What are Canadian Medical Students Learning about Health Informatics?

Katrina F. Hurley[1,2]*, Brett Taylor*[1,2]*, Paul Postuma*[1,3]*, and Grace Paterson*[1]

[1] *Medical Informatics, Dalhousie University, Halifax, Nova Scotia, Canada*
[2] *IWK Health Centre, Halifax, Nova Scotia, Canada*
[3] *Saint John Regional Hospital, Saint John, New Brunswick, Canada*

Abstract

Objective: To perform an environmental scan of health informatics teaching practices in Canadian medical schools as part of a quality improvement initiative at Dalhousie University's Faculty of Medicine. Methodology: We contacted undergraduate medical education staff at all seventeen Canadian medical schools and, via e-mail, asked open-ended questions about informatics content in the curriculum, timing of content delivery, teaching methodologies and informatics faculty. Results: Sixteen of seventeen medical schools answered our queries. Each school identified curricular content on information literacy and evaluation of evidence but identified no formal core curriculum in health informatics. Conclusions: As of 2009, health informatics had not yet penetrated formal undergraduate medical curricula in Canada. Efforts to introduce health informatics initiatives should take into account the lack of understanding of the discipline of health informatics by educators and the densely packed nature of medical curricula. A new Canadian project, involving the Association of Faculties of Medicine of Canada and Canada Health Infoway, offers promise for building new health informatics curricula within undergraduate medical education.

Keywords: Medical Informatics; Undergraduate Medical Education; Curriculum

1   Introduction

Health information is considered the "lifeblood" of health care today with health information technology serving as its "circulatory system." (1) Health informatics is the scientific discipline behind this system, aiming to promote health and improve the delivery of patient-centered care through innovative applications of information systems to collect, manage, transform and share health information. (2) While academic centers are expanding their involvement in health informatics, much of the leadership on this front has arisen from those with business, political or advocacy interests. (3) Consequently, well-designed studies demonstrating the impact of informatics tools on patient outcomes have been slow to come and, until recently, health professionals in North America have been slow to adopt informatics infrastructure. (4)

Several credible and influential sources have published health informatics learning objectives or competencies for clinicians including: Medical Council of Canada (C2LEO), American Association of Medical Colleges (AAMC), International Medical Informatics Association (IMIA), Institute of Medicine's Health Professions Education Summit, Undergraduate Medical Education for the 21st century (UME-21) and the HealNET National Centre of Excellence Initiative. (5-10) Although many health care professionals use information technology in patient care and communication, few know how to optimize it for the greatest benefit in decision-making, workflow, and patient safety, for example. (4) For this reason, IMIA and others have stated that "all professionals in healthcare should, during their studies, be confronted with BMHI [biomedical and health informatics] education." (7)

Medical students appear to want and need informatics training; in one study nearly half of all trainees identified health informatics as a learning need, and students

in general were found to be unaware of many health informatics sub-domains and issues. (11) A 2006 survey of American medical students on informatics competencies found that the lowest ranked competencies in terms of self-perceived confidence were: exposure to and ability to use clinical information systems; and competency accessing databases of clinical information. (12)

We undertook an environmental scan of Canadian medical schools to assess health informatics teaching practices and content in Canadian medical school curricula as part of a quality improvement initiative at Dalhousie University's Faculty of Medicine.

2   Methods

For the purposes of this environmental scan a working group was convened at Dalhousie University with representation from clinical and academic faculty, community practitioners, and students. Our working group sought to document health informatics curricula exclusively and distinguished this from the use of technology to facilitate teaching and learning, commonly referred to as e-learning.

We systematically contacted undergraduate medical education staff at all seventeen Canadian medical schools via e-mail in the fall of 2009. To distinguish health informatics from e-learning, we introduced health informatics as the science of health information, used to improve health outcomes and patient care processes. We invited qualitative responses to open-ended questions about health informatics curricular content, timing within the undergraduate curriculum, informatics teaching methodologies (content delivery) and informatics faculty and teaching staff used to deliver this curriculum at their respective institutions. We sought clarifications via e-mail and by telephone when needed. The responses were collated and stored in a Google Document to share the results with the working group.

Because this was a quality improvement initiative, we did not seek institutional ethics review.

3   Results

Sixteen of seventeen medical schools responded to our queries. Each school identified curricular content on information literacy and evaluation of evidence. These activities were often led by librarians and associated with objectives in evidence-based medicine, critical appraisal and epidemiology. While some schools acknowledged informal experiential learning that may take place in clinical placements, no medical school identified a core formal curriculum in health informatics, even in universities with graduate programs and specialized research expertise in informatics.

