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Recommendation Letter

The members of the leadership committee for the AFMC-Infoway Physician in Training: e-Health Curriculum and e-Learning Project applaud the foresight of both the Association of Faculties of Medicine of Canada (AFMC) and Canada Health Infoway (Infoway) for investing time and resources in the important area of e-health as it relates to medical education.

The importance of this issue and the project’s role in addressing it cannot be overestimated. Medical education, to be truly aligned with the needs of Canadians, must adapt, and adapt quickly, to major changes in clinical practice catalyzed by e-health technologies. Through this letter, we request your leadership and support to guide and ensure the prompt enhancement of e-health training in the medical curriculum through endorsement of the following seven recommendations resulting from the Environmental Scan of e-Health in Undergraduate Medical Curriculum. We as a group of faculty members across the country are willing to enthusiastically support you in this pursuit.

Both medical students and their teachers need to develop new skills and adapt existing ones. Learners must hone new sensitivities to ethically, appropriately and professionally capture, use and share personal health information contained in e-health records, understand the legal implications of working in an e-health environment, and safely manage patients’ digital identities.

We need to go beyond teaching the nuts and bolts of using new technologies (operator skills) and move towards a more comprehensive view that encompasses the cultural, social, and business effects of an e-health enabled healthcare environment. We must also recognize that learners are no longer learning only in classrooms or large teaching hospitals; doctors are being trained in the community, in rural and remote regions, at distributed campuses, and at home. Contemporary medical education curricula are therefore challenged by technological change in many dimensions. Medical education has so far not established a substantive position on e-health, and until it does we are not adequately preparing our learners. Indeed, we may be putting patients at risk.

Bringing a new dimension to medical education requires the collaboration of multiple players including Provincial ministries of health and education, regulatory authorities, hospitals and other clinical teaching sites, faculties of medicine on their home campus and distributed sites, accreditors and many others. Each plays a critical role in shaping curricula and learning environments. They therefore hold the keys to effecting change. Identifying the appropriate lead for each of the recommendations that follow has been challenging, and we acknowledge that no single entity will be in a position to implement any recommendation alone. What is needed is a systematic, collaborative, strategy to develop a cohesive, nationally-relevant e-health curriculum.

These recommendations will require modest investments for success. While we recognize that we are all operating in a challenging fiscal environment, we believe that the relatively small investments
needed, will yield lasting dividends. There is a cost to modernizing medical school curricula. This is a cost that will be recovered by equipping our future workforce to take full advantage of the e-health revolution and that will create capacity for continuing adaptive change both in terms of efficiency and quality of care.

Recommendation 1: Creating a common language

One of the most significant barriers to effectively integrating the use of e-health into medical education is the lack of a common language to talk about it; even amongst members of the relatively small community advancing this critical agenda, there is a differing understanding and interpretation of terms like e-learning, ICT, informatics, information management and e-health.

Developing a common lexicon will go a long way towards allowing us to advocate for change, develop learning opportunities, identify standards and competencies, enhance curricula and support a breadth of scholarship in and around the intersection between e-health and medical education.

This does not mean that we must all agree on what is most important, or where medical curriculum should focus. But in order to begin to debate and discuss these issues more effectively, we need to agree on some basic terminology.

We believe that the AFMC is the natural lead for this work. We suggest that the process build upon the extensive work that has been done by experts in the field of Informatics and use this to create a shared national vocabulary for e-health in medical education.

Recommendation 2: Creating National Learning Outcomes and Competencies

The original motivation for the AFMC-Infoway Physician in Training: e-Health Curriculum and e-Learning Project was to better understand how learners in Canadian faculties of medicine are exposed to e-health and to stimulate improvements in undergraduate medical education in this essential area.

We have identified a need for national learning outcomes and competencies for e-health that can clarify both the scope and form of e-health teaching and learning required for 21st Century Canadian doctors.

Under the leadership of AFMC, other stakeholders, such as the Medical Council of Canada, should collaborate in this endeavor.

Recommendation 3: Proposing Accreditation Standards

In order to ensure that e-health finds an appropriate position within medical education, we need a clear and unambiguous set of accreditation standards that support the outcomes and competencies identified in recommendation 2. These should be linked to CACMS/LCME. We also need review and revise existing accreditation standards to ensure that they remain relevant within our new e-health enabled environment.

