthened or shortened, at least theoretically. It promises greater accountability, flexibility, and learner–centeredness. In medical and health education, competencies and outcomes are usually defined by external accreditation organizations and/or professional regulatory bodies.

To be successful, the implementation of competency and outcome–based learning should occur in a systematic fashion. Multiple steps are involved, including the development of guiding educational statements (vision, mission, and goals), exit outcomes (with corresponding key competencies and enabling competencies), milestones for the various learner levels, appropriate assessment tools, curriculum design, curriculum goals and unit objectives, educational activities and the related activity–specific objectives, and a curriculum evaluation strategy for continuous quality improvement. It is important to tailor the above steps to the local learning environment and context. Each step must be carefully coordinated, as failure to do so may compromise the success of competency–based learning.

Below is an example that illustrates how the abovementioned steps can be strategically implemented. Since 2015, the University of British Columbia (UBC)'s undergraduate medical education curriculum has implemented a robust renewal process to its underlying pedagogical principles. The renewed curriculum at UBC is grounded upon social responsibility and accountability, a competency–based curriculum, robust student assessment, flexibility, scholarship, integration of

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learning, continuity of learning, and adaptability to an evolving health care system. The graduate outcomes are set *a priori*, and the exit competencies are constructed to match the national requirements of the external qualifying examination. Competencies are grouped into year–specific milestones. The curriculum design was also changed from the traditional block system to the spiral system, whereby topics are split up and spread out longitudinally. The spiral system encourages both horizontal and vertical integration between topics and more closely approximates real–life thinking and encounters. For example, the teaching of biomedical ethics follows its own theme spiral. There are multiple learning activities in the first two years of the curriculum, including content in the Case Based Learning (CBL) cases, lectures, online modules, and interprofessional workshops. These learning activities are mapped to the biomedical ethics exit competencies. Additional content on ethics is also added to the final two years of the curriculum and delivered mainly in the workplace setting, to complete the spiral theme. This content is also captured in the curriculum map. Like any curriculum design, the spiral system can present challenges, such as the need for learners to jump between topics when studying. The renewed curriculum is subject to continuous improvement based on feedback from students and faculty members.

A number of enablers can help to ensure successful implementation of competency–based learning. One prerequisite is a user–friendly, real–time curriculum mapping tool. This is not a new concept, although its adaptation to a complex curriculum such as that seen in medical and health education requires a thoughtful and programmatic approach.[16] The curriculum map links granular session level objectives to the broad exit competencies. At UBC, content experts ensure that each objective, at every level, is linked to at least one objective from the levels above and below. This process identifies how the yearly milestones (or exit competencies) are achieved and related to the session level objectives.

Another important enabler of successful competency–based learning is adequate teacher support through proactive faculty development. This is especially important for province-wide distributed medical education programs, such as in British Columbia, where many teachers are clinicians and practitioners located in a vast number of geographical locations. Helpful tips for teaching in the classroom and workplace settings have recently been published by my team.[17] Examples of best practices in distributed classroom teaching include: promoting teacher–learner connectivity, optimizing the long–distance working relationship, using the reality television show model to maximize retention and captivate learners, including less teaching content if possible, telling learners what you are teaching and making it relevant, and turning on the technology tap to fill the knowledge gap. Some of the best practices in distributed teaching in a clinical workplace setting include: asking "what if" questions to maximize clinical teaching opportunities, trying the five–minute short snapper, multitasking to allow direct observation, creating dedicated time for feedback, reassuring learners that there really are no stupid questions, and working with a heterogeneous group of learners.

As we move into the future, many questions on competency–based learning remain to be answered. These concern the impact of competency–based learning on patient and population health outcomes, the cost–effectiveness of competency–based learning, and ways to empower learners to achieve excellence beyond the competency benchmarks. An education–scholarship approach in answering these questions would be helpful.

Workplace–based assessment

The traditional assessment methodology in medical and health education has limited workplace assessment, in terms of both scope and frequency. One of the implications of implementing competency and outcome–based learning is the need for a renewed student and learner assessment system, which would deploy multifaceted assessment modalities that are both continuous and frequent. Direct observation with regular feedback in a formative manner should be a critical feature, and authentic workplace–based assessment (WBA) can be used for summative decision making.

There is increasing evidence that supports a programmatic assessment approach in competency–based learning; this approach is based on the theoretical construct that any single assessment data point can be flawed, while a collection of multiple assessment points can strengthen the overall assessment decision.[18,19] In general, the higher the stakes, the more assessment points are needed. Expert group judgment should be part of the process for making any high–stakes decision. In fact, the validity of any non–standardized assessment rests more with the user than with the assessment instrument *per se*.

At UBC, the undergraduate medical curriculum has adopted the programmatic assessment approach, which is comprised of five assessment modalities: progress tests, course written examinations, portfolio, objective structured clinical examinations, and WBAs. The details are well–articulated in a faculty development online modular course.[20]

Of note, WBAs charts a learner's progression towards competence in tasks within clinical placements over time. To obtain a passing grade at the end of the year, students need to demonstrate that they have achieved the educational milestones related to the learning outcomes commensurate to the level of training, which are in turn predetermined by the program. There are two streams of information–gathering to inform WBAs: direct observations at the workplace and contributory data (which reflect the students' applied knowledge, skills, and attitudes, from multiple sources). Support for the students who demonstrate academic difficulty and opportunity for remediation are provided throughout the year.

Some of the early lessons learned from the rollout of WBAs include the need for continuous improvement of the system, active student engagement and feedback, and ongoing communication with the key stakeholders, including frontline teachers, administrative staff, and educational leaders. Change–management plays a critical role here.

As with implementing competency–based learning, further studies are warranted to examine the impact of WBAs on the student experience, resource requirement, and staff workload. It would also be interesting to explore how WBAs can continue upon completion of training, such as for the purpose of continuing professional development.

Implications

This article highlights the future of competency–based learning and workplace–based assessments in transforming medical and health education. These approaches provide consistency across the learning continuum, from the undergraduate to postgraduate and to professional development levels. The approaches also allow valid and reliable measurements to be made for quality improvement purposes. A number of competencies are common and can be shared among all health professions, providing new opportunities for alignment and

collaboration in interprofessional education.

There is an increasing interest to adopt competency–based learning and WBAs in other university degree–granting programs. Lessons learned from medical and health education can be tremendously informative and helpful. The future is here and now.

Acknowledgement

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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.[1] 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.[1] 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.[1] 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.[2] 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.[1] 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.[3] Information presented later in a case is given more weight than information presented earlier.[3]

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.[2] 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.[4] 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.[5] There was a 72% lower accuracy compared to the whole–case format.[5] 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.[6] 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.[6] Asking students to keep a tally of these cases without paying attention to the quality of supervision does not contribute towards improving student learning.[6] This illustrates the importance of effective preceptors in a student's clerkship years. Many clinicians are not trained to provide effective feedback.[7] They are expected to train their students to be effective clinicians, often without any framework to guide them.[7] 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.[8] 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.[9] 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.[10] 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.[10] 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.[11] 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.[12] 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.[13] 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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A Simulation–Based Group Study Method for Preclinical Medical Students

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Abstract

Group study has been identified to be an effective method in promoting student motivation, academic success, and mental health. We present a model of a semi–structured group study method that allows students to practice and develop their clinical decision–making, communication, and physical exam skills. This method centers around a case–based approach by running multiple simulated patient cases in parallel, and introducing time dedicated for case presentations, review of laboratory results, and patient counselling. The proposed group study method may be useful as an adjunct to the UBC curriculum in building student competency, while also encouraging bonding between fellow medical students.

Introduction

As a leader in medical education, the UBC MD Undergraduate Program (MDUP) has renewed its curriculum to facilitate student progression towards yearly milestones.[1-4] This preclinical curriculum, formatted as a "spiral," leverages spaced repetition of both foundational knowledge and clinical skills to maximize retention and familiarity before students enter clerkship and residency. However, recent internal surveys indicate that over half of preclinical students feel they lack opportunities to practice their clinical skills.[5] This finding is reflected across medical schools, where instructors and students have highlighted students' struggles with clinical skills and decision–making.[6]

In parallel with formal curriculum, students can integrate their knowledge and actively practice toward competencies through group study.[7] The literature describes these social learning environments as a method for students to share key concepts and address knowledge gaps while enhancing motivation and accountability for their learning, thus improving academic outcomes.[7-9] These groups have also been shown to promote student well–being, providing an avenue for both social and academic support that is particularly crucial during the transition into clinical years.[9-11]

Positioned at the intersection of competency–based education and peer learning, this case study presents the iterative development of a group study method that allows for the deliberate practice of clinical roles. This method aims to promote the integrated application of clinical skills and decision–making, communication skills, and foundational knowledge, which aligns with the UBC MDUP milestones in all categories, particularly in the roles of "Medical Expert" and "Communicator."[4]

Methods

Our presented group study method was developed by five medical students of the UBC MDUP, who continually modified the approach through intermittent evaluation and adjustment in a Plan–Do–Study–Act (PDSA) model of quality improvement.[12,13] The final iteration consisted of each group member creating a patient profile for a disease related to the curriculum topic of the week and being prepared to roleplay as that patient. Every group member took a turn roleplaying as the "patient" and "provider," practicing history–taking, physical examination, differential diagnosis, and patient counselling in a timed manner as illustrated in Figure 1. Full descriptions of the iterations and PDSA cycles can be found in Appendix 1.

Patient cases were either written manually by group members or found from resources that provided prewritten cases. Group members wrote patient profiles by selecting a disease and researching the expected signs, symptoms, physical exam findings, laboratory results, imaging results, possible differential diagnoses, and the proposed assessment and management plan. Prewritten cases were found from sources such as The Human Diagnosis Project[14] and Clinical Case articles from the New England Journal of Medicine.[15]

Discussion

Self–regulated learning

Self–regulated learning (SRL) is the process of a learner being proactive in motivation, behaviour, and metacognition[16] and has been associated with academic achievement,[17,18] success in clinical skills,[19] and improved mental health among medical students.[20] Metacognition involves learners evaluating their own knowledge and recalibrating learning strategies to reach defined goals, which has also been associated with improved academic outcomes and skills attainment.[21,22] In SRL, interdependent learning and motivation encourages the learner to transition through phases of planning, performance, and self–reflection.[23,24]

Promoting metacognition prior to clinical years may improve SRL during the transition to clerkship and beyond, which is beneficial as poor SRL may contribute to difficulties when learning in clinical environments.[25,26] This group study method utilizes the SRL framework to complement weekly curricular learning by creating and solving cases near the limit of the group's knowledge base. This active and performative learning environment fosters self–observation and self–evaluation as participants confront the bounds of their clinical skill and reasoning in real time. For example, amidst taking a history, students may find it necessary to pause the roleplay to ask for assistance from the group, as the group identifies and expands its knowledge limits.

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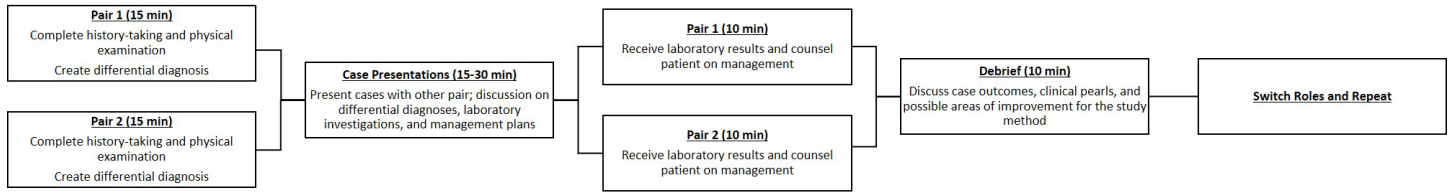
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Pair 1 (15 min)
Complete history-taking and physical examination
Create differential diagnosis

Pair 2 (15 min)
Complete history-taking and physical examination
Create differential diagnosis

Case Presentations (15-30 min)
Present cases with other pair; discussion on differential diagnoses, laboratory investigations, and management plans

Pair 1 (10 min)
Receive laboratory results and counsel patient on management

Pair 2 (10 min)
Receive laboratory results and counsel patient on management

Debrief (10 min)
Discuss case outcomes, clinical pearls, and possible areas of improvement for the study method

Switch Roles and Repeat

Figure 1 | Flowchart of Iteration 3.

Iteration	Plan	Do	Study	Act
1	•In a group learning environment, review content as outlined by UBC MDUP's weekly learning objectives •Improve retention of content delivered in lectures through active learning	• Weekly 2-3 hour study group • Members taught one another using projectors or whiteboards (active learning) • One designated notetaker created collective notes for study	• Good for creating study notes for content described in learning objectives • Poor long-term retention of content • Desire to encode content through narrative and experiential learning • Lack of practice of clinically applicable skills, such as history-taking, physical examination, and differential diagnosis development	• Change didactic study method into an experiential role-play of patient cases
2	• As a group, perform a work-up of a patient case • Practise entire work-up, from history-taking, physical examination, laboratory investigations, differential diagnosis, counselling, and management • Improve clinical reasoning skills	• Weekly 3-hour sessions • One member prepared to role-play as a patient with a condition related to the week's content, ready to act out relevant clinical findings and provide expected laboratory results and imaging for his/her condition • Other members role-played as various health care providers as determined by the case creator, such as a medical student, general practitioner, specialist, or paramedic • Cases often had multiple stages, such as an initial encounter for history and physical examination, a second encounter for further counseling on laboratory results and next steps for management, third encounter for specialist appointment, etc.	• More clinical application of week's content • Cases were not time-efficient due to the multi-stage role-playing • Focusing on single cases limited student exposure to different diseases • Lack of practice of case presentation • Lack of time constraints	• Continue with patient cases, but provide a different structure to improve efficiency and clinical realism
3	• Incorporate more cases • Fewer stages of role-play • Dedicated time for case presentation and peer critique of differential diagnoses and clinical reasoning	• Weekly 3-hour sessions (Figure 1) • Every member prepared a patient case related to the week's content • Members paired up and conducted history-taking and physical examination separately (15 min) • All pairs reconvened to provide case presentations, differential diagnoses, proposed list of laboratory investigations, and management plans; other members provided critique and advice on next steps (15-30 min) • Pairs separated again to discover their laboratory results and counsel patients (10 min) • Debrief on conclusions for all cases (10 min) • Reverse roles and repeat for a new case	• Improved efficiency for time and better simulation of time constraints in a clinical setting • Increased exposure to a variety of conditions • More opportunities to practise case presentation • Provided a structure for practice of independent clinical decision-making skills and subsequent critique and collaborative clinical reasoning • Failure to incorporate analysis of trends in laboratory investigations • Lack of practice reading consultations and patient charts • Limitation to primary care encounters • Lack of realism of physical exam findings (ex. inability to replicate body habitus, heart murmurs, dermatological findings, etc.) • No supervision or feedback from practising physicians	• Continue to monitor and modify approach based on perceived needs gleaned from external clinical experiences • Schedule re-evaluation of methodology

Table 1 | PDSA cycles of three iterations.

Extension of roleplay in medical education

Active learning (AL) has been highlighted as a means of encouraging medical student learning and engagement.[27-30] This group study methodology prioritizes AL in its participants, as responsibility for learning is placed on group members in a multimodal fashion. Specifically, students are forced to think critically in a stepwise fashion to rule out pathological conditions, as roleplay requires active participation in the selection of investigations and derivation of differential diagnoses. Traditional roleplay and simulation methodologies are commonly utilized in the pedagogy of medical communication skills in which students rotate between the roles of patient, interviewer, and observer when learning to take patient histories.[31] Our method builds upon this foundation, as students in the role of the interviewer extend past history–taking to perform relevant physical exams, order laboratory investigations, and present an oral report to an audience of peers while synthesizing relevant findings in predetermined timeframes. In anticipation of scenarios that commonly occur in clerkship, these structured cases serve as a means to practice concrete medical skillsets in real time.[32] This extended format of practice is built upon previous data illustrating common pitfalls of roleplay as a learning tool.[33]

Integration into the UBC MDUP

There are a number of ways through which this group study method can be implemented into the formal curriculum beyond the formation of independent student groups. The described study technique can be enhanced by involving clinical skills preceptors to provide direct observation and teaching points on medical presentation and clinical skills. Faculty can also choose to involve standardized or volunteer patients to enhance accuracy or realism of clinical cases, although this comes at the cost of student learning and engagement in case preparation. This can serve as an adjunct to the Family Practice preclinical curriculum, clinical decision making sessions, or roleplay focused questions during case–based learning sessions.