Three institutions offer medical informatics electives. We were not able to confirm the annual enrollment. Two institutions provided a core session in pre-clerkship on how to integrate technology into the doctor-patient relationship in an unobtrusive fashion.

Three medical schools have informatics units with dedicated staff. However, two of these units focus on the use of informatics to support pedagogy, aligning more closely with e-learning than health informatics. The third unit participates in a graduate level program in health informatics but does not play a role in the undergraduate medical curriculum. One institution formed an informatics advisory committee for undergraduate medical education in 2007. This committee included librarians and faculty. While their objectives include monitoring the implementation of informatics components within the undergraduate curriculum and assessing developments in informatics education at other institutions, at the time of this study their work was described as being in the "development stages."

4   Discussion

The inadequacy of manual record keeping has long been cited as an impediment to integrated health care and informed clinical and administrative decision-making. (13, 14) In 2010 the Canadian Medical Association identified accelerated adoption of health information technology and e-prescribing as part of its roadmap toward health care transformation. (15) Leading organizations in medical education have outlined informatics competencies, a perspective that has been echoed by learners. (5-11) Without core skills in informatics, physicians are limited in their ability to be skilled users, optimally navigating clinical information systems and choosing technologies that match their clinical needs. Input from skilled clinicians is also essential in developing informatics tools that fit within clinical workflow and meet the needs of patients and their health care providers. (16)

Despite the need for health informatics skills, at the time of this study in 2009, there were no clearly identified core formal curricula in health informatics in Canadian medical schools. Several barriers to informatics initiatives have been recognized at the undergraduate medical education level. First is a lack of understanding of the discipline of medical informatics among educators. (17, 18) There is a "general tendency to prioritize the teaching on IT skills (the 'easy win') to the neglect of health informatics... this finding would appear to be

related to a lack of staff with the skills and motivation to develop health informatics as a curriculum theme." (18) Second is the densely packed nature of the medical curriculum. (17, 18) A national survey of clerkship and undergraduate teaching in American medical schools suggests that only 52% of pre-clerkship and 32% of clerkship medical students receive training in health informatics prior to the clerkship stage citing cost, time, and lack of staff as significant barriers. (19)

The tide is beginning to turn on this trend. Informatics is poised to be recognized as a sub-specialty of preventative medicine and pathology under the American Board of Medical Specialties. (20) Flagship programs have been successfully launched such as the integrated, 90 hour, longitudinal informatics curriculum at the University of Arizona College of Medicine (Phoenix track). Through collaborating with the Department of Biomedical Informatics at Arizona State University, this program spans information literacy, mobile computing skills, decision analysis and decision support. (21) The University of Toronto has designed, developed and implemented Canada's first educational module for medical students to identify and adapt to the negative effects of information technology on the patient-physician interaction. (22)

The importance of faculty development in distributed curricula continues to be underscored by at least one study that compares on-campus learners to distance education learners in a health informatics curriculum. While overall scores may be similar between these two groups, face to face instruction may provide a benefit in some individual sub-domains of health informatics teaching. (23) In particular, the domains of Health Data Structure, Content and Standards; Healthcare Statistics and Research; Information and Communication Technologies; and Data, Information and File Structure were found to be different, with the on-campus students scoring higher. (23)

The Association of Faculties of Medicine of Canada (AFMC) in partnership with Canada Health Infoway has launched the *Physician in Training e-Health Curriculum and e-Learning Project*. (24) This project will engage clinician educators, informatics experts, deans, students, interns and residents in an in-depth review of current objectives, curricular content and teaching methodologies. Ultimately the project aims to create new resources to support medical education on electronic medical records.

5 Conclusions

Despite recommendations that health informatics be included in core undergraduate medical education activities, as of 2009, it had yet to penetrate core undergraduate medical curricula in Canada. Faculty development is needed to raise the profile of health informatics amongst academic physicians. (3) Institutions with informatics programs and dedicated faculty should explore opportunities for inter-professional and cross-faculty collaboration. An organized approach to curriculum development with an eye toward research and program evaluation would bring these initiatives into mainstream medical education journals. New programs such as the *Physician in Training e-Health Curriculum and e-Learning Project* offer promise toward a bright future in health informatics education for young physicians in Canada.

6 Acknowledgements

References

1. Blumenthal D. Launching HITECH. N Engl J Med. 2010 Feb 4;362(5):382-5.

2. UK-CHIP Vision [Internet]. United Kingdom: United Kingdom Council for Health Informatics Professions; 2011. [Accessed August 19, 2011]. Available from: http://www.ukchip.org/?q=page/UKCHIP-Vision.