The leadership committee has agreed to coordinate the development of the appropriate submission to the LCME.

Recommendation 4: Training the Trainers

We must work within our respective communities to identify, develop and sustain a cadre of champions; leaders who can advance the e-health agenda in medical education. We need Canadian medical
educators and learners who are not only willing, but able to ensure that tomorrow’s doctors are prepared to function in a digitally enabled workplace. Continuing Professional Development for medical educators and Continued Medical Education for clinicians will therefore be needed alongside mentorship and other supports.

This work is best accomplished by mobilizing and building upon the AFMC-Infoway e-health community of practice this project has created.

**Recommendation 5: Teaching Materials**

The pedagogical tools and resources available to educators and learners must support the national learning objectives and outcomes identified in recommendation 2. This work involves commissioning and collaborating in the development of national resources in e-health for medical education programs.

This work can build on the national CHEC-CESC repository and its various initiatives.

**Recommendation 6: National Collaboration**

The world of medical education is complex and involves many players, even more so in the area of e-health. In addition, collaboration among different health professions is an essential part of a modern medical education curriculum. Creating interprofessional partnerships and a national leadership group that reflects the diverse needs and cultural dimension of e-health will be essential. In particular, we need to create bridges between those charged with setting standards in Canada’s multiple practice environments and our faculties of medicine.

We envisage the committee acting as the nucleus for a wider leadership group.

**Recommendation 7: Support and Recognition for Scholarship**

e-Health initiatives have been notably disconnected from academic institutions and medical programs. There is a need for increased legitimacy of e-health scholarship including research, evaluation, process re-engineering, informational care transformation, quality improvement, teaching, training and learning.

This may involve commissioning research projects and other scholarly activities that draw together existing scholars and develop new ones. Greater recognition on the part of research funding agencies for the importance of medical informatics research must occur on both philosophical and financial levels.
Introduction

1.1 Background of the Study

Founded in 1943, the Association of Faculties of Medicine of Canada (AFMC) represents Canada’s 17 faculties of medicine and is the voice of academic medicine in Canada. Canada’s faculties of medicine graduate over 2,530 MDs a year with an enrolment of over 11,100 undergraduate medical students. The AFMC supports medical education, health research, and clinical care in faculties of medicine.

In 2011, the AFMC, in partnership with Canada Health Infoway, launched the AFMC-Infoway Physician in Training: e-Health Curriculum and e-Learning Project. The goal of the project is to improve clinical practice and patient care by supporting clinicians in their adoption and use of electronic health record systems. The initiative focuses on the integration of e-health, including the integration of information and communication technology and informatics curriculum in faculties of medicine across Canada.

One initiative of the project is an environmental scan to identify what exists, the trends, and the potential gaps across Canada in medical curricula, core competencies, policies and other activities related to e-health in undergraduate medical education in Canadian faculties of medicine. The environmental scan includes: a literature review; key informant interviews with undergraduate deans of medical education and one e-health or informatics expert at each of the faculties of medicine; and an online survey of informaticians, faculty members who are integrating e-health in their programs, staff/faculty at the undergraduate curriculum office, and other staff members such as informatics coordinators at the 17 faculties of medicine in Canada. The interview tool, online survey and literature review were developed in consultation with the project’s leadership committee.

This report presents the findings from the environmental scan including the study objectives and methodology; findings from the key informant interviews and online survey (conducted by EKOS Research), and the literature review. The report also includes information gathered about core competencies related to e-Health at the faculties of medicine and the existing accreditation standards.

1.2 Study Objectives

The objective of the environmental scan is to learn the following about e-health from the 17 Canadian faculties of medicine:

1. The different ways that e-health is represented within undergraduate curricula
2. The ways in which e-health topics integrate with other curricula structures
3. The representation of e-health in outcomes and competencies related to e-health
4. Relevant educational and administrative policies and initiatives to e-health
5. Infrastructure (e.g. hardware, software, services) to support e-health teaching and assessment
6. Available staffing, expertise and other human factors issues
7. Evaluation and audit activities related to e-health
8. Learning resources that have been created to support e-health in the curricula
9. Specific e-learning resources that have been created to support e-health in the curricula

The environmental scan is guided by three primary research questions: 1. What resources are available in undergraduate medical education in Canada to support health informatics (teaching and learning) related to electronic health records? 2. What, if any, are the curriculum requirements that relate to health informatics related to electronic health records for undergraduate medical education in Canada? 3. What are the measures of success for both teaching and learning related to health informatics at the undergraduate level?