Limitations

Despite the improvements made through iterative development, this methodology is not without limitations. First, changes at each iteration were primarily based on members' perceptions of what would be most beneficial. Incorporating a validated measure to systematically assess the strengths and weaknesses of an iteration would strengthen the rationale and impact of changes. Second, the group study method must be constantly adapted to the group's level of training in order to be maximally helpful to students. For example, first–year medical students may find it difficult to adopt the exact format of the most recent iteration as they lack exposure to various physical exams, history–taking skills, investigations, and medical diagnoses necessary to finish a case. Lastly, the authors chose not to cite empiric improvement in their medical knowledge, clinical skills, or well–being, as it would not be possible to establish causal effect to this group study method alone.

Conclusion

Our proposed group study method may be useful as an adjunct to the UBC curriculum in building student competency prior to clerkship. The use of structured cases forces medical students to be confronted with gaps in knowledge and ultimately allows purposeful integration of medical knowledge into clinical practice. By placing these simulations before actual patient encounters, students have an opportunity to make mistakes, practice difficult scenarios (e.g., counselling on sensitive issues), and learn critical lessons without experiencing the negative consequences that follow such errors in real–world clinical settings. Finally, the strong peer–led nature of this study method promotes bonding among fellow medical students, which has been proven to play a critical role in student well–being.

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The Significance of Race-Based Generalizations in Canadian Medical Education

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Abstract

Health outcomes between racial groups vary due to a range of genetic, cultural, and social factors. That said, when medical educators refer to race as a risk for disease, they often do not refer to any of these corresponding factors. As a result, medical education often promotes an essentialist view that both pathologizes race and discourages individualized care. This poses a risk to patients and society of reinforcing false understandings of race as a biological entity. Canadian medical schools should encourage students to think critically about race–based generalizations by delivering transparent and context–specific education.

In a small–group session in my first term of medical school, I was told that when it comes to race, I should "generalize, but not stereotype." Generalizations in healthcare are instruments of efficiency; they are crude screening tools implemented to help narrow differential diagnoses, stratify risk, and inform treatment. For example, it would be a generalization to put lactose intolerance high on a differential for an East–Asian person with stomach pain, considering there is a higher prevalence of lactase deficiency in this ethnicity. An example of a treatment–informing generalization would be being aware that a Jehovah's Witness may refuse a blood transfusion due to religious beliefs. Indeed, generalizing can lead to increased diagnostic accuracy as well as a deepened understanding of varied lifestyles. That said, generalizing also groups people into discrete categories and encourages physicians to think about patients as a part of those categories first and as individuals second.

There is a broad body of literature that states that race is a not a biological category.[1] Rather, it is widely agreed upon that racial categories are social constructs, defined by the societies in which they lie. Given this, why does medical rhetoric so regularly group health statistics based on race, and to what effect? What does it mean when physicians say that non–white groups are at higher risk of diabetes or that African–Americans have higher rates of kidney disease?[2,3]

Undeniably, health outcomes differ between racial groups.[4,5] There may be poor genetic similarity within groups, but certain ancestral alleles affect disease rates and can be passed down through generations.[6] For example, 12-13% of African–Americans have two copies of a specific genetic variation in the gene APOL1. This genotype is associated with a four–fold increased risk of developing non–diabetic end stage kidney disease compared to the risk in those without the genotype.[7] Similarly, absence of the HEXA gene on chromosome 15 is much more common in Ashkenazi Jewish populations than others and leads to the development of Tay–Sachs disease. Perhaps a more common cause for variation is the myriad of social determinants that affect health outcomes. There is strong evidence that factors such as food insecurity, social cohesion, and social support have associations with glycemic control in people with type 2 diabetes.[8] Other studies link race–based discrimination and hypertension, as well as internalized racism and insulin resistance.[4] Combined, these genetic and social factors result in a de facto understanding that there are racial differences in disease prevalence and outcome. There is no problem with acknowledging such differences exist and even making diagnostic decisions based on them. However, a problem arises when physicians use race as a proxy for discussing the factors underlying these differences. After all, genes are not passed down neatly and social determinants do not affect every member of a racial group equally.

I argue that in medicine, generalizing about racial differences can be a form of racial essentialism and should be reviewed critically and minimized when possible. Generalizations based on race as a biological entity are often imprecise and poorly evidenced. They ignore the circumstances of the individual and, in turn, can impact the health of visible minorities. Medical education should be wary of these generalizations and teach students to be critical of their use.

What is racial essentialism?

Racial essentialism is the belief in the existence of discrete, fixed, and uniform characteristics that constitute and differentiate racial categories. The concept of racial essences is not new. It was brought into philosophical discourse in the 18th century as a way of illustrating social hierarchy.[9] Around the same time, Thomas Jefferson proposed that there were inherent differences in lung capacity between African slaves and white colonists.[10] Ever since, the idea of biological racial differences has been foundational to the medical sciences. Indeed, lung capacity is still considered to vary based on race, despite a global study that showed for the same weight, height, and sex, there is no difference in lung function tests between races.[11,12] On a societal level, this has the effect of encouraging people to think about races as fundamentally different from one another and therefore not equal. On a patient level, the application of racial essentialism can not only lead to beliefs about fundamental differences in biology, but also judgments from practitioners about fundamental differences in patient behaviours. For example, the generalization that non–white races have higher rates of type 2 diabetes complications may lead some healthcare practitioners to think that these racial groups have poorer lifestyle choices and will be less compliant, and subconsciously show their beliefs in their actions.

Indeed, racial essentialism can perpetuate racial stereotyping. In a study on racial essentialism from 2012, essentialist thinking positively predicted stereotyping, even when controlling for gender and age.[14] This can result not only in overtly racist acts, but also in subtle changes in how patients are treated. Some cases of this involve physicians starting medications at low doses based on race–based disease rates and drug efficacy statistics, and not individual history.[13]

Racial essentialism also affects the practitioner. The same 2012 study showed that essentialist thinking has a common mechanism to

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creative stagnation: categorical thinking.[14] In medicine, physicians need categorical thinking to divide concepts into groups and create differential diagnoses. However, more flexible thinking is required when considering the more complex aspects of medical care, including addressing unusual presentations of symptoms or discussing the significance of race. The study showed that essentialist thinking decreased markers of flexibility, association, and insight—all traits that are crucial to quality medical care.[14]

What can physicians do?

The adverse effects of racial essentialism do not mean that physicians should ignore racial categories. Paradoxically, to overcome health disparities, the concept of race may even be necessary. How can public health bodies track differences such as access to healthcare and discrimination if they do not acknowledge the categorization upon which these disparities arise? A recent study by sociologist Gerry Veenstra noted the challenge of discovering health outcome mediators due to small sample size. In order to fix this, Veenstra encouraged Statistics Canada to oversample minority populations in future surveys.[4] The concept of race exists, whether or not it is helpful to society, and medical professionals should pay more attention to it in medical education, not less. The more research done that investigates the details behind differences in health outcomes by race, the less health care professionals will be able to justify broad and unsubstantiated generalizations. Similarly, the more research done that is Canada specific, the less health care professionals will be relying on American data to make possibly inaccurate generalizations.

Another way to be more thoughtful about presenting race–based generalizations is to acknowledge the repercussions of racial essentialism directly and explicitly in curricula. This could mean promoting educational leaders in specific race–based topics such as University of Toronto's "Black Health Lead" and University of British Columbia's "Indigenous Health Lead." Schools can encourage their lecturers to be wary of facile use of race as a bioscientific datum in their presentations and encourage further research into the topic. For example, educators and students alike can try to understand why non–white racial groups have a higher risk of diabetes. In doing so, they would find an extensive range of studies trying to identify the factors at play. This includes studies about the relevance of neighbourhood walkability in determining disease prevalence. It would

also include associations between waist circumference and race, which show that waist circumference has more relevance in predicting diabetes onset in Asian populations than in African–American populations.[15] This type of research takes a small amount of time and makes a big difference in how one treats the idea of race.

One of the UBC Medical Undergraduate Program exit competencies suggests that graduating medical students should be able to "help a patient access … resources according to [their] unique physical and psychosocial needs."[16] I suggest that medical students should be taught to critically review the use of race–based generalizations to better appreciate the unique physical and psychosocial needs of the individual and not perpetuate harmful racial stereotypes.

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The Humanity of Medicine: A Case for Literature and Subjectivity in Medical Education

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Abstract

Many schools are incorporating the study of humanities into medical education. This growing and diverse field offers opportunities for students to strengthen their capacity for meaningful doctor–patient relationships. In particular, fiction provides students with a unique opportunity to read cross–culturally and internalize disparate, subjective experiences resulting in a greater capacity for empathetic communication.

Empathetic capacity and the ability to interact meaningfully across differences of culture and lived experience are foundational skills for positive doctor–patient relationships. They also affect how practitioners understand aspects of medical research such as patient drug compliance and risk behaviour, and influence public perceptions of the profession as a whole.[1,2] The empathetic ability and cultural sensitivity of medical students and residents can be strengthened through the guided study of fiction.

Many medical schools have adopted aspects of literary study into their programs under the heading Medical Humanities.[2] The University of Alberta "Arts and Humanities in Health and Medicine" program brings together medical students and faculty and "uses arts and artists to support medical students in learning to better relate to patients, understand patient stories, and translate science in relation to human experience."[3] One of their courses, "Shadowing Artists on the Ward," pairs students with artists, including poets and writers, who then work with patients to translate their anxiety, pain, and hopes into art.[4] The University of Toronto MD Program includes Health Humanities as a focal area in all four years of study and evaluates the narrative competence of students: their "capacity to appreciate, interpret and work empathically with the stories of others."[5]

A recent randomized controlled trial of 180 nurses measured scores on the Jefferson Scale of Empathy before and after zero, four, and eight months of narrative reading education.[6] The intervention included reading and discussing literature around common themes such as "empathy," "holistic care," and "company," followed by relating patient narratives to these themes and assessing psychological and social needs. The authors observed a statistically significant six–fold greater increase in Jefferson Scale of Empathy by the group with the most narrative education. The study was limited to a cohort that was primarily female (90%) and young (mean age 18) but showed potential for the rigorous investigation of reading as a method to expand empathy.

A recent meta–analysis of arts–based interventions in healthcare education found widespread enthusiasm for the practice, but cited two key issues: "the first is a lack of clarity over the criteria for the success of these interventions; the second is the low proportion of studies involving artists in design and delivery."[7] There was also very little homogeneity in the type of intervention, with only 16% classified as literary interventions based on the reading of fiction.

Many physicians have documented how fiction has helped them cope with difficult circumstances and/or patient trauma.[8] Fiction can help physicians "shape the language of mourning, of suffering, of death entering the ill person's condition, and looking at it from all sides"[9] and is "a means of rekindling and deepening those human experiences of imagination and commitment essential for caregiving."[10] Fiction situates the reader within the subjective experience of a character or set of characters: we do not read of the disparate experiences of others but are asked to place ourselves inside the point of view of the main character(s).

While the impact of fiction on empathy is beginning to be evaluated, the mechanism of this impact is less clear. Two potential mechanisms underscore the value of fictional art: it encourages the exercise of empathetic imagination, and it facilitates cross–cultural knowledge acquisition of underrepresented communities or communities that face unique burdens in the access and quality of health care.

Reading works written in the distant past can allow students a relatively safe space to explore their emotions, including grief, judgement, or apathy, without feeling the need to conform to contemporary expectations of how they should feel. A qualitative study of 250 fourth year medical students found that the novella "The Death of Ivan Illych," written over a hundred years ago by Russian author Leo Tolstoy, was an effective tool "to introduce new ethical concepts to less experienced medical trainees."[11] At this level, the goal is not to shape the responses of the students but rather to expand them: "The most fundamental of insights about literature [is that] it isn't supposed to have a single meaning."[12]

A related approach is to read contemporary works from medically relevant, underrepresented, at risk, or otherwise marginalized communities. In Canada, such communities include First Nations authors, women of colour, immigrants, members of the LGBTQ community, as well as those suffering from drug addiction or mental health issues.[13,14] Here fiction is not intended to minimize the proven value of firsthand, non–fiction accounts from these communities.[15] Instead, it serves as a different and undervalued resource by asking the reader to imagine themselves in the place of the marginalized person. Fiction has the unique ability to enable the reader to inhabit the subjective space(s) of the protagonist(s). To see as they see, hear as they hear, and feel as they feel. It is a safe space for a physician or medical student to take the leap of faith into the subjective reality of their patient and better understand their illness and emotional needs.

Unlike in non–fiction, or ethnographic accounts, those having read a work of fictional literature can more easily attempt to imagine themselves in the shoes of the main character. They can then proceed to share, discuss, and debate the subjective experience of the lives of the main characters without the limitation of it being tied to a real person. Ways of being become not right and wrong, but multiple and proliferative, and the act of imagination helps to bridge the distance between doctor and patient. Ruth Charon, a physician and literary scholar believes that "together with medicine, literature looks forward to a future when illness calls forth… recognition instead of anonymity, communion instead of isolation, and shared meanings instead of insignificance."[16]

It is unfortunate that many medical students find their exposure to fiction declines once they enter medical school. One study reported

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that 75% read fewer non–curricular books during their medical education.[17] The value of fictional literature in medicine needs to be further specified and measured if it is to make a lasting and meaningful foray into the overburdened curriculum of medical education. Specific teaching approaches need to be formulated and evaluated so that it can be recognized as a powerful process for the expansion of empathetic consciousness and a way to connect with marginalized communities.

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Cadaveric Anatomical Education in the 21st Century: Preserving Medical Education

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Abstract

Anatomical medical education through cadaveric dissection is a tradition that has been preserved through the centuries. Advancements in medical knowledge were gained throughout millennia through dissections of animals and humans. Now, the roots of this heritage wither as medical programs restrict laboratory time in favor of more modern educational techniques. We seek to promulgate a medical student's perspective on the use of cadaveric dissection within the curriculum and why dissections must remain an imperative part of medical education. Continuing a hands–on approach to anatomical systems will ensure both educational and medical standards are achieved and enhanced.

Education in human anatomy through cadaveric dissection is a pedagogical tool nearly as old as the profession of medicine itself. Ancient literature by Galen and Hippocrates was dominated by dissections and vivisections of animals, whereby the foundation of medicine flourished.[1] Modern medical training arguably began during the Renaissance (14th-17th century), with key anatomists and physicians such as Andreas Vesalius and William Harvey producing seminal works on anatomy and circulation, respectively.[2,3] These advances in the wealth of knowledge were hard won, continually facing pressure from hierarchical institutions. Despite the medical profession's pedigree in anatomy, there has been a reduction in the volume of information instructed via cadavers over the past decade, as various stakeholders vie for valuable time and resources.[4,5] Here, we provide a student's perspective in this debate, asserting that cadaveric dissections have irreplaceable educational benefits in medical education. To emphasize this point, we will begin by discussing the change in pedagogical tools by examining the progression to prosections and digitization in anatomy. We will then discuss the importance of cadaveric dissection in the comprehension of organ systems and its benefits to practitioners.