3. Smith M, Agresta T. Commentary: The time is now: Academia and opportunities in health informatics and e-health. Acad Med. 2010 Jul;85(7):1108-9.

4. Stead WW, Searle JR, Fessler HE, Smith JW, Shortliffe EH. Biomedical informatics: Changing what physicians need to know and how they learn. Acad Med. 2011 Apr;86(4):429-34.

5. Considerations for Cultural-communication, Legal, Ethical and Organizational aspects of the practice of medicine (C2LEO) objectives. Medical Council of Canada; 2005.

6. Contemporary issues in medicine–medical informatics and population health: Report II of the medical school objectives project. Acad Med. 1999 Feb;74(2):130-41.

7. Mantas J, Ammenwerth E, Demiris G, Hasman A, Haux R, Hersh W, et al. Recommendations of the International Medical Informatics Association (IMIA) on education in biomedical and health informatics. First revision. Methods Inf Med. 2010 Jan 7;49(2):105-20.

8. Committee on the Health Professions Education Summit - Institute of Medicine of the National Academies. Health professions education: A bridge to quality (quality chasm series). Greiner AC and Knebel E, editors. Washington, DC: The National Academies Press; 2003.

9. Gjerde CL, Pipas CF, Russell M. Teaching of medical informatics in UME-21 medical schools: Best practices and useful resources. Fam Med. 2004 Jan;36 Suppl:S68-73.

10. Covvey HD, Zitner D, Bernstein R. Pointing the way: Competencies and curricula in health informatics. HEALNet Education Initiative. 2001.

11. Devitt N, Murphy J. A survey of the information management and technology training needs of doctors in an acute NHS trust in the United Kingdom. Health Info Libr J. 2004 Sep;21(3):164-72.

12. Krause ND, Roulette GD, Papp KK, Kaelber D. Assessing medical informatics confidence among 1st and 2nd year medical students. AMIA Annu Symp Proc. 2006:989.

13. Lalonde M. A new perspective on the health of Canadians. Ottawa: Government of Canada; 1974 April.

14. Romanow R. Building on values: The future of health care in Canada. Ottawa: Commission on the Future of Health Care in Canada; 2002 November.

15. Health care transformation in Canada. Ottawa: Canadian Medical Association; 2010.

16. Lorenzi NM, Riley RT, Blyth AJ, Southon G, Dixon BJ. Antecedents of the people and organizational aspects of medical informatics: Review of the literature. J Am Med Inform Assoc. 1997 Mar-Apr;4(2):79-93.

17. Buckeridge DL, Goel V. Medical informatics in an undergraduate curriculum: A qualitative study. BMC Med Inform Decis Mak. 2002 Sep 3;2:6.

18. Murphy J, Stramer K, Clamp S, Grubb P, Gosland J, Davis S. Health informatics education for clinicians and managers–What's holding up progress? Int J Med Inform. 2004 Mar 18;73(2):205-13.

19. Aiyer MK, Dorsch JL, Mintz M, Torre DM, Thomas MR, Papp KK, et al. Medical informatics in the internal medicine clerkship: Results of a national survey. Med Teach. 2009 Aug;31(8):e351-5.

20. Terry K. Clinical informatics poised to become medical subspecialty. Information Week. 2011 July 29; [Accessed August 2, 2011]. Available from: http://www.informationweek.com/news/healthcare/leadership/231002948.

21. Curriculum and training [Internet]. Phoenix, Arizona: The University of Arizona, College of Medicine; 2008; [Accessed January 10, 2010]. Available from: http://www.medicine.arizona.edu/education/Phoenix_Track/index.cfm.

22. Radhakrishnan A, James J, Radhakrishnan D, Cooper MA. Friend or foe? An educational intervention addressing the barriers to patient-physician communication resulting from the use of IT. In Canadian Conference on Medical Education: May 1-5, 2010; St. John's, NL.

23. Russell BL, Barefield AC, Turnbull D, Leibach E, Pretlow L. Evaluating distance learning in health informatics education. Perspect Health Inf Manag. 2008 Apr 24;5:5.

24. Webster PC. Curricula reform needed to develop more tech-savvy physicians. CMAJ. 2011 Jul 12;183(10):E621-2.

Correspondence

Dr. Katrina Hurley MD, MHI, FRCPC
Faculty, Medical Informatics Program
Division of Medical Education, Faculty of Medicine
Dalhousie University
5849 University Avenue
Halifax, Nova Scotia B3H 4H7 Canada

Phone: +1 902-494-2234
Fax: +1- 902-494-2278
http://informatics.medicine.dal.ca/

kfhurley@dal.ca