For the purpose of this study, e-health has been defined in the following way: “E-health is the use of information and communication technology and innovation to improve or enable health and health care services. E-health is different from e-learning, which is concerned with the use of Internet-based technologies for educational purposes. It is worth noting that e-health could make use of e-learning, for instance patient education, and e-learning can include aspects of e-health, such as monitoring stress and other learner welfare factors.”

1.3 Methodology

a) Key Informant Interviews

AFMC compiled a list of deans of undergraduate medical education, one from each of the 17 faculties of medicine. A similar list of 17 e-health experts within medical faculties was compiled (based on suggestions from deans or faculty members using e-health in their teaching or with an interest in the area) for a total of 34 potential respondents.

In all cases (with one exception), prior approval from the body responsible for research ethics was required from each institution before interviews could be conducted. AFMC submitted the documentation required to obtain ethics approval for these institutions, and approval was granted in all cases.

The interview was comprised of 23 questions and was estimated to take 30-45 minutes to complete over the phone. The AFMC developed questions for a semi-structured interview, which included several open-ended questions to elicit detailed responses, as well as several fact-based questions, for which interviewees were encouraged to elaborate. The interview guide also contained information explaining the study background, objectives, and key definitions. The guide was provided to
respondents before the interview, along with a consent form which was required to be signed by the
respondent and returned to EKOS. The interview guide was tested with two key informants. A few minor
changes to the guide were made with AFMC approval based on the test. The two interviews that were
tested are included as part of the analysis and presentation of findings. The interview guide is included
in Appendix 1.

EKOS made initial contact with key informants by telephone and email. Subsequent
attempts at contact were made by EKOS to individuals who were not reached on the first attempt. A
total of 31 interviews were completed between May 2012 and August 2012 with representation at all 17
faculties of medicine in Canada.

b) Online Survey

The methodology for this study involved an online survey of informaticians, faculty
members who are integrating e-health in their programs, staff/faculty at the undergraduate curriculum
offices and other staff members such as Informatics Coordinators at the 17 faculties of medicine in
Canada. The survey sample was developed based on recommendations from key informants and from
AFMC. The survey questionnaire was designed and translated by AFMC, and then programmed for
administration using EKOS’ web-based survey software. In total, 101 individuals were invited to
participate in the survey.¹ No formal pre-test was conducted as part of this study due to the relatively
small number of potential respondents available. However, the questionnaire was thoroughly tested by
EKOS and AFMC to ensure that it functioned properly, and that it was clearly organized and worded.

The initial survey invitation was sent on August 22, 2012. The email invitation included a
description of the survey (in both official languages), and a hypertext link to a survey website. When
respondents clicked on the survey link, they were taken to a website containing the bilingual survey
instrument. The survey database was mounted using a Personalized Identification Number (PIN), so only
individuals with a PIN – sent to respondents in the initial email invitation – were allowed access to the
survey. The PIN allowed respondents to exit and re-enter the survey at any time to complete or change
information before the questionnaire was completed and submitted.

To ensure security, survey responses were housed using a Canadian-based server that did
not contain any personal information (i.e., cases had a PIN that was created specifically for this survey,
not a name or any other known identifiers). Respondents were advised that the survey had received
ethics approval from their institutions, that individual information would not be shared with third
parties, and that analysis and publication of survey results would be at the aggregate level only.

In an effort to increase the survey response rate, all non-respondents were sent an email
reminder on September 24th, October 9th and October 16th. Of the 101 individuals that were sent the

¹ Note that the initial sample of 95 individuals was increased by an additional six individuals respondents supplied by one
institutions toward the end of the survey period.
survey, a total of 35 completed it for an overall response rate of 35 per cent. Table 1.1 outlines the final disposition of the email contacts for this study. The survey was conducted between September 24 and October 12, 2012.