Medical education is evolving with the development of new diagnostic and imaging technology. The incorporation of digital imaging and 3D rendering software, which allow learners to peer deeply into body systems, gives modern students a significant advantage over the forebears of anatomy, who dissected to understand structure and vivisected to understand function.[6] Despite these advances, studies have failed to prove superiority of digital education over dissection.[7,8] In fact, Saltarelli et al. suggest that cadaveric dissections may better facilitate knowledge transfer from laboratory to clinical practice.[9] We propose that the digitization of anatomy as an instructing medium alone does not allow the student to critically appraise the body in its totality and thus cannot completely replace the cadaver. These tools do indeed come close to cadaveric anatomy, with the ability to manipulate, remove, and rotate structures digitally; however, this approach and that of 3D renderings lack the inherent advantage of tactile learning. We believe that the ability of the learner to observe structures— feel by hand their tensile properties, thicknesses, and diameters— and physically follow the neural and vascular input is of paramount importance. This form of kinesthetic learning is favored by medical students and has been reported to enhance deep comprehension, thus improving the students' ability to apply information to other fields of medicine such as radiology.[10,11] Furthermore, these kindly donated cadavers provide the opportunity to practice clinical techniques that would not be possible with digital constructs.[12]

To understand how disease impacts patients, one must comprehend how the various organ systems interact. While cadaveric anatomy in the 21st century is not always implemented, many institutes that hold true to this tradition deliver laboratory sessions by anatomical region.[13] However, Brooks et al. report reductions in student comprehension and performance when anatomy is taught focusing on specific regions (e.g., using prosections) as opposed to systems.[13] Additionally, among programs that instruct using prosections, there is evidence that brief exposure to whole–body dissections is viewed favorably in enhancing clinical skills and overall anatomical comprehension.[14] These findings illustrate an inherent disadvantage of prosections in anatomical education, whereby students are required to piece together individual regions instead of understanding the body as a whole. For example, students may not fully understand the mechanism of Pancoast's syndrome if they only view the lungs in isolation, neglecting the neurovascular structures located superomedially. As such, we assert that a systems–based approach may best suit the clinician–in–training.

In a recent survey of physicians from diverse specialties, 50.9% of respondents indicated gross anatomy knowledge was most fundamental to clinical practice, followed by physiology (38.6%) and pharmacology (32.1%).[15] Anatomy is utilized by the majority of clinicians as they interact with patients through landmarking and surveying for disease.[16] Proper identification of structures is essential for ensuring adequate sensitivity and specificity in physical examinations, which students are required to perform with competency and precision. With in–office procedures such as injections and excisions being common practice, anatomy does not remain solely within the domain of the surgeon. For example, in 2006, 36% of Canadians reported experiencing some form of musculoskeletal disorder, making it one of the most common reasons for a physician office visit.[17] These visits necessitate special physical exams, landmarking, and possible application of intra–articular medications in order to diagnose and treat the patient. Finally, cadaveric dissection provides students with the opportunity to sequentially view structures from superficial to deep, allowing for better comprehension of layers and their respective landmarks. As future practitioners, we view this deep understanding of anatomy as an integral part of our ability to deliver timely and quality care to patients.

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A seemingly inevitable trend in science is the favoring of a reductionist approach, focusing inwardly to the protein, genome, and gene level.[18] This gaze has undoubtedly led to significant advances in medical screening, diagnosis, and treatment; however, the ideology associated with this "one–gene disease" phenomenon fails to fully address systemic complications. Facilitated by the continual introduction of newer methods and technology, anatomical education too has fallen victim to this reductionist approach, focusing on specific body regions rather than a whole–body approach. We suggest that the concept of "systems biology" should be extended to medical education in anatomy, whereby cadavers are used to provide students with hands–on experience in learning about the human body as a whole.[19] This approach, tactile in nature, will continue to facilitate greater comprehension and recognition of the impact of disease on the patient. The importance of these skills in evaluating the human body in its entirety has been reinforced time and time again and builds the foundation for clinical practice. The continuation of traditional cadaveric anatomy teaching, supplemented by the march of progress in technology, will ensure quality medical education and therefore quality diagnosis and treatment of patients.

Disclaimer

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Considering the Use of Massive Open Online Courses (MOOCs) in Medical Education

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Abstract

Massive open online courses (MOOCs) are a form of e–learning that currently allows people to learn about a wide variety of topics remotely from experts. They may serve as a way to augment the current delivery of medical education. Specifically, MOOCs have a role in supplementing curricular content, enhancing preparedness for clinical medical practice, and guiding personal interests to assist in specialty decision–making for students in the foundational years of medical school. We will be exploring the benefits of learning with MOOCs, their limitations, and their potential implementation into medical curricula.

Introduction

Given the current explosion of medical knowledge and evolving societal needs, medical curricula must adopt a pedagogical approach that addresses the changing requirements of a physician–in–training. Technology in the form of e–learning is being increasingly used as a means to achieve these goals and circumvent the time and resource constraints of an undergraduate medical education program.[1] E–learning refers to disseminating education via technology, such as the internet and multimedia platforms like Khan Academy. Massive open online courses (MOOCs) are a form of e–learning that are generally free and open to anyone for registration.[2] MOOCs are comprised of different elements including: 1) pre–recorded content; 2) graded assessments; and 3) discussion forums. Once registered, there are suggested timelines; however, course completion is asynchronous from learner to learner.[3] MOOCs can be created by educational institutions and are hosted on online platforms, such as edX and Coursera. MOOCs may have an important role in helping medical students achieve certain CanMEDS competencies throughout their foundational medical training while supporting rapidly changing content.[4,5] This article aims to explore the benefits, shortcomings, and relevant considerations regarding the potential implementation of MOOCs into medical education as a supplemental resource.

Benefits of MOOCs in Medical Education

MOOCs can be used to support the foundational first two years of medical education. Currently, students have content delivered in didactic lectures and are provided with recommended resources for supplementation. This traditional approach has some inherent limitations, including inflexibility to various learning styles.[6] A systematic review reported that e–learning interventions compared to no intervention demonstrated higher degrees of clinical preparedness with better patient outcomes.[7] With MOOCs, the content is provided in short pre–recorded segments utilizing both audio and visual learning. Research has shown this style of teaching increases attentiveness and retention of information.[8,9] The content is also available to review at any time, enabling students to access content remotely and at any point in their education. In addition, MOOCs promote retrieval–based learning by using frequent assessment checkpoints to keep students engaged and active. Furthermore, as MOOCs are an open resource, students from various healthcare backgrounds, including physiotherapy, nursing, and pharmacy, may enrol at any given time. A diverse cohort coupled with the discussion forums promotes real–time collaboration and fosters an interprofessional community.[6] Students can also use these forums to provide feedback to peers, which has been proven to be an effective model of learning.[4] Lastly, the integration of MOOCs into formal medical education could allow students to better prepare for case–based learning, thereby providing more time in session to focus on interactive aspects such as problem solving, team–based skills, and knowledge application.[6]

While the conventional curriculum delivered in the foundational years of medical school is essential, there remain gaps in clinical preparedness that MOOCs can address. Medical students may have particular areas of interest which are not taught in–depth.[10] For example, a student interested in a surgical subspecialty may opt to use a MOOC to gain preliminary knowledge about procedural practices. This could further enhance current practices, such as learning from upper–year medical students, shadowing practitioners, and using informal online resources. MOOCs in these specialized areas could be generated by leading doctors from around the world and accessed remotely by students.[10]

Limitations of MOOCs in Medical Education

It is important to consider the limitations of using MOOCs for medical education. Formal studies evaluating the effectiveness of MOOCs in medical education are lacking.[6,11] It remains unclear whether they offer an advantage in comparison to other online education resources, such as the modules used in current curricula. In addition, the large heterogeneous population of students enrolled in MOOCs makes it difficult for instructors to cater to individual needs. The student–teacher ratio in MOOCs is typically in the thousands, which makes one–on–one interactions unlikely and places increased reliance on peers assisting each other through discussion forums.[10] While MOOCs may be an effective form of teaching foundational knowledge, knowledge translation to patient care would be challenging without sufficient in–person interaction. In addition, while enrolment in current MOOCs is extremely high, the completion rate of these courses is typically less than 10%.[3] Lastly, it is unclear whether MOOCs offer a sustainable business model for educational institutions to use.[10]

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Implementation in Medical Curricula

There are several important factors to consider when exploring implementation strategies for MOOCs into formal educational structures. In order to address high incompletion rates, medical institutions could incentivize students by providing academic credits or certification for the completion of MOOCs that meet their educational standards.[10] With regards to content covered, MOOCs could be tailored to supplement lecture content as opposed to more complex problem solving and clinical reasoning.[6] One possibility is to have national–level collaboration for creating resources in medical education. Sharing of these MOOCs across institutions would reduce the cost of producing and disseminating redundant materials.[12] This could be achieved by developing one centralized online collaborative learning platform like Coursera. In theory, the platform could act as a repository for students to access MOOCs synthesized by healthcare professionals within Canada, as well as MOOCs licensed from other international institutions.

Discussion

Technological innovation in the field of education is occurring at a rapid rate. However, it is ultimately effective teaching pedagogies that will determine the utility of these tools.[10] Shifting towards a more student–centered approach can enhance medical education to fit progressing times. MOOCs can be used to augment and personalize traditional educational models in a way that serves varying learning styles. Furthermore, beyond the use in medical school, there remain many potential applications of MOOCs in supporting the transition into medical practice. MOOCs could help recent graduates in understanding billing practices, medical–legal nuances, and navigating and operating health information technology (HIT) systems such as electronic health records.[12] In conclusion, additional research evaluating the efficacy of supplemental MOOCs in comparison to current teaching standards could validate the implementation of MOOCs into higher–level education. Overall, we remain optimistic about the welcoming MOOCs in formal medical curricula.

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Deconstructing Biases: The West is Not Best

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Abstract

The Western world, a mirage of wealth, power, knowledge, and competence, is often used as a measuring stick to which the rest of the world is compared. Academics interested in global health understand the need to dismantle preconceived notions of people, culture, and health in their work. However, there might be one deeply rooted bias that has not left us. As I packed my bags for a month–long immersion in rural island medicine in the Philippines, I did not realize that I was unprepared to face my implicitly held belief that "health in the West is best."

As the world becomes increasingly globalized, medicine has recognized the need to create today's physicians as global citizens who serve populations of all cultural backgrounds.[1,2] This need lends a strong interest in fostering global health education, whether that is serving marginalized populations in one's own country or working in international initiatives.[3] Much of the literature in this field focuses on the subtle differences in cultural practices and ideologies of health; however, very few academics have focused on the similarities of health care across nations. Through this narrative reflection piece, I argue that this conversation has inadvertently created implicit biases that limit Western medical students from understanding the breadth of global medicine. By downplaying the commonalities of medicine worldwide, we harm the growth of global health practices. As I packed my bags for a month–long immersion in rural island medicine in the Philippines, I did not realize that I was unprepared to face my implicitly held belief that "health in the West is best."

In my first week, I sat in a third–year community medicine class at the University of the Philippines. The professor introduced a case about JJ, a child from a rural Philippine community who delayed seeking medical care due to funds and distance, resulting in his death from sepsis following untreated tuberculosis and pneumonia. The professor then asked the class three reasons why JJ died, unrelated to physiology. I vividly remember believing I would impress this class by presenting unique social determinants of health unheard of to the students in this Eastern medical educational institution. Ultimately, I assumed the East used a biomedical model that held little space for biopsychosocial discussions.[4,5] To my surprise, the students in the class eloquently discussed patient health literacy, preventative care, access to care, and the disconnect between traditional and Western medicine. I had unknowingly belittled the higher education system in a foreign country by assuming the complexity of my own, when in fact I should have realized that post secondary education, in all countries, is a means of teaching critical thinking beyond lay ideologies.[6] The intersectionality of the social determinants of health with physiological science is taught to academics, unrelated to cultural beliefs in any society.

Shifting into the clinical setting of a rural island in the Philippines, I quickly felt common ground as I heard names of diseases and conditions discussed in my first year of medical school such as: diabetes, hypertension, tuberculosis, COPD, and HIV. Yet for some reason, this familiarity took me by surprise. The field of medicine is related to the human body, and besides a few variations, all bodies have been made biologically similar. My education had trained me to learn about the diseases of the body, so I should not have been startled that this language was familiar in a foreign country. But, I was. Somewhere along the way of traveling to a "developing country," my brain had assumed that the premise of health would be drastically different. Yet, this thought was not spontaneous. The literature in global health practices focuses largely on the need to understand areas such as tropical medicine, or infectious diseases.[1,2] We tend to hone into how practices are different rather than similar. Although this is justified because the context in which disease occurs is important, it also subconsciously labels health concerns in the developing world as alien to the more "developed" Western world by not recognizing any overlap. This creates a barrier to approaching the collaboration that can occur between health practitioners in various countries.

Arriving in a rural community, I had anticipated a very basic approach to health care services due to limited resources. As I progressed through my rotation, the structure of the Rural Health Unit highlighted how influential and creative direction from local leadership can change the landscape of health. My preceptor, Dr. J, was the Municipal health officer to a jurisdiction of 20,000 people. Not only was he the singular physician to the community, he also oversaw all health services and public health programming. Having the doctor be both a front–line and administrative worker allowed for the most effective change in the municipality. I witnessed how Dr. J constantly developed his academic and analytical skills in public health through continuous online education, in order to improve health delivery. At the beginning of our rotation, Dr. J presented a comparison between the national evaluations of health services in the remote island community of Alcantra in 2011 and 2017. In 2011, the jurisdiction was marked deficient in more than 80% of categories, yet in 2017 it was deficient in only 2% of categories. This community had flourished under the direction of a creative and driven doctor, despite its remoteness. Even the most rural communities can experience immense change when their leadership excels—the exact principle I applied in my own country.

I walk away from my immersion in the Philippine rural health system with the understanding that global health is an interplay of health systems, rather than a dichotomy between the "developed" and "developing" worlds. Global health is not rooted in outlining the shortcomings of another country and comparing it to my standard of efficiency. It is amalgamating the strengths of all the innovative leaders in each country to develop novel ideas for the advancement of health on a global scale. The field of medicine is more universal than I had subconsciously allowed myself to believe. Seeing world health as more homogeneous rather than disparate allows us, as western learners, to

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use our maximal potential to contribute to international health practices in the future. It means we include knowledge gained from our own world–lens in addition to learning from others, instead of seeing the two as exclusive. I argue that to truly be a global community we need to genuinely believe that no part of the world has better mastered the art of medicine and health care, but instead approach global health from a humble standpoint of community learning.[5] Shifting our focus from solely comparing the differences in global health to understanding similarities can negate implicit biases on superiority that develop within Western global health education.

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Telecommunications: The Disconnect Between Medical Practice and Medical Education

Rebecca Afford[1]

Abstract

Innovations in telecommunications have reinvented the delivery of medical education, but the change in medical curricula may be lagging behind the rapid expansion of the use of these technologies in medical practice. Specifically, the use of smartphones is a mainstay for communicating between colleagues and to inform clinical decision–making. Medical education must therefore inform students of the risks associated with securing patients' confidential information. By analyzing the current state of personal electronic device usage by medical trainees clinically, practical solutions to secure patient information and protect healthcare professionals can be implemented into undergraduate and graduate medical programs.

Telecommunication is continuously expanding its niche in medicine. Not only is it changing medical education by connecting learners hundreds of kilometers away to their peers and mentors, it is also shaping the practice of medicine by connecting professionals and patients virtually instantly. Personal devices are used almost ubiquitously to inform clinical practice and maintain communication. Because of this popularity, medical learners begin using personal devices early in their training. Medical education should prepare learners for their future medical practice, but how is the prospective use of telecommunications being taught now?