Table 1.1: Response Rate

<table>
<thead>
<tr>
<th>Formula Item</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total invitations (a)</td>
<td>101</td>
</tr>
<tr>
<td>Undeliverable/bounce (b)</td>
<td>0</td>
</tr>
<tr>
<td>Net usable invitations (c=a–b)</td>
<td>101</td>
</tr>
<tr>
<td>Total completes (d)</td>
<td>35</td>
</tr>
<tr>
<td>Qualified break-offs (e)</td>
<td>0</td>
</tr>
<tr>
<td>Disqualified (f)</td>
<td>0</td>
</tr>
<tr>
<td>Not responded (g)</td>
<td>66</td>
</tr>
<tr>
<td>Quota filled (h)</td>
<td>0</td>
</tr>
<tr>
<td>Response Rate (calc = (d+f+h)/c)</td>
<td>34.6%</td>
</tr>
</tbody>
</table>

The table below summarizes the proportions of survey respondents from each medical faculty. The largest proportion of respondents is from the University of Western Ontario (17 per cent). Four of the 17 medical faculties are not represented in the sample: University of Ottawa, Université de Montréal, Université de Sherbrooke, and Northern Ontario School of Medicine.

Table 1.2: Sample Distribution by Institution

<table>
<thead>
<tr>
<th>Institution</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memorial University</td>
<td>3</td>
</tr>
<tr>
<td>McMaster University</td>
<td>9</td>
</tr>
<tr>
<td>Dalhousie University</td>
<td>11</td>
</tr>
<tr>
<td>University of Western Ontario</td>
<td>17</td>
</tr>
<tr>
<td>Université Laval</td>
<td>11</td>
</tr>
<tr>
<td>Northern Ontario School of Medicine</td>
<td>0</td>
</tr>
<tr>
<td>Université de Sherbrooke</td>
<td>0</td>
</tr>
<tr>
<td>University of Manitoba</td>
<td>6</td>
</tr>
<tr>
<td>Université de Montréal</td>
<td>0</td>
</tr>
<tr>
<td>University of Saskatchewan</td>
<td>6</td>
</tr>
<tr>
<td>McGill University</td>
<td>3</td>
</tr>
<tr>
<td>University of Alberta</td>
<td>11</td>
</tr>
<tr>
<td>University of Ottawa</td>
<td>0</td>
</tr>
<tr>
<td>University of Calgary</td>
<td>3</td>
</tr>
<tr>
<td>Queen's University</td>
<td>3</td>
</tr>
<tr>
<td>University of British Columbia</td>
<td>9</td>
</tr>
<tr>
<td>University of Toronto</td>
<td>9</td>
</tr>
</tbody>
</table>
The table below summarizes other characteristics of the survey sample. Slightly more than half of respondents are men (57 per cent). Just over half is under age 45 (55 per cent). The majority of respondents are faculty members (55 per cent); almost one quarter is staff/non-faculty (23 per cent). Three in four respondents have teaching responsibilities (74 per cent), while the remainder does not (26 per cent).

Table 1.3: Sample Distribution by Other Characteristics

<table>
<thead>
<tr>
<th>Sample Characteristics</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>57</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>3</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td>6</td>
</tr>
<tr>
<td>35-44</td>
<td>49</td>
</tr>
<tr>
<td>45-54</td>
<td>14</td>
</tr>
<tr>
<td>55-64</td>
<td>14</td>
</tr>
<tr>
<td>65+</td>
<td>14</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>3</td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>55</td>
</tr>
<tr>
<td>Non-faculty</td>
<td>23</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>14</td>
</tr>
<tr>
<td><strong>Teaching Responsibilities</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>74</td>
</tr>
<tr>
<td>No</td>
<td>26</td>
</tr>
</tbody>
</table>

About half of survey respondents (who were identified by interview respondents as contributing to e-health in their institutions in some way) agree they refer to themselves as an informatician (48 per cent), while 45 per cent disagree with this term being applied to them. Slightly less than half would say they can be considered an e-health specialist (45 per cent); 32 per cent do not think this label applies to them, while a large minority (23 per cent) is unsure.
c) Literature review

The literature review was conducted at the Association of Faculties of Medicine of Canada. The initial search strategy was based on the inclusion of e-health related topics and needed to incorporate medical education component. The preliminary scan comprised of 60 resources was posted on CHEC-CESC in the AFMC - Infoway Physician in Training e-Health Curriculum & e-Learning community and seven members of the community sent feedback. Through the feedback, 60 more resources were collected from suggested publications, databases, and new search terms.