Virtual connectedness has changed the medical profession as personal devices are at arm's reach in scrub pockets and beside call–room beds. They have become reference tools and a means of communication. In a 2018 study by Guo et al., medical learners at the University of British Columbia (UBC) from all stages in their education were surveyed regarding their use of personal cellphones.[1] Out of the respondents, 98% stated that they have used text messaging as a part of their medical training, but 9.1% were not aware of the security settings on their phones.[1] Furthermore, 27% said their phone was backed up to a cloud while 30.5% were unsure of their backup settings.[1] The location of the cloud in question was not further specified. The study only asked about the utilization of cellular devices in practice, not tablets nor laptops. A similar survey was completed by fourth–year medical students at the University of Toronto, yielding the following results: 26% of students not having any security features on their phones, 68% believing that personal devices pose a risk for patient privacy and confidentiality, and 22% communicating patient–identifiable information via their devices.[2] Although the majority of learners are using password protection or encryption on their phones, text messaging can also be forwarded to other devices such as tablets, laptops, and desktops in real–time. This creates an added layer of complexity to protecting patient information. Moreover, the use of applications or "apps" was not a part of these questionnaires. A multitude of apps have been developed for exchanging and obtaining clinical information as well as informing clinical decision–making. They have become pocket resources for trainees to develop differential diagnoses, determine investigations, and guide management. Some apps allow users to communicate in groups with the added benefit of encryption, such as WhatsApp. Unfortunately, some of these apps, including the aforementioned, use servers located outside of Canada to store information which, by means of the British Columbia Personal Information Protection Act, is a breach of patient confidentiality if messages contain identifying information.[3] Furthermore, these studies only captured students at two universities. Without formal, public data published for most medical schools across the country or open access to the curriculum of each school, it is difficult to compare how Canadian medical programs are addressing this topic. The University of Alberta outlines required privacy and confidentiality training for clinical, non–clinical, and research staff, but not for trainees.[4] On the East Coast, Memorial University's Medical Student Code of Conduct states, "The discussion of a patient and the handling of their medical record shall not violate their confidence."[5] This objective is clear, but relies upon the judgment of the student, which potentially may not be informed by privacy and confidentiality policies. The use of devices is inevitable and becoming increasingly more prevalent, dependent upon in practice, but with this comes increasingly more complex safeguards to protect private information.

The prevalence of telecommunications in medicine has been addressed by the Canadian Medical Protection Agency (CMPA). The CMPA recognizes the "pervasiveness and convenience" of communication via text messaging and email, but also warns that these modalities are prone to misdirecting to the wrong recipient as well as having information held in databases outside of Canada.[6] Governing bodies, such as the BC College of Physicians and Surgeons, have released similar standpoints.[7] Overall, the Canadian medical community recognizes the concerns associated with the prevalence of personal devices in clinical practice, but the benefits of efficiency may outweigh the perceived risks. This sentiment has been echoed by patients.[8] Patients generally prioritize communication and rapid access to healthcare over the protection of their personal information.[8] Despite this, the risks of confidentiality breaches are not zero. Since medical students receive clinical exposure early on in their education, medical curricula should continue to reinforce the importance of technological stewardship in medical practice.

So, what can be done? Legislation regarding privacy and confidentiality puts the onus on the custodian of sensitive information to regulate its security.[6] Therefore, as medical professionals it is our

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responsibility to not only be guardians of our patients' wellness, but also of their privacy and personal information. Currently, the Faculty of Medicine at UBC provides introductory modules as well as lectures during transitioning periods of medical education to address issues regarding personal devices and personal information of patients. UBC Information Technology has created the Privacy and Information Security Management (PrISM) Program, which provides online modules that provide step–by–step, device–specific instructions to encrypt and secure personal devices, as well as an overview of privacy and confidentiality policies.[9] These modules are available to any UBC student or staff. As of August 2018, all UBC employees, including clinical clerks, are now required to complete these modules.[10] As most Canadian medical programs have adopted cased–based or problem–based learning sessions into their curriculum, application of safe telecommunication practices may be woven into these regular small–group sessions. Furthermore, attending physicians and residents have the opportunity to impart conceptual and practical knowledge to students during clinical experiences. Physicians in these leadership positions can role model and reinforce secure telecommunication practices to encourage students to consolidate previous teaching on the clinical use of personal devices. Practical experience handling patient information electronically is especially pertinent for the clerkship and elective years. The next generation of healthcare professionals will need to adapt to an evolving tech–savvy climate, which is providing an exciting, innovative means of connecting patients and providers.

Personal devices, especially smartphones, are proving to be just as, if not more pervasive than a stethoscope in modern medicine. Current medical education has relied mainly on didactic learning to present this information to medical trainees. Unlike the practical physical examination and procedural skills that are routine in medicine, the practical training to safely use telecommunications is lacking. By practicing technological stewardship, we can further foster a trusting relationship with our patients and further explore the possibilities of these devices in medical practice.

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Highlighting Current Needs in Addressing Youth Mental Health in British Columbia

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Abstract

In 2017, undergraduate medical students in BC decided as a collective to advocate at the provincial level on the subject of youth mental health. This paper outlines key gaps and evidence–based recommendations to improve BC's youth mental health system, including: the introduction of mental health literacy programs for primary and secondary schools as a form of primary prevention; implementing simplified data collection and information sharing to facilitate coordinated care between different service providers; initiating one–stop shop and place–based models of care for improving accessibility; and reemphasizing a need to meet the Truth and Reconciliation Committee's Calls to Action regarding Indigenous health.

Introduction

Children and youth (0-24 years old, as defined by the United Nations) are vulnerable to mental illness, particularly due to the extensive biological, personal, and social development of early life.[1] Indeed, over half of young adults reported their mental illness first appeared during childhood.[2] Therefore, investing in positive mental health early on in life represents an opportunity to develop lifelong mental wellness.[3]

In BC, the prevalence of mental illness in children and youth is estimated to be 12.6%,[4] with depression affecting as many as 3.2 million youths aged 12 to 19 in Canada.[5] Although many service providers are already taking steps in supporting youth in BC, we aim to highlight evidence–based improvements that should be made in the areas of primary prevention, service coordination, accessibility, and Indigenous health.

Primary Prevention

Longitudinal studies show that the majority of mental illnesses arise in childhood and adolescence.[6-8] Evidence also suggests that classroom–based programs can substantially improve mental health.[9] Therefore, mental health literacy programs that are implemented in schools may help to prevent initial occurrences of mental illnesses, leading to an improvement in mental health outcomes and a reduction in need for later crisis management.[4,9-12]

An example of this is FRIENDS, an evidence–based cognitive behavioural primary prevention program in BC, offered at three different time points: grades K-1, 4-5, and 6-7. This program was endorsed by the World Health Organization as an effective management program for anxiety[13,14] and taught skills such as emotional awareness, problem solving, and interpersonal communication.[15] A program evaluation of FRIENDS found significantly improved levels of anxiety and self–esteem, and a qualitative assessment found the vast majority of participants thought the program was fun (81%), would recommend it to a friend (77.4%), had learned new skills (72.8%), and had used their skills to help someone else (41.1%).[15]

In June 2018, the Ministry of Children and Family Development (MCFD) discontinued its license with the FRIENDS Program. The reason for this discontinuation is not clear, but there is now a gap in evidence–based mental health education available for grades K-7. Furthermore, in secondary schools, only North and West Vancouver have integrated mental health courses in their curriculum.[16] These shortages result in a significant need for primary prevention programming aimed and delivered to BC youth.

Coordination of Mental Health Services

There are multiple youth mental health providers across BC, spanning local health authorities, the MCFD, the Ministry of Health, private psychology clinics, school counsellors, family physicians, and community agencies. These service providers lack infrastructure to efficiently communicate and coordinate with one another, especially due to legislation that restricts the sharing of information.[17,18]

Strategies to increase the coordination of services must be collaborative between different providers. For instance, the Responsive Intersectoral Children's Health, Education, and Research Initiative and the BC Children's Hospital Emergency Department's Vulnerable Youth Working Group has developed a "Situation, History, Assessment, Recommendation, Disposition Script for Community–Emergency Department Communication."[19] This facilitates direct communication and timely sharing of critical information between front–line community agencies and BC Children's Hospital. Such initiatives could be used as a framework for efficient and timely information sharing amongst other service providers.

Coupled with an additional lack of a centralized data collection system between the various service providers—and without simplified access to and analysis of those data—a significant gap in standardizing and enabling the coordination of services will persist. Creating reliable province–wide infrastructure for mental health data collection and information sharing has the potential to enhance both the coordination and quality of youth mental health care in BC.[18]

Accessibility of Mental Heath Services

Approximately 35% of youth aged 10-19 had their first contact with BC's mental health system in an emergency department,[20, 21] indicating that youth may be waiting until a moment of crisis before receiving care. Accessing the myriad services can be difficult for youth, especially for

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those without the means to navigate services located outside of their community.

Evidence–based recommendations to resolve these issues include taking a "place–based" approach to services, where mental health professionals meet with youth at locations where they spend most of their time, such as schools and community centres.[22, 23] School–based mental health services have been shown to improve access to mental health and substance use services by minimizing physical, financial, and social barriers to accessing care.[24-26]

Evidence also suggests that youth prefer to access services in one location, where a place–based model can also serve as a "one–stop shop."[27-29] An example of this is the Foundry, a provincial initiative run by Providence Health Care, which delivers primary care, mental health, and social services in centres throughout BC.[30, 31] An early satisfaction survey of the first Foundry Centre (previously known as the Granville Youth Health Centre) found a high level of satisfaction with youth–friendliness and the benefits of integrated services. These results mirror the experiences of other "one–stop shop" integrated health centres around the world, including Headspace Centres in Australia and Headstrong Centres in Ireland.[32-33] Addressing the issue of access to youth mental health services is imperative to closing gaps in care. It is important for all youth in BC to have the care they need, when they need it. A place-based approach is a way of increasing access to mental health resources for youth in BC.

Indigenous Youth Mental Health

First Nations, Métis, and Inuit populations experience far greater health inequities than non-Indigenous Canadians.[34-37] Multiple factors contribute to this inequity, including the intergenerational effects of residential schools, familial deaths, racism, and the dismantling of culture.[34,37] Indigenous youth suffer a disproportionately high burden of mental illness: for example, the suicide rate among all Indigenous youth aged 15-24 is 5-6 times the national average, and as high as 11 times the national average amongst Inuit youth.[6]

In 2015, the Truth and Reconciliation Commission (TRC) published 94 Calls to Action[37] to address the legacy of residential schools and strive towards reconciliation. Three of the Calls to Action (#22, 23, 24) can be specifically achieved within the medical community through collective and individual action across workplaces, hospitals, medical schools, clinics, and health authorities. The Calls to Action include concrete steps that can be taken, such as recognizing the value of Indigenous healing and integrating practices collaboratively with traditional healers and Elders; increasing the recruitment and retention of Indigenous healthcare providers; developing continuing medical education courses in Indigenous health; and providing mandatory education and training for current physicians and medical students on the colonial history of Canada, Indigenous rights, anti-racism, and applied cultural safety. By addressing the TRC's Calls to Action, healthcare professionals can collectively work towards reconciliation and support the mental health and wellbeing of Indigenous youth in BC.

Conclusion

The youth mental health services spectrum in BC is complex and multifactorial. It requires systemic change and a holistic implementation of primary prevention, improved coordination and accessibility of services, comprehensive substance use and addiction services, and a collective effort to meet the needs of Indigenous youth. Specifically, there is a great need to expand primary prevention programs by implementing appropriate mental health education into the school curriculum for students of all ages. In conjunction, prioritizing the establishment and dissemination of infrastructure for data collection and information sharing can ensure coordination and communication between disparate mental health services. This concept can be further expedited by place–based approaches to youth mental health services that emphasize schools and community centres as early access points. Services should also be expanded to support a full spectrum of substance use and supportive recovery services for youth who are living with concurrent and complex mental health disorders. New models of clinical management can focus on building therapeutic relationships through youth–centred, trauma–informed practices. In particular, collaborations with Indigenous communities to address and respond to the TRC's Calls to Action #22, 23, and 24 will contribute to the ability to provide youth mental health services in culturally responsive ways.

Limitations

The intent of this piece is to highlight some of the gaps in services from prevention to treatment of youth mental health. As this is not an exhaustive list, there are many issues and policies that were not discussed that could be the focus of future policy development and research. Of particular note are the issues of adverse childhood events, role of the family in youth health, mental health and addiction amongst youth both within and aging out of government care, as well as issues of secure care, which should be further reviewed.

Acknowledgements

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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

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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 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 smart 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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Coordinating Student Academic Advocacy in the UBC Medical Undergraduate Program through the Medical Education Committee (MEC)

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Abstract

The past two decades have seen rapid shifts in medical education practices. Within a learner–centred paradigm, medical students play an increasingly important role in educational policy and curriculum decisions. Prior to 2016, there was no centralized process for nominating students to serve on decision–making committees of the Faculty of Medicine. The Medical Education Committee (MEC) arose in response to the growing demand for a fair and accountable selection process, as well as to ensure that viewpoints presented to the Faculty are representative of student opinion. This commentary will discuss MEC's formation, operations, and mission. We show how MEC's actions aim to promote student engagement and coordinate academic advocacy in a transparent and accountable manner.
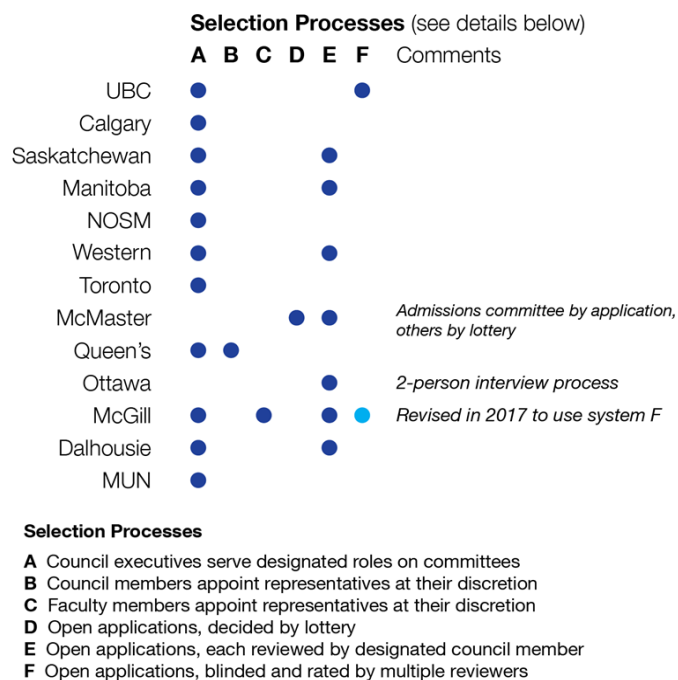
Background and Motivation

A core mandate of any medical Faculty is to train future healthcare professionals. Medical students are thus a key stakeholder group within a Faculty, especially with regard to its excellence in health education. Student participation in university governance offers many potential benefits.[1] Functionally, student engagement provides experiential perspectives on Faculty decisions. Student leaders also serve as accessible contacts for information dissemination and honest dialogue among peers on educational issues such as curriculum renewal. Moreover, healthcare disciplines are unique in that learners participate directly in patient care, and their feedback can therefore contribute to gradual system improvements with potential societal impact. Involvement in Faculty governance also provides personal and professional development opportunities, aligning with nearly all competencies of the CanMEDS 2005 framework, especially the Professional, Communicator, Collaborator, and Health Advocate domains.[2]

At the University of British Columbia (UBC), the nature of student involvement in university governance varies throughout the Faculty of Medicine. The role of some students is to provide feedback on policy or program proposals, especially on committees whose role is administrative oversight. Other students contribute to specific mandates such as reviewing applications (e.g., Admissions Subcommittee or Research Access Committee). Still others are engaged in bottom–up strategic development roles, such as the implementation working groups for the Faculty of Medicine 2016-2021 Strategic Plan.[3] Some students serve as part of their responsibilities as an elected official of the Medical Undergraduate Society (MUS), while others are appointed directly to a committee to represent their peers.

At the 2016 Annual General Meeting of the Canadian Federation of Medical Students (September 24-25, 2016), presidents of the Canadian Medical Student Societies discussed the topic of student representation on medical education committees. The minutes of that discussion have been summarized compactly in Figure 1. Notably, many student societies utilize a combination of multiple systems to choose their representatives.

The figure also reflects one update to the system used by the McGill Medical Student Society, which we were made aware of when Medical Student Society presidents were recently repolled in November 2018.

Currently at UBC, 80 Medical Education Committee (MEC)–appointed students serve as representatives on 18 different Faculty of Medicine committees (Table 1). Prior to 2016, students were appointed as needed by specific MUS Executives upon request by the Faculty of

Selection Processes (see details below)

A B C D E F   Comments

	A	B	C	D	E	F	Comments
UBC	●					●	
Calgary	●						
Saskatchewan	●				●		
Manitoba	●				●		
NOSM	●						
Western	●				●		
Toronto	●						
McMaster				●	●		*Admissions committee by application, others by lottery*
Queen's	●	●					
Ottawa					●		*2-person interview process*
McGill	●		●		●	●	*Revised in 2017 to use system F*
Dalhousie	●				●		
MUN	●						

Selection Processes

A Council executives serve designated roles on committees
B Council members appoint representatives at their discretion
C Faculty members appoint representatives at their discretion
D Open applications, decided by lottery
E Open applications, each reviewed by designated council member
F Open applications, blinded and rated by multiple reviewers

Figure 1 | Systems employed by Canadian Medical Student Societies to appoint student representatives to Faculty of Medicine decision–making committees. This information was extracted from minutes of the Presidents' Roundtable discussions at the 2016 Annual General Meeting of the Canadian Federation of Medical Students and may not perfectly reflect current practices.

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Committee	Student Seats
Curriculum Integration Advisory Council	1
Faculty Development: Clinical Decision Making	4
Internal Medicine Undergraduate Education Committee (UEC)	8
Joint Occupational Health & Safety Committee	2
Learning Environment Advisory Council	1
MD Admissions Subcommittee	2
MEDD 419 FLEX	7
Northern and Rural MD Admissions Subcommittee	4
Pediatric Undergraduate Education Committee	5
Portfolio Advisory Group	6
Recommendations Implementation Committee for the Dean's Task Force on Mistreatment in the Learning Environment (RIC)	5
Research Committee	1
Student Affairs Advisory Council	18
Student Assessment Subcommittee	4
Transition to Postgraduate Practice	2
UBC Health Student Caucus	2
UBC Medicine Family Practice	4
Undergraduate Medical Education Committee	4

Table 1 | The number of MEC–appointed student seats on each Faculty of Medicine committee. Note that seats filled ex officio, such as by elected MUS councillors, are not included.

Medicine. Students did not have equal access to these opportunities, as the representatives were often appointed on the decision of a single MUS executive or chosen based on students' existing connections with the Faculty. Communication between the MUS and student representatives was inconsistent, and communication between representatives on different committees was rare. In 2016, the MUS partnered with a number of engaged students to form MEC in order to coordinate student representation. In this commentary, we outline the core goals of MEC, outline its operations, and describe future directions.

## Core Principles of The Medical Education Committee

MEC operates on four core goals:

1. Facilitate communication among students to ensure effective partnership between the MUS and the Faculty of Medicine via unified, coordinated, and consistent representation of the interests of medical students.
2. Recruit student representatives in a fair, efficient, and accessible manner while promoting the personal and professional development of all those involved.
3. Ensure accountability by streamlining the timely communication of relevant information to the medical student body in a transparent manner.
4. Support student representatives as leaders and communicators so that they can effectively represent the thoughts, views, and needs of their class.

MEC was approved in April 2016 at the Annual General Meeting of the MUS. It was founded entirely by students under the purview of the MUS, without oversight or direction by the Faculty of Medicine. Policy development occurred in a grassroots, collaborative manner through a series of discussions between students engaged in disparate Faculty subcommittees and the MUS. The membership of the MEC executive committee is approved by the MUS annually and consists of student volunteers tasked with facilitating a fair nominations process and maintaining open channels of communication with the MUS and the Faculty of Medicine. The MEC chair serves as a nonvoting MUS council

member under the MUS VP Academic portfolio. Accordingly, the MUS VP Academic Sr. and Jr. sit on the MEC as voting members.

For all committees within its purview, the MEC invites student applications through a standardized form. It then recruits an ad hoc selection board comprised of MUS executives and a previous representative on the relevant committee, who review anonymized applications. Once selected, contact information for all student
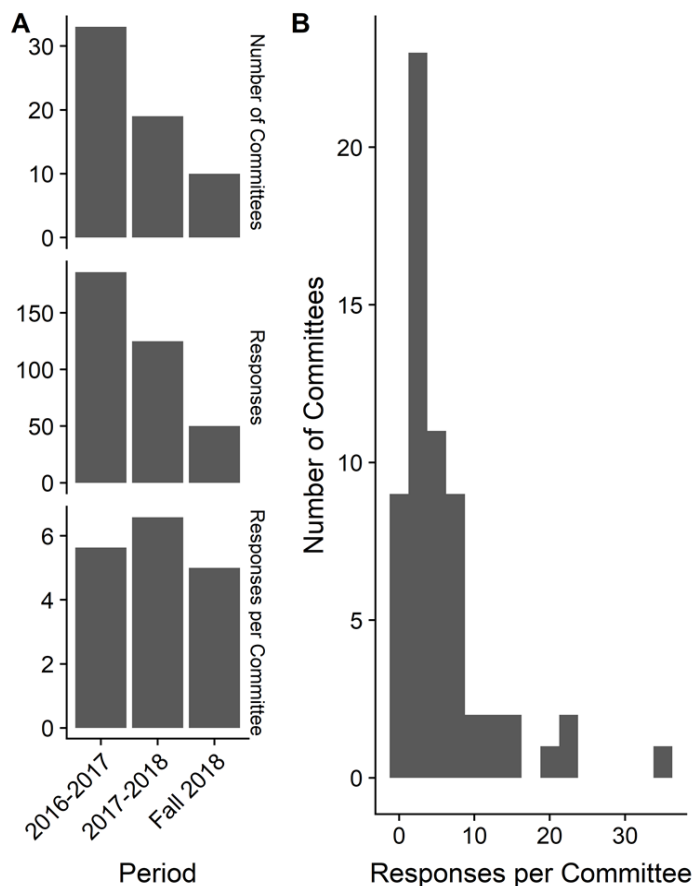
Figure 2 | Tallies of student applications for Faculty of Medicine committees via MEC. (A) The number of committees available annually varies depending on duration of the committee's student terms. Engagement has consistently been maintained at 5 to 6 applications per opportunity. (B) The number of applications to each committee varies, with most receiving 1-15 applications, but some receiving over 20.

representatives is listed on the MEC website. MEC is also responsible for working with the MUS VP Academics to ensure that student representatives are aware of key academic issues and MUS strategy.

Metrics and Milestones

Since its inception in 2016, MEC has received 361 student applications and filled 62 positions on Faculty of Medicine committees, maintaining an average of 5.8 responses per committee opportunity (Figure 2). Opportunities vary yearly depending on the duration of student terms for each committee and the year and site of students eligible to apply. The slight decrease in number of positions since 2016-2017 is likely due to renewal of terms for some existing student representatives. Unfortunately, prior to MEC, such metrics were not recorded, making it difficult to determine to what extent MEC's presence encourages student engagement.

An updated website that lists appointed representatives coupled with regular email announcements regarding new engagement

opportunities help to inform students of who their current representatives are. This represents a key milestone in promoting openness and transparency. As channels of communication between representatives and the MUS continue to solidify, further advances could be made, such as through regular updates about important past or upcoming policy changes or academic programming decisions disseminated via the semiweekly MUS newsletter.

Through ongoing partnership with the Faculty of Medicine and MUS, the MEC maintains a central role in the ecosystem of medical education. The organizational structure of a Faculty is in constant flux, responding to the shifting demands of society and stakeholders. To this end, Dr. Roger Wong, the Faculty's Executive Dean of Education, has been a key partner and mentor to the MEC, serving as its Faculty Advisor. Dr. Cheryl Holmes, Associate Dean of Undergraduate Medical Education, has also mentored and supported MEC as it grows and pursues new endeavours. Moreover, MEC plays an important role in the proactive advancement of academic goals. In 2017, MEC chairs contributed substantially to the development of the 2017-2020 MUS Strategic Plan, which defined focus areas in academic advocacy.

Vision for the Future

The past two decades have seen rapid shifts in medical education around the world, with regard to both demographics and teaching methods.[4] The shift from lecture–based to problem–based learning is emblematic of a broader desire for curiosity–driven, self–directed learning.[5] Rapid change in this arena demands a learner–centred approach to designing and implementing educational policy and curricula.

Today, learners play key roles on Faculty of Medicine decision–making committees. It is an ongoing mandate of the MUS to ensure representative, diverse, and informed communication of student feedback. Over the past two years, MEC has provided a tangible process to address this mandate. In the future, MEC is well situated to provide educational advocacy training, report key issues to the student body, and produce educational scholarship on the perspectives and outcomes of students serving in leadership roles.

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The Decline of Embryology Instruction Within Medical Schools Worldwide: Options for Adapting

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Abstract

There has been a drastic decline in the hours devoted to embryology within medical curricula worldwide over the past century. The instructional hours have dwindled to an annual average of seven hours within Canadian medical schools and 14 hours within the United States. Current evidence suggests that incorporating three-dimensional animations and models into embryology teaching may improve learner outcomes. Incorporating new teaching methods may ensure that medical graduates meet the embryological competencies needed to practice medicine safely, in spite of restricted instructional time.

Embryology is a fundamental component of a thorough medical education. Understanding the embryonic origins of human anatomy is essential for many fields of medicine, most notably those that deal with congenital abnormalities, such as pediatrics and obstetrics. Aside from clinical relevance, an understanding of embryology can improve and enrich students' understanding of human anatomy. Furthermore, an understanding of embryology can improve physicians' understanding of disease processes and the necessary treatment.[1] The significance of embryology is not lost on students. In a recent survey polling 146 British medical students, 81% stated that embryology should be included in the medical curriculum.[2] A similar survey within Australia found that an overwhelming number of medical school graduates believed that understanding embryology helped during their clinical experiences.[3]

Despite being recognized as an important facet of medical education, progressively less time is being allocated to anatomical sciences within the medical curriculum.[4,5] In 1909, over 900 hours of laboratory and lecture time was devoted to the anatomical sciences in American medical schools, compared to an average of 129 hours in 2016-2017.[4,5] This reduction in anatomy instruction has been attributed to several factors, including a shift to an integrated curriculum, an increase in curricular content due to advances in molecular medicine, and the need for future doctors to be educated in social determinants of health.[4]

Embryology instruction has declined as the anatomical sciences have been squeezed out of the medical curriculum. In 2016-2017, American medical schools allocated an average of 14 hours (SD ± 8) to embryology, with some schools allocating zero hours.[5] The limited teaching hours combined with the complexity of the subject has made learning embryology frustrating for students. Reports have shown that medical students are not confident in their embryology knowledge, find it difficult to learn, and consider it to be poorly taught during their undergraduate degree.[2,3] Overall, the evidence suggests that traditional teaching methods are not suitable for teaching embryology given the current time constraints.

Worldwide, the cutback in embryology is concerning enough that several expert groups have released syllabi for foundational embryological knowledge.[6,7] Here in Canada, a study from McMaster University showed that Canadian medical schools devoted an average of seven hours to embryology in 2016-2017, with the University of British Columbia reporting six hours.[8] The impact, if any, of severely limited hours of embryology instruction in Canadian medical schools and worldwide is worthy of rigorous inquiry. Are students confident in their embryological knowledge? Are they satisfied that the knowledge of embryology acquired in medical school will translate into competent clinical practice, not only for embryology–related disciplines, but also more broadly? These questions require urgent, systematic elucidation, at least within a Canadian context.

There is also the related question of how to best teach embryology effectively and efficiently, given the current time constraints. Currently, most studies focus on innovative methods used to teach gross anatomy. Given the close relationship between embryology and gross anatomy, it is reasonable to assume that many of the research findings in anatomy education would be applicable to embryology as well. By reviewing the current research surrounding anatomy education (and the few studies specific to embryology), educators can determine which best–evidence approaches may improve embryology teaching.

Online modules, videos, and interactive web atlases have been previously used to supplement the anatomy curriculum in medical schools, with students accessing the resources on their own time to reinforce concepts taught during lectures.[9,10,11] Studies have had mixed results as to whether or not online modules improve learning outcomes compared to lectures.[9,11,12] However, they have found that students' learning experiences are positively affected.[9,11,12] Interactive, three–dimensional images and animations are often incorporated into these modules as a way for students to participate in their own learning. Traditionally, teachers have used two–dimensional chalkboard drawings to illustrate static and dynamic concepts within anatomy. However, research shows three–dimensional images are superior to two–dimensional ones, as they increase learner satisfaction, factual knowledge, and spatial knowledge.[12,13] In particular, three–dimensional animations have been shown to improve understanding of dynamic processes such as embryonic development.[14]

It is important to note that while three–dimensional animations are a beneficial supplement to physical models and cadavers, they are not a suitable replacement. Evidence suggests that learning outcomes for anatomy, including spatial knowledge and long–term retention, are always better when a physical model is available to students.[14,15] Several studies have explored the incorporation of physical models, such as clay or three–dimensional printed models, in embryology teaching.[16,17,18] The evidence indicates that physical models are superior to three–dimensional

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images when it comes to learning embryology. However, physical models are not always feasible or accessible in the embryology classroom. Most embryology teaching no longer occurs in a lab, but in a lecture hall, where models must be passed around or assembled during limited instructional time.[4,5] It appears from the available evidence that, given the time constraints on embryology education, the consensus best practice would be employing online modules that incorporate three–dimensional images as embryology teaching adjuncts.

Going forward, hours devoted to embryology are unlikely to increase within the medical curriculum. Educators should adapt to the limited instructional time by using innovative teaching methods to ensure that students are meeting the necessary embryological competencies to safely practice medicine. The limited hours for embryology education may not impact students' embryological knowledge if instructors are willing to adapt. However, remaining bound to traditional teaching styles in today's environment will be to the detriment of learners and potentially patients.

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Shaping Medical Education Through A Trauma–Informed Curriculum

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Abstract

Experiences of violence and trauma are widespread with significant mortality and morbidity worldwide. Despite the prevalence of such experiences and the impact on population and individual health, they are often misunderstood in the health care system. Without a trauma–informed lens through which to address patient concerns, physicians may overlook somatic manifestations and coping mechanisms and miss the underlying histories of trauma. The undergraduate medical curriculum is an ideal setting to introduce a coherent foundation for trauma–informed practice. This commentary aims to address current principles and approaches to trauma, and to discuss new directions in the trauma–informed medical curriculum.

Violence and trauma are significant causes of morbidity and mortality with 1.3 million people dying of violence each year, and many more non–fatally affected through physical, psychological, and/or sexual abuse.[1] Violence is "the intentional use of physical force or power, threatened or actual, against oneself, another person, or a group or community, resulting in or having a high likelihood of resulting in injury, death, psychological harm, mal–development or deprivation."[2] Trauma is the emotional response following a devastating event such as a sexual assault.[3] Violence and trauma manifest in populations and individuals. In Canada, policies enacted by settler colonialism such as the "Indian Act," residential school systems, and the Sixties Scoop have led to intergenerational trauma that continues to affect indigenous communities today.[4] Individual experiences of violence can manifest as physical, emotional, and behavioural issues. This has been well described amongst childhood survivors of abuse from the Adverse Childhood Experiences Study who have an increased risk of biopsychosocial problems in adulthood.[5]

Medical students learn to elicit the patient's chief complaint and gather data, but rarely does the patient present with a chief complaint of "trauma." Patients presenting with behavioural changes, somatic manifestations, or mental health concerns may be misdiagnosed or overlooked, particularly when a history of violence is not on the differential diagnosis. Patients with maladaptive coping mechanisms, such as self–medication and substance use, may be written off without further inquiry or support.[6] If students are not trained to appreciate the possibility of trauma in their clinical interactions with patients, they may ultimately miss opportunities to support and intervene. To provide appropriate care for these patients, clinicians need to change the traditional approach of "what is wrong with this person?" to "what happened to this person?"[7]

British Columbia's Trauma Informed Practice Guidelines highlight six main principles that shape trauma–informed practice (TIP)[6]:

1. Awareness of trauma;
2. Looking at trauma through the eyes of the individual;
3. Emphasizing safety and trustworthiness;
4. Providing options for choice, collaboration and connection;
5. Using a strengths–based and skill–building approach;
6. Recovery is possible.

While these principles may seem intuitive, they do not always reflect current clinical practice or medical education.[8] Dr. Carol–Ann Saari recently wrote how TIP changed her practice, with physicians inevitably seeing patients with recent or remote trauma.[8] Often, these patients' presentations are not well understood in the medical field, which can further affect the patient–provider relationship, shifting from safety and empathy to unintended judgement.[8] TIP "is a way of providing services that recognizes the need for physical and emotional safety, choice, and control in decisions affecting one's treatment and an environment where patients do not experience further traumatization."[8]

The UBC medical curriculum

The introduction of UBC Faculty of Medicine's spiral curriculum and flexible learning education scholarship (FLEX) projects presented a unique opportunity to engage faculty, trainees, and community stakeholders in the development of a cohesive and trauma–informed medical curriculum. The growing need for TIP in medical training is reflected in the increased efforts to incorporate training for residents and practicing physicians in North America.[9] A FLEX project was designed to assess current curricular objectives related to trauma and violence, as well as determine avenues for further improvement. Faculty experts in medical education, marginalized populations, and health equity were involved to apply a trauma–informed lens to education in a culturally safe manner. After curricular objectives were mapped, violence, as a general topic, was identified to be introduced in preclinical years through two cases in case–based learning, three didactic lectures, one family practice seminar on sexual assault, and one sensitive interview in clinical skills on intimate partner violence (see Table 1). Despite seemingly foundational exposure to violence, unpublished feedback from the Classes of 2016-2018 relay that 20% of respondents did not recall learning about this topic. This suggests that trauma and violence require reinforcement regarding their medical implications and consistency with how it is presented in the curriculum. On review of curricular organization, "trauma" was not specifically represented under any faculty leads, which likely contributed to the inconsistent teaching of this important topic.[10]

This student–led FLEX project resulted in the re–examination of the pre–existing Year 2 sexualized violence seminar to include

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	Year 1	Year 2
Case–Based Learning (CBL)	Week 32: Meningitis	Week 44: Joint Injury
Lectures	Week 28: Determinants of Hope Among First Nations (Discussion) Week 32: Symposium on the Health and Social Issues Related to IV Drug Use	Week 44: Child Abuse (CDM)
Clinical Skills	Psychiatry Clinical Skills Session	Sensitive Interviewing Clinical Skill Session
Family Practice	Week 5: Health Inequities	Week 40: Sexual Assault Session
Modules	San'yas Indigenous Cultural Safety Training	

Table 1 | Curricular activities with objectives relating to trauma and violence in the Class of 2019 cohort.

an introduction on trauma–informed care. In addition, a new online case module for the Year 3 rural family practice clerkship curriculum was also developed, focusing on the presentations of recent and remote trauma in a family practice clinic. Both of these learning modules incorporate multiple cases for medical students to learn the approach to a patient with a possible history of trauma. The collaborative efforts with faculty leaders provided a student perspective to build a thorough framework for TIP in the UBC medical curriculum, and to bridge the gap between didactic and clinical teaching.

The role of medical students

As medical students, there are ways to adopt a trauma–informed lens to our training:

1. Become familiar with the TIP principles and intentionally apply these principles in your interactions with patients. Patients do not need to disclose a past history of abuse or violence for this care to be provided to them.

2. Learn about local resources and connect with expert faculty that support individuals who have experienced trauma and violence to feel more comfortable in future patient counselling scenarios.

3. Challenge yourself with practice, peer discussions, and self–exploration.

It is important for medical students to learn how to apply these skills appropriately to all patients, as physicians encounter many patients who have experienced some degree of trauma and violence on a daily basis. Current tools that teach TIP describe a common basic skillset, reinforcing the importance of practicing and training in a trauma–informed way early in medical education.[11] Violence and trauma are pervasive social and health concerns that affect every demographic population. The medical profession has embraced patient–centred care, but it may never truly achieve this without consideration to the experiences behind the patient's decisions.

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Should We Be Teaching Medical Students to be Moral Isolationists?

Farhad R. Udwadia[1]

Abstract

Learning not to judge cultural practices can be implicitly or explicitly stressed to medical students and healthcare professionals. The perspective that one should not impose judgement on the practices of other cultures is termed "moral isolationism." Mary Midgely, a philosopher, argues against moral isolationism, citing it as a logically incoherent theory. This perspective piece presents and applies Midgely's argument within the context of medical education, and healthcare at large.

As medical students, we are implicitly and explicitly taught the importance of being respectful towards other cultural practices, with respect to medicine, healing, and other aspects of daily living as well. This is exceedingly important as respect is integral to the formation of a trusting relationship between physician and patient. Culturally sensitive health care has been empirically shown to improve health outcomes amongst racial and ethnic minorities in multiple studies.[1,2] Therefore, it makes sense that cultural respect would be such an integral part of medical education in Canada.

However, respecting cultural practices is often conflated with not judging cultural practices, and it would not be untoward to state that we are often led to believe that imposing judgment on the practices of another culture is wrong. Mary Midgely, a world–renowned ethicist and philosopher describes this position as one of 'moral isolationism,' and argues against it.[3] In essence, moral isolationism is the view that one ought to respect other cultures, but not impose any judgement upon them. I find Dr. Midgely's work on the subject to be greatly important to those embarking on careers in healthcare professions, as it brings clarity and context to an important perspective.

The question of whether or not we should impose judgement on cultural practices is a controversial one in medicine and global health. A popular example would be the practices of circumcision and female genital mutilation in different parts of the world. A more common and polarizing example in North America is parents refusing life–saving treatment for their children due to religious or cultural beliefs. In Canada, the example of Jehovah's Witnesses refusing blood transfusions for their children has a contentious history. In 2009, the Supreme Court ruled that such interventions fall within the legal mandate of the court in cases where the minor's life is clearly in danger.[4] Under different circumstances, however, the courts have gone the other way. For example, 11–year–old Makayla Sault, was allowed to refuse life saving chemotherapy in lieu of traditional Indigenous medicine and alternative therapy.[5]

Both examples have ignited intense public debate in recent history, and have subsequently raised the question: as healthcare providers, community members, and fellow human beings, should we pass judgement on the practices of cultures that we are not a part of? A moral isolationist would say we should not, and Midgely vehemently disagrees.

Midgley argues that as human beings, we experience a common and rather intense difficulty trying to understand cultures that are different from us. She claims that a way of dealing with this difficulty is by taking a stance of moral isolationism, a route that many people favor. Moral isolationism posits that we can never understand any culture well except our own; therefore, in order to respect these different cultures, we should not impose judgement on them. This is also based upon the assumption that as human beings, we are embedded within different societies, each with their own set of cultural beliefs and practices.

However, Midgley also goes on to argue that such a position is not only wrong, but logically incoherent. Midgely forms her argument against moral isolationism by analyzing the logical cohesiveness of the theory with other premises we know to be true. Her argument and its implications can be broken down as follows:

1) *If we cannot judge another culture, that also means we can never truly respect another culture.* Midgley claims that one cannot actually respect another culture without imposing some particular judgement about the culture first. In other words, she means to say that we cannot actually form respect for something—which involves forming an opinion—without imposing some degree of prior judgement. On the other hand, she claims that if we are to be true moral isolationists, then we cannot praise another culture either, as that also involves a subjective evaluation. How would this play out in a medical setting? From a moral isolationist perspective, any attempts to respect a cultural difference would either be disingenuous—as it would require a lack of judgement or evaluation—or nonexistent altogether.

2) *Outsiders can make good and constructive judgements about our own cultures.* Midgely's second point is that outsiders can, and regularly do, make accurate and important judgements about other cultures. Understanding is not binary; we can make progressive judgements along a spectrum that allows us to make intelligent indictments as outsiders about a particular culture. We are, in principle, capable of making fair and logically sound judgements, which are to be distinguished from 'crude opinions;' that is, opinions that are based on ignorance and not reason. In healthcare, we often need to make useful judgements about something without understanding it to an exact degree, but a moral isolationist stance would not allow us to do so.

3) *If the grounds for moral isolationism is not understanding, then we cannot judge our own culture either.* If understanding is a prerequisite for judgement, then we should not be able to judge our own culture because sometimes, we do not fully understand it either. Additionally, this would also mean we have the general inability to engage in moral reasoning of things we do not fully understand. This is both wrong and problematic, as moral reasoning is crucial and fundamental to our existence. The ability to judge our own culture is integral in medicine; without it we would not be able to critically assess, evaluate, and improve practices within our own healthcare system.

4) *We do not live in isolated bubbles of culture, which is an inherent assumption of moral isolationism.* Midgley brings her argument home by negating the very premise of moral isolationism—the idea that we live in isolated bubbles of culture. She claims this to be a false statement, as we are constantly transferring, mixing and fusing aspects of different cultures together, now more than ever before. It would make sense to have isolated opinions of isolated cultures, but no such thing exists. Healthcare is the perfect example, where people from different cultural backgrounds work together every day.

In principle, I believe Midgely's argument to be sound and especially

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pertinent to those working in healthcare and medicine. When educating people who will one day serve as stewards of health and wellness for a multitude of people, I wonder to what extent an education that favors a moral isolationist way of thinking would influence health outcomes. I recognize that Canadian medical history has been stained by acts of racial oppression and discrimination. The most severe breaches in trust have occurred not so far in the past, with instances of unethical research practices and abuse inflicted on Indigenous populations at residential schools as recently as the 1970s.[6] Therefore, it is fundamental that medical education is rooted in cultural respect. But does that equate to a culture of nonjudgement?

When we look at the few examples discussed earlier (genital mutilation, parents refusing life–saving treatment for their children), I believe taking a stance of moral isolationism is inherently wrong. When practices call into question the life and dignity of an individual, we must not turn a blind eye for fear of imposing judgement on something we do not fully understand. In fact, we should look keenly, collaborate, listen, and work towards understanding and critically evaluating practices in a fair and just way, which includes taking into consideration past injustices. We should not be quick to shy away from moral arguments when culture is a factor. That is not to say that any of these practices discussed above are wrong or right; rather, they should not be beyond our discerning eye.

The risk of being a moral isolationist is significant, as harm and oppression can often be masqueraded as a cultural practice. It might be a distorted interpretation of such a practice, but it happens. This is frequently seen in sexual abuse and oppression of women, where rights are breached with culture cited as an excuse.[7] As healthcare professionals, we are in a unique position to advocate and safeguard human rights, especially when the violations of these rights affect health.

Even though I have never been explicitly told to be a moral isolationist as such, the message of "nonjudgement" has been stressed to me at various points in my formal and hidden medical curriculum. In turn, I have pondered deeply on whether or not it is beyond our purview as medical students or healthcare providers to pass judgement on practices associated and stemming from a particular culture. I believe that it is not, and that there is a need to learn just how to do so in a fair, respectable and reasoned way.

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Potential Cost Savings and Reduction of Medication Errors Due to Implementation of Computerized Provider Order Entry and Bar–Coded Medication Administration in the Fraser Health Authority

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Abstract

A closed–loop medication management system is an ideal system that seamlessly integrates the distribution of medication from health care providers to the patient. The main areas that the system encompasses are prescribing, transcription, dispensing, and drug administration. This paper examines two main aspects of a closed–loop medication management system: bar–coded medication administration (BCMA) and computerized provider order entry (CPOE). Our review of the literature shows that these systems combined could have prevented up to 72% of medication errors; this equates to 11,234 medication errors and 201 adverse drug events (cost saving of $1.4 million) in the Fraser Health Authority from 2013-2017.

Introduction

Medication errors can lead to significant harm to patients and increase the burden on the health care system.[1] Currently, an estimated 70,000 preventable adverse events occur per year in Canada, and one–quarter of these events are related to medication errors, resulting in 700 deaths per year.[2,3] The cost of these medication errors is estimated to be $2.6 billion per year.[4] Each preventable adverse drug event in a hospitalized patient costs an estimated $6750 CAD (inflation adjusted to 2017) and increases the length of stay by 4.6 days.[5]

The most frequently cited method for preventing medication errors is incorporating a closed–loop medication management system (CLMM).[4,5,6] The ideal CLMM system seamlessly integrates information technology from automated dispensing devices (ADD), computerized provider order entry (CPOE), and bedside bar–coded medication administration (BCMA). This integration will enable each stage of the medication management process, including prescribing, transcription, dispensing, and administration, to be consolidated into an efficient and safe structure that optimizes patient health.[6]

Fraser Health is British Columbia's largest health authority and is comprised of 12 acute care hospitals, 7760 residential care beds, and 25,000 staff, with an annual operating budget of over $3 billion.[7] Presently, Abbotsford Regional, Surrey Memorial, Royal Columbian, and Chilliwack Hospitals have deployed ADDs, and the rest of the Fraser Health hospitals will eventually receive them; however, implementation of CPOE and BCMA is only in the planning stages.[8]

CPOE can produce exceptional safety improvements, reducing 46% to 88% of medical errors within US hospitals.[9-12] Furthermore, BCMA has been shown to reduce medication errors by 49% to 51%, and generate an annual savings of $2.2 million from time–saving.[13,14] Thus, we believe that if a CLMM system had been deployed in Fraser Health from 2013-2017, a significant number of medication errors would have been prevented, in addition to a potential cost savings. This article examines the potential benefits of implementing BCMA and CPOE in Fraser Health. The

medication errors in the Fraser Health Authority from 2013-2017 are listed in Table 1.

Category	Actual Event
Other	3980
Omitted dose	2890
Incorrect quantity (*e.g.*, dose, strength, or concentration)	1812
Extra dose	1448
Incorrect product	1147
Incorrect time (*e.g.*, given late)	1055
No order	783
Incorrect rate or frequency	646
Incorrect patient	545
Incorrect route or technique (includes use of incorrect IV line or SC butterfly)	267
Adverse reaction	277
Contraindicated	206
Incorrect form or formulation (*e.g.*, tablet instead of liquid)	177
Incorrect storage or location	116
Expired or deteriorated product	93
Incorrect sequence	48
Narcotic count discrepancy	14
Total	**15,504**

Table 1 | Medication Errors from 2013-2017 in the Fraser Health Authority

Discussion

Several systematic reviews summarize the effectiveness of BCMA and CPOE. The main benefits include more accurate timing of administration, preventing wrong medication from being given to the patient, ensuring the correct route of administration, improving dosage adjustments, and increasing transcription precision.[12,14] Both CPOE and BCMA can prevent many medication errors, and the effects of these two systems can be multiplied together due to their independent reduction values.[14] Based on conservative estimates from the literature, CPOE and BCMA could reduce medication errors by 46% and 49%, respectively.[9-14] The documented number of medication errors in the Fraser Health Authority from 2013-2017 was 15,504; the number of errors would therefore have been reduced from 15,504 to 8372 with the implementation of CPOE, and further reduced to 4269 with the addition of a BCMA system (Table 2).

Preventable adverse drug events refer to patients having dangerous responses to medications that could have been prevented. If CPOE and BCMA had been implemented from 2013-2017, 201 adverse reactions in

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the Fraser Health Authority would have been avoided and would equate to a total savings of $1.4 million CAD. The proposed savings from a reduction in adverse drug events represents a small portion (13%) of the total savings that can be realised by implementing a closed–loop system.[9]

	Prior to Implementation	CPOE and BCMA Implementation	Total Reduction
Medication Errors	15,504	4269	11,234 (72%)
Adverse Drug Events	277	76	201

Table 2 | Medication errors and projected potential reduction with CPOE and BCMA implementation

'Adverse drug events' was the only category for which we could accurately calculate cost savings. Other medication error groups were excluded in the cost–saving calculations due to insufficient clinical and literature information. This provided a very conservative estimate. The categories not included in the calculation were errors with dose, quantity, product, time, order, frequency, patient, route, storage, expired product, and sequence. Furthermore, additional benefits of CPOE and BCMA were not included in the analysis due to considerable variance between hospital systems and implementation strategies. These 'other benefits' include improved nurse time utilisation, specific drug guidance, renal dosing guidance, and laboratory monitoring.[9] 'Other benefits' are difficult to quantify and can require an extended period of time to manifest.

Despite the potential for CPOE and BCMA implementation to produce significant patient safety improvements, it is essential to be cautious, as the numbers calculated here are theoretically derived and may be imprecise. Incorrect implementation of the system, for example, could lead to conflicting results, such as what occurred with the implementation of iHealth in Nanaimo Regional General Hospital, Dufferin Place, and Oceanside Healthcare Centre. A survey indicated that more than 50% of the staff felt the new Electronic Health Record system (EHR) was less safe and more inefficient compared to the previous paper–based one.[15] Furthermore, the system went over budget by $18.9 million CAD in capital funds and an additional $35.2 million CAD in operating cost.[15] Nevertheless, the leadership at these centres is working tirelessly to improve the usability and functionality of the iHealth system. The principal message is that when examining results, it is critical to be cautious in drawing conclusions about the benefits of these systems, as each location is unique and will have a different experience. Proper implementation of CPOE and BCMA into Fraser Health will require significant stakeholder input, full investigation of all safety concerns with iHealth, assurance that the right leaders are in place, creation of realistic financial plans, secured funding, reviewed governance structure, and readiness plans including sufficient training for all staff.[15] The above recommendations are critical to solving the usability and functionality concerns that may arise if Fraser Health chooses to adopt this system.

Conclusion

Overall, the potential cost savings associated with a closed–loop system due to preventing medication errors is underestimated. The initial stage of implementing the system is the costliest and is usually the primary barrier to implementation. The cost of implementation is challenging to determine for the Fraser Health Authority and will require an extensive review. Nevertheless, implementing CPOE and BCMA has significant potential to produce improved safety and cost savings if the system is appropriately executed.

Conflicts of Interest

None to disclose.

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Increasing Patient Engagement Using Community-Based Resources

Rachael E. Houlton[1]

Abstract

Patients' level of engagement in their health and health care is a key determinant of their health status and should be maximized. This article highlights two organisations ("InspireHealth" and "Self–Management BC") offering free patient engagement interventions within British Columbia and discusses the need for better publicizing of these and other community–based patient resources to ensure that patients receive the best available care.

Patient engagement has been referred to as "the blockbuster drug of the century"[1] and is the cornerstone of patient–centred care. For the majority of the population, their level of engagement and ability to self–manage is likely to be the primary determinant of their health.

What are self–management and patient engagement, and why are they important?

Self–management refers to all the things that patients do to manage their own health. This includes day–to–day activities such as maintaining a healthy diet, doing regular exercise, and mitigating stress, as well more directly medically–related actions such as taking medications, monitoring blood sugar, and interacting with the health care system in various ways.[2]

The term "patient engagement" or "patient activation" refers to patients' ability to self–manage their health. This is determined by their knowledge, skills, confidence and motivation, and is often correlated with socioeconomic status.[3] Greater patient activation is associated with lower rates of smoking and obesity, improved A1C, HDL and triglyercide values, increased participation in cancer screening programs, and fewer emergency department visits.[3]

Increasing patient engagement

Given the great importance of patient engagement, how can we increase the engagement of all our patients? Primary care physicians can play a key role. A mere 2-4 minute counselling session with a family physician followed by referral to a health educator was shown to increase patients' cardiovascular fitness.[4] Likewise, a 30–minute session providing advice and information about the importance of physical activity reduced patients' cardiovascular disease risk factors 6 months later.[5]

In their 2016 study, Greene et al. used a validated survey–based measure of patient activation (the patient activation measure or "PAM") to assess how PAM changed across a two–year period. They found that changes in PAM levels were positively associated with changes in health status. They also found that some physicians were more successful at increasing patient activation than others. Those who were most successful tended to use five key strategies: emphasizing patient ownership; partnering with patients; identifying small steps; scheduling frequent follow–up visits; and showing care and concern for patients.[6]

However, despite the impact that physicians can have on patient activation/engagement, many physicians are failing to discuss lifestyle changes with their patients. For example, in their 2011 study, Yang et al. found that only 40% of pre–diabetic patients reported having been advised about lifestyle modifications by their healthcare provider within the last year.[7] It is likely that time constraints[8] and limited training in motivational interviewing are limiting factors for many family physicians.[9]

Thankfully, physicians do not have to tackle patient engagement on their own, and there are a growing number of studies describing community–based patient engagement interventions.[2] Evidence suggests that self–management interventions are effective in improving patients' confidence, knowledge and feelings about their condition and self–management behaviours, while findings are more mixed regarding quality of life, service utilization, health outcomes, and mortality.[2] Interventions tend to be more effective for patients with less severe illnesses or in the early stages of disease.[10-12] Outcomes are also likely to depend on the patients' stage of change and level of engagement with the intervention[13], which may reduce the apparent effectiveness of interventions during randomized controlled trials. However, in real–world situations, where motivated patients self–select by choosing to participate in programs, the benefits may be more consistent.

My personal experience with patient engagement programs in British Columbia

Given the possible benefits of supplementary patient engagement interventions, I was interested to learn about two such programs that are freely available to patients in B.C.

In December 2017, I attended a two–day patient education program at "InspireHealth", a not–for–profit supportive cancer care organisation with locations in Vancouver, Victoria, and Kelowna (www.inspirehealth.ca). The "LIFE Program" is a free course for cancer patients and their supporters. Approximately 20-40 people can participate in a given course, and they are offered regularly throughout the year. The course includes talks on a range of topics, including nutrition, exercise, mindfulness, and even laughter yoga. It provides patients with easy–to–digest information about how to maximize their health and well–being in the wake of their cancer diagnosis. Furthermore, it gives patients an opportunity to meet with others going through similar experiences (peer support and social connectedness have been shown to be associated with positive health behaviours).[14,15] Within two days, there was a palpable increase in morale and the participants seemed more empowered

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and optimistic. Even though I was there as medical student rather than a patient, I too was motivated to prioritize my health and felt a strong bond with the other participants.

While I found InspireHealth's LIFE program to be excellent for cancer patients, I wanted to know what programs are available for patients with other conditions. I was therefore excited to learn of "Self–Management BC", an offshoot of the University of Victoria's Institute on Aging and Lifelong Health. Self–Management BC runs free educational courses for patients with any chronic health condition, as well as courses specifically catered to those with diabetes, chronic pain, or cancer. Similar to InspireHealth, their courses cover healthy eating, exercise, pain and fatigue management, and stress management, as well as how to communicate effectively with healthcare professionals, manage medications, plan and problem solve. Courses are delivered in weekly, 2.5–hour group sessions over a period of six weeks and are offered in multiple languages throughout the province (see www.selfmanagementbc. ca for more information). They also offer an online version of the course and an extended telephone–based "Health Coach Program", in which patients speak with a trained health coach for 30 minutes a week, over a period of three months. Self–Management BC's evidence–based courses follow the approach of the Self–Management Resource Centre (previously known as the Stanford Patient Education Research Center) in Colorado, USA, which has been found to be efficacious in a large number of studies (see www. selfmanagementresource.com/resources/bibliography). The Self–Management BC website also provides useful links to government resources, advocacy groups, nutrition and lifestyle resources, and some disease–specific support groups.

Moving forward: publicizing patient engagement resources

These free courses offered by InspireHealth and Self–Management BC have the potential to improve both patients' subjective experiences as well as their health. However, few patients (and physicians) seem to know that they are available. Indeed, most of the patients I met in the InspireHealth program had heard about the course through friends and family, rather than their health care providers. This realization made me wonder what other courses, community resources, and support groups are available to patients but under–utilised due to a lack of publicity.

In their 2015 international survey of patients with a range of chronic health conditions, the health consulting company, Accenture, found that only 19% of patients are aware of the therapeutic services available to them.[16] However, of those patients who are aware of services, 58% use them and 79% consider them to be very or extremely valuable. Furthermore, as awareness increases, so do participation rates. This lack of awareness of services is also an issue in Canada and appears to be a significant barrier to service use among Canadian dementia patients and carers.[17,18] Furthermore, those family physicians who attempt to link patients with community–based services are relying on out–of–date resources and inefficient search strategies to do so.[19]

A key issue seems to be the lack of a single authoritative and centralized list of patient resources. As mentioned above, the Self–Management BC website provides a list of patient resources, as does the B.C. government (https://www2.gov.bc.ca/assets/gov/

health/health-drug-coverage/pharmacare/registeredgroups.pdf). However, neither list is fully comprehensive (the Self–Management BC's site does not include information about InspireHealth, while the B.C. government does not mention either organisation).

"Pathways" (pathwaysbc.ca) is a new online resource that provides family physicians and their staff with access to lists of local specialists to whom they can refer patients, as well as lists of relevant patient support services. Pathways can be accessed through the Electronic Medical Record system and is hoped to help family physicians connect patients with resources at the point of care. However, it is not clear what measures will be taken to ensure that the Pathways list of patient resources will have more comprehensive coverage than the pre–existing lists mentioned above. I also fear that by restricting access to this list to health care providers, we are preventing patients from researching resources on their own, reducing their self–efficacy. Conversely, leaving patients to "Google it" for themselves, puts too much onus on them and means that resources will be discovered only by highly determined patients who know what they are looking for and which search terms to use.

I therefore suggest that there is a need for a well–promoted and comprehensive database of all patient resources (interventions, education programs, support groups etc.) that is easily accessible to both physicians and patients, and can be filtered by geographical location. Indeed, the development of an "easily searchable 'one–stop–shop' online database with all available community services" was also strongly recommended by Canadian family physicians interviewed by Ploeg et al.[19]

Ontario's "thehealthline.ca" has made great strides towards meeting this goal. It provides an easy–to–navigate listing of community care and social services and is accessible for both physicians and the public. This is an excellent resource, and other provinces could benefit from adopting something similar (or, ideally, a single nationwide site). However, it is worth noting that a website of this format will require vigilant updating to remain comprehensive.

An alternative is to create a collaborative wiki site that physicians, support organisations, and patients can access and contribute to. A collaborative format would allow patients to play an active role, reduce the likelihood that resources will be omitted, and share the workload involved in creating and updating the site. Other examples of successful healthcare wiki sites that allow contributions from both patients and physicians include wikicancer.org and diabetes. wikia.com. Contributions can also be moderated by an editor before being published in order to prevent errors. Once created, this site would need to be actively promoted in order to increase awareness and encourage use; however, I propose that this would be a highly cost–effective way to improve patient engagement, health, and well–being, while ensuring that existing services are fully utilised.

Conclusion

As physicians, we need to be aware of and open to using all available resources that can help improve our patients' health. Community–based resources that have the potential to increase patient engagement are freely available in B.C., and patients should be made aware of these resources so that they can participate if they wish. The current lack of awareness of such resources among physicians and patients demonstrates the need for better publicity of patient services and support groups within British Columbia. I suggest

that this could be achieved through the use of a collaborative wiki site that can be accessed and contributed to by both physicians and patients.

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Listen and Learn: How the Podcast Revolution Is Shaping Medical Education

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Since the dawn of portable music players and smartphones, podcasts have rapidly earned their way into the pockets of consumers across the world. The term "podcast" was first coined in 2004 to describe regularly published audio excerpts that can be downloaded from the Internet and listened to on personal computers or mobile devices.[1] Young people are particularly fond of this rising form of digital media, with 41% (and counting) of Canadians aged 18–34 having listened to one or more podcasts in the past month.[2] This statistic is not particularly surprising, given the multitude of podcasts that are publicly available. According to a recent survey, over 525,000 active podcasts and 18.5 million episodes in topics ranging from comedy to investigative journalism to current events have been produced as of 2018.[3] Although podcasts are perhaps most well–known as a source of entertainment, many have turned to them for their educational value. The medical field, for instance, although a newcomer to the podcast world, has started to embrace this unique medium of communication to educate medical trainees and professionals at all levels and specialties around the world.

With respect to subject matter, medical education podcasts fall into a variety of subcategories based on the target demographic, whether it be medical students, residents, fellows, or full–fledged family/specialist physicians. Depending on the listener population, these podcasts can have vastly different objectives. For the busy physician, for instance, podcasts offer an efficient and practical means by which one can stay up to date on the medical literature in his or her respective field. Moreover, podcast developers often perform the most time—and resource—intensive tasks themselves by sifting through and hand–selecting the most recent and relevant literature, while simultaneously supplementing it with their own critical analyses and clinical pearls. The BS Medicine Podcast, produced by the Therapeutics Education Collaboration in Vancouver, for example, provides healthcare professionals with "current, evidence-based, practical, and relevant information on rational drug therapy"[4] and is freely and publicly available to anyone with Internet access. Among the podcasts targeted towards students, objectives more commonly involve conveying general clinical knowledge and preparing students for written and clinical exams. Surgery 101, produced by the University of Alberta in Edmonton, for example, is a popular series of surgical education podcasts aimed at teaching clerkship students and residents about the basics of surgery. Although a small number of other open–access medical podcasts exist, the supply remains markedly overshadowed by the growing demand for high–quality podcasts.

Podcasts provide users with advantages that cannot be offered through more traditional methods of learning. One clear benefit regards the flexibility afforded to learners to study at their own pace, wherever and whenever they may choose. Medical students in one study, for example, reported listening to educational podcasts while commuting, shopping, exercising, and performing household chores.[5] Listeners may also rewind, fast–forward, pause, or increase the episode speed to their choosing and are free to listen to the podcast as many times as necessary.[6] The implications from this are significant: busy students of today are no longer restricted to the classroom or the library to study but can instead look outside these traditional settings to chart their own schedules and learn "on the go." Podcasts also help cater education to students with a range of learning styles and study habits, particularly auditory learners. Indeed, studies have suggested greater benefits to long–term memory if material is listened to as opposed to read.[7,8]

To the podcast skeptics, early studies have even shown test score improvements among students who used podcasts when compared to controls using text resources, though further research is needed to establish stronger links.[9] Supporting these early results are a collection of qualitative findings demonstrating that educational podcasts reduce exam–related stress and anxiety, help consolidate information, and allow for multitasking among medical students.[10,11] Regarding the podcast style, medical students in past studies particularly enjoyed conversational and case–based episodes, as they were simultaneously engaging and clinically relevant.[11-13] Students also benefitted from wrap–up summaries at the end of podcasts,[11] a welcome addition given the "multitasker–friendly" design of podcasts and subsequent potential to miss pertinent information. Listeners across multiple studies also tended to prefer podcasts under 30 minutes of duration.[9] Importantly, however, such time restraints limited the volume of information that could effectively be packed into a single podcast. As such, students often tended to prefer podcasts as supplements to live lectures and textbooks rather than replacements.[10] Others yet preferred podcasts as extracurricular tools, i.e., for learning outside of direct curricular needs.[11] Thus, although podcasts have demonstrated their worth as adjuncts to core curricular content, podcasts alone are likely not sufficient as a sole learning resource for medical students. This is further supported by the fact that podcasts are pre–recorded resources and thus prevent listeners from contributing to discussions or asking questions as they would during a live lecture or seminar. Another limitation involves the money, time, and labour costs required to develop a high–quality podcast. As a result, medical education podcasts such as PedsCases, produced by the University of Alberta in Edmonton, accept podcast submissions written and recorded entirely by medical students, thus reducing costs while offering eager students a platform to gain experience in their field of interest.

Despite the recent emergence of medical education podcasts, relatively few studies have explored their effectiveness and formal podcast development guidelines have yet to be established. However, data from existing studies are consistent: podcasts are valuable learning tools that, among other benefits, improve and individualize learning by offering total flexibility with regards to when and how one chooses to learn. Test scores agree, with early studies demonstrating score improvements among podcast learners as compared to control groups. Add this to the relative ease at which episodes can be distributed and

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shared online and it is clear to see why many medical educators are so enticed by them. In the future, educators should focus on developing objective and validated evaluation tools and producing evidence–based guidelines for the creation of new podcasts. In the meantime, however, one thing is clear: thanks to this exciting new form of media, education can be as simple as hitting "play."

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The Future of Lung Cancer: An Interview with Dr. Stephen Lam

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Introduction

Lung cancer causes the greatest number of cancer–related deaths worldwide.[1] Despite this sobering statistic, the five–year survival of lung cancer has only slightly improved from 15% during 1995-2000 to 18% during 2006-2012.[1,2] This is largely explained by the asymptomatic nature of lung cancer during its early stages. As a result, half of all lung cancer cases in Canada are diagnosed during advanced stages.[3]

Given the high frequency of individuals with stage III and IV lung cancer, lung cancer screening has been proposed. Dr. Stephen Lam, Leon Judah Blackmore Chair in Lung Cancer Research and MDS–Rix endowed Director of Translational Lung Cancer Research at the BC Cancer Research Center, is currently researching lung cancer risk prediction calculators with low–dose CT scans as a population–level screening method. In this paper, Dr. Stephen Lam will discuss the past, present, and future state of lung cancer.

Why do you focus your research on the early detection of lung cancer?

Lung cancer is the most common cause of cancer death in not only Canada, but around the world.[4] When I first began practicing medicine, the survival rate of lung cancer was around 5% to 8%. Presently, it is better, but still very poor at approximately 18%. I think this has not changed much because there is no lung cancer screening program in place. Early detection of lung cancer is key because treatments were and are still not very effective for patients with advanced lung cancer. I examined the global trends of different diseases and I noticed lung cancer is among the top five killers. I wanted to address this important health issue.

How has lung cancer treatment evolved over the past twenty years?

Firstly, we have much better surgical techniques. For small early cancers, we have developed image–guided surgery where a radiologist can insert a fuzzy wire into the nodule to enable the thoracic surgeon to precisely locate the tiny growth and remove it with a high degree of accuracy, without significantly compromising the lung function of a patient.[5] There are also new radiation therapies, such as stereotactic body radiation therapy, which can treat early stages of lung cancer for people who cannot or do not want surgery.[6] For patients with advanced lung cancer, there are exciting developments in targeted therapy and immunotherapy, although these are mostly palliative.

What do you think lung cancer screening will look like in ten years and how does the recent legalization of marijuana affect this?

I think it will be much more precise. Even today, there is now good evidence from two large randomized clinical trials that screening with low–dose CT scan can reduce lung cancer deaths by 20% or more.[7,8] With additional research, we will likely be able to identify people who should be screened based on numerous additional parameters such as environmental factors and perhaps blood or genetic tests. Analyses will also be more precise and rapid since CT scans will be read using deep learning. This will help to identify patients who need to be carefully watched or who need an early biopsy versus those with a slow growing cancer or benign nodule who can be more easily watched. Regarding the legalization of cannabis in Canada, it will be very difficult to study its effects on lung cancer. Unlike cigarettes where you can calculate how many cigarettes an individual smokes per day, one joint is not the same as another joint, and with the numerous ways people inhale marijuana, this makes it challenging to study.

Conclusion

Worldwide, lung cancer continues to cause the most cancer–related deaths.[9] This is partly explained by its common insidious progression, often resulting in advanced stages of lung cancer when patients present with symptoms. A limited number of surgical and radiation therapies have been developed over the years, and these are still ineffective at curing advanced lung cancer.

The work by Dr. Stephen Lam and his colleagues paves the way for improving the future of lung cancer diagnosis by encouraging the use of low–dose CT scans as a screening method for asymptomatic patients. Currently, research groups around the world are refining their screening processes by implementing environmental and genetic parameters into risk prediction models, attempting to use deep learning to accelerate CT scan readings, and modifying and comparing screening protocols amongst research groups. The current prognosis of lung cancer is abysmal, but the future of lung cancer screening and treatment is promising.

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The Problem of Unmatched Canadian Medical Graduates: Where Are We Now?

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Over the past few years, there has been a heated national debate on the Canadian Resident Matching Service (CaRMS), spurred in part by the tragic case of Robert Chu, a highly qualified Canadian medical graduate (CMG) who chose to end his own life in 2017 after remaining unmatched for two consecutive years.[1] Over the last decade, the number of unmatched CMGs has increased steadily from 11 in 2009 to 69 in 2018.[2] When accounting for the number of CMGs who chose not to apply for the second iteration after going unmatched in the first iteration, there were 115 CMGs who could not obtain residency positions in 2018.[3,4] In a country with a projected shortage of physicians, why is it that a growing number of CMGs cannot find residency positions?

Since 2009, the Canadian Medical Association and the Canadian Federation of Medical Students have recommended an ideal target of 120 spots for every 100 CMG applicants in order to optimize the matching algorithm.[5,6] In 2009, there were 112 spots for every 100 CMG applicants,[7] which although was less than desired, still allowed for the majority of students to match into a specialty of their choice. Over the past decade, this ratio has steadily decreased to the point where there are now 101 spots for every 100 CMG applicants.[2] When language differences are taken into account, there may be less than 98 spots for every 100 English–speaking applicants due to a greater number of Quebec graduates matching outside of Quebec than English speakers matching inside Quebec.[2]

There are many reasons for the relative shortage of residency positions. Medical school class sizes have grown at a rate faster than that of residency positions over the past decade.[8] Since 2014, residency positions have failed to increase and even suffered cutbacks while the number of applicants continues to grow.[8] In 2015, Ontario cut 50 residency positions due to cited "scarce healthcare dollars."[9] At the same time, the number of international medical graduates (IMGs) applying for residency in Canada has been growing, many of whom are Canadians who studied medicine abroad.[10] The number of CMGs applying to the US and international residency programs has also decreased over the past decade.[10] Finally, students who fail to match for a residency position in the previous year re–enter the match, adding to the pool of current–year candidates. Overall, a mismatch between the number of graduating students and available spots has resulted in this crisis.

Going unmatched is an anxiety–provoking topic for medical students. In addition to the stigma and emotional toll caused by a year of uncertainty, there are significant career and financial repercussions. With neither student status nor professional license, unmatched graduates depend on their school and provincial legislation for the ability to work in clinical settings.[11] In addition to potentially paying for another year of tuition, unmatched students are required to immediately begin paying back their student loans and lines of credit—which can total more than $100,000—without a resident salary.[1] Unfortunately, their chances of being successfully matched the following year are not optimistic either. Over the past three years, an average of 41% of prior–year CMGs failed to match, compared with only 3.5% of current–year CMGs.[2,12,13] Their medical degree is essentially useless without residency as one cannot practice medicine without a license.

Across Canada, student affairs, undergraduate medical education (UGME) committees, and student leaders are collaborating to find a solution to this crisis. In January 2018, the Association of Faculties of Medicine in Canada released a position paper titled, "Reducing the number of unmatched CMGs: A way forward."[6] In May 2018, the Canadian Federation of Medical Students published its own position paper.[14] Among the strategies and recommendations put forward by both parties, increasing the ratio of CMG spots to CMG applicants to 1.1 was seen as the priority, either by increasing funding or shifting IMG positions to CMGs.[6] Both parties also agreed that the first step would be to increase support for unmatched CMGs, such as providing career counseling and increasing access to opportunities during a year off.[6,14]

As of 2018, all Canadian schools have improved the availability of individualized career counseling and match data for students as early as their first year.[10] The majority of schools now allow a "fifth year" for unmatched students to obtain additional clinical elective experience.[15] Other schools are instead offering graduate–level programs to gain research experience and develop complementary skillsets in epidemiology, education, or business.[15]

For UBC graduates, there are currently two main options available: expedited access to a UBC Masters of Health Science (MHSc) program or the ability to organize their own clinical traineeship within BC, provided they can find an appropriate supervisor.[11] In a UBCMJ interview, Dr. Janette McMillan, Associate Dean of Student Affairs at UBC, revealed that UBC UGME is in the process of developing a new program that would offer UBC–supported clinical time for unmatched graduates.[15] She stated, "The more flexibility we can offer for our [unmatched] students, the better we can meet each individual graduate's need."[14] During the interview, she also proudly mentioned that every CMG that had finished the UBC MHSc and worked with Student Affairs matched the following year, though not necessarily in the specialty they applied for in their first attempt.[15]

Provincial governments have also begun to recognize the importance of this issue. As a temporary fix, the Ontario provincial government responded in April 2018 by announcing that it would fund 53 additional positions in the coming match cycle for unmatched Ontario CMGs, with the requirement of a two–year rural service contract.[16] In May 2018, the Canadian Armed Forces also announced that they will work to fund additional family residency spots for the Medical Officer Training Program.[17] Though these are steps in the right direction, it remains to be seen whether this funding will be available for the coming years.

As a nation with an aging population and increasing health

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needs, Canada needs to continue prioritizing healthcare and ensure that medical students trained with taxpayer money can continue to residency so that they have the opportunity to contribute to the community as practicing physicians. With increasing attention to this issue and collaboration between stakeholders, there is hope for a future that protects Canada's resource of young doctors.

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Screen Time and Childhood Obesity: A Commentary on the Evidence Behind Current Guidelines

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Now more than ever, youth are being exposed to media at a young age. It can be expected that an average elementary school student is adept at using a tablet or a smartphone. However, this acquisition of technological prowess is not without its downsides. It has been well–established that the use of technology that requires one to be sedentary is associated with obesity in youth.[1] "Screen time," a term that describes the number of sedentary hours spent in front of a screen, has been coined to quantify an individual's usage of technology. Given the ubiquity of technology in modern life, it seems unreasonable to entirely eliminate screen time among youth. Nevertheless, the impact that screen time is having on obesity has become so apparent that national guidelines recommend a limit on the daily amount of screen time in youth.[2,3] This article identifies the pertinent literature supporting the role of limiting screen time in youth in reducing obesity, explores why and how screen time contributes to obesity, and lastly, highlights current guidelines that address this issue.

Evolutionarily, humans have been selected to live active lifestyles in the pursuit of food rather than remain sedentary in front of a screen.[4] As humans have seemingly become more sedentary in the 21st century, one wonders what role this behaviour is playing in the increasing rates of metabolic dysregulation and obesity worldwide.[5] A longitudinal study done at the University of North Carolina that followed 9155 15–year–olds to the age of 21 demonstrated an association between obesity and the amount of screen time.[6] The researchers surveyed the participants' activity levels, screen time, and weight, and found that weekly hours of screen time independently predicted obesity in early adulthood. In the study, fewer hours of weekly screen time reduced the relative odds of incidence of obesity by over 40% among females and over 20% in males. The study also found that longitudinal physical activity patterns were not predictive of obesity in the cohort.[6] This suggests that with increased sedentary screen time, the effect of exercise on obesity may not be as protective as previously thought. This is particularly concerning for healthcare practitioners who prescribe exercise to patients. Knowing this, it may be more prudent to prescribe a maximum cap of daily screen time, and to encourage frequent breaks during screen time to limit continuous sedentary behaviour.

Given the powerful effect that sedentary screen time has on obesity, the question remains: what is the mechanism behind this relationship? Some suggest that eating while screen–viewing contributes to increased energy intake.[7] According to a review by Robinson et al., some of the effect that screen time has on obesity may be caused by the high–caloric foods that are consumed while watching television, media distracting children from their feelings of satiety, and media advertising sugary and processed foods to children.[7] In a study done in 2014, 2 to 11–year–olds and 12 to 17–year–olds, respectively, saw an average of 12.8 and 15.2 food and beverage advertisements on television alone daily.[8] Over 90% of the foods marketed through television and other

media platforms are highly processed and unhealthy, according to a report published by the Heart and Stroke Foundation (HSF) in 2017.[9] Importantly, many children are being marketed to through novel forms of media such as applications, websites, and social media. This change is especially disconcerting when one considers that these platforms may appear to younger children as entertainment and not advertising.[9] In response to this growing issue, the HSF has recommended a push for legislation to restrict marketing of food and beverages to children in Canada. The Child Health Protection Act, a bill that has been designed to prohibit the marketing of food and beverages towards children under the age of 13, was put forth in the senate in 2015.[10] In addition to this upcoming legislation, evidence–based guidelines have been created to limit screen time in the interim.

The Canadian Society for Exercise Physiology (CSEP) has released guidelines surrounding activity in a 24–hour day for 5 to 17–year–olds. These guidelines, otherwise known as "Sweat, Step, Sleep, and Sit," suggest no more than two hours of screen time per day. In addition, the CSEP guidelines recommend 60 minutes of moderate to vigorous exercise daily, unstructured light exercise throughout the day, and 9-11 hours of uninterrupted sleep per night.[2] These guidelines are based on evidence collected from several systematic reviews.[11,12] In one of the systematic reviews, which compiled 235 studies and represented 1,657,064 unique participants, they found that children 5-17 years-old who spent more time in front of a screen were more likely to have elevated body mass index (BMI) and higher cardiometabolic risk scores.[12] More specifically, in this meta–analysis, children who were less sedentary, more physically active, and who got more sleep had the most favourable cardiometabolic profile. Moving forward, replacing screen time with physical activity to optimize child health is a warranted recommendation.

The American Academy of Pediatrics (AAP) has also released their own guidelines about maximal dose of screen time in children. These guidelines recommend restriction on screen time for children between 2 and 5 years of age to no more than one hour per day.[3] The rationale for this restriction is to allow children more time to engage in healthier activities that are critical to their development, and to establish screen–viewing habits that are conducive to a lower risk of obesity later in life.[3] These same guidelines also suggest that screen time in children up to 18 months of age should be avoided altogether unless it is being used for video calling, because non–social screen time is hypothesized to be detrimental to neurodevelopment.[3]

Screen time has become commonplace in day–to–day life, however it appears that its normalcy has gone unchecked. In particular, youth are vulnerable to becoming obese due to the large amount of time they spend in front of screens, as well as the marketing of poorer food choices through various forms of media.[9] Organizations of healthcare practitioners are beginning to recognize and caution against too much screen time in youth, as evidenced by the CSEP and AAP guidelines. Considering the data summarized above and the harm that screen time presents, it will be vital for healthcare practitioners to be

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prepared to advocate for healthier ways of using technology. Physician advocacy groups and research studies must continue to monitor the impact of technology on youth in order to minimize its harms as our world enters an era of technological ubiquity.

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Chronic Disease

A substantial proportion of Canadians are living with chronic diseases ranging from well-managed illnesses to degenerative and debilitating conditions without effective treatments. The burden of chronic diseases on the healthcare system is significant and is projected to become greater due to the aging Canadian population. Certain lifestyle elements can play a part in the development and prognosis of chronic conditions. There is a key role for patient education and counselling in reducing the onset of chronic diseases with modifiable risk factors.

In addition to prevention and treatment, we recognize the growing role of palliative medicine in managing chronic diseases. Palliative care is a multi-disciplinary approach that involves the physical, mental, social, and spiritual care of patients, as well as their loved ones. The federal government of Canada has committed $11 billion over the next 10 years towards home, palliative, and mental care, which are important in the care of patients with chronic disease. As we recognize the growing number of chronic diseases, the accessibility, quality, and financial constraints in palliative care need to be discussed.

In this coming issue, we invite you to engage in a dialogue surrounding different types of chronic diseases, management and prevention of these conditions, and potential future therapies. To encourage and recognize high-quality writing, the UBCMJ Distinguished Writing Award, which includes a $250 honorarium, will be presented to the authors of the strongest article submitted in the Fall 2019 and Spring 2020 issues. For more information please visit our guide to authors: https://ubcmj.med.ubc.ca/submissions/ubc-medical-journal-guide-to-authors/

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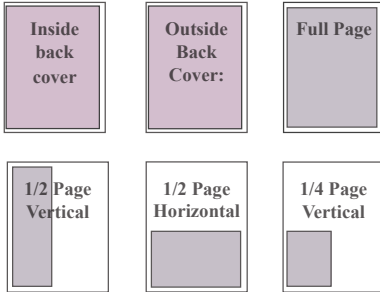Dr. Michelle Wong
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