Members were also asked to provide competencies or objectives related to e-Health that are being used at their faculty of medicine. A search was conducted of the Medical Council of Canada’s Objectives for the Qualifying Exam (for the M.D. licensure) and of the Liaison Committee on Medical Education Accreditation Standards.
E-Health at Canada’s Faculties of Medicine

Key findings:

› There is an absence of a common language across medical faculties with respect to e-health. The term e-health is not universally applied in the same way across medical faculties and terms such as medical informatics, health informatics and, to a lesser degree, clinical informatics are also commonly used terms related to e-health.

› About half of medical faculties use EMR, EHR or similar systems as teaching tools, and students in almost all faculties have exposure to these systems at some point during their medical education. However, there is no consistent approach or policy to teaching and learning e-health. Specific educational opportunities for students may occur in institution-based and/or other (clinical) settings, and include practical exposure to these systems and/or formal learning.

› Key informant interview findings indicate that faculty resources to support e-health are not well developed. Few institutions have designated e-health departments, committees, or designated faculty members, and it is uncommon for funding to be dedicated to activities that fall under e-health. However, more than half of faculties do offer access to professional development opportunities related to e-health and many faculty members who were interviewed are involved in e-health related committee work beyond their institution. Survey respondents further indicate a variety of activities and projects related to e-health in which they are involved.

› Still, less than half of survey respondents agree that teaching, learning, and research related to e-health are valued at their institution, and nearly one in four feels this area is not valued. One in four survey respondents agree that students in their programs are being prepared for practice in a technology-driven environment when they graduate.

› Resources identified by key informants and survey respondents as being important to support learning and teaching e-health include the development and training of faculty and technical experts; access to e-health systems that allow for demonstration, simulation and feedback to be used for teaching and learning; and online resources for support.

2.1 E-Health Vocabulary

Findings from the survey and key informant interviews point to some variation in the use of the term e-health and its application in medical faculties. Survey results indicate that 60 per cent of respondents say that e-health is a term used in their institution. About half of respondents also identified medical informatics and health informatics as key terms their institutions use. One-third
(34 per cent) identified information literacy as a key term. One in four (26 per cent) use clinical informatics. Other terminology identified by survey respondents (14 per cent) includes:

- E-learning
- Evidence-based medicine
- Intégration des technologies au secteur de la santé
- Informatics

Key Terms Related to e-Health

“What are the key terms related to e-health used in your institution?”

According to key informant interviews, almost half of the medical faculties do not use the term e-health. Some key informants point out that the use of e-health as an umbrella term is more confusing than helpful; for instance, in some institutions, the term may be more associated with government/administrative policies and initiatives, rather than a term used in the context of teaching and learning about patient care. Key informants suggest other terms such as medical informatics, clinical informatics and information and communication technology. Most of the faculties agree that medical informatics is widely accepted and used as an e-health related term; of these faculties, a few note that medical informatics is not employed in any formal sense, but rather is embedded in their faculty’s understanding of the field of e-health (which may be useful in distinguishing e-health from concepts like e-learning). Over half of the faculties mention that clinical informatics is generally accepted as part of the e-health vocabulary, though use of the term across faculties is not as widespread as medical informatics. About a third of faculties use the term information and communication technology.
2.2 Electronic Medical Records (EMR) and Electronic Health Records (EHR)

Use of e-health software systems like electronic medical records (EMR) and electronic health records (EHR) as teaching tools is moderate in Canadian faculties of medicine. According to key informant interview responses, about half of faculties of medicine use EMR, EHR or similar systems as teaching tools in their faculty, while respondents in almost all faculties reported that students have exposure to these systems at some point during their medical education, typically in a clinical or hospital setting. A number of respondents note that students’ exposure to these systems is through practice rather than formal teaching, although some also mention there is some formal instruction or orientation on how to use the systems as part of their clinical placements.

### Table 2.1: Teaching/Learning Tools

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Number of Faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use EMR, EHR or similar systems as teaching tools at your school?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Do your students have other access to EMR, EHR, or other software or systems technology for learning purposes?</td>
<td>15</td>
</tr>
</tbody>
</table>

* Faculties for which there was no information or conflicting information

Source: AFMC Environmental Scan Key informant interviews, 2012

Just over four in ten survey respondents (43 per cent) say their faculties use EMRs as teaching tools. About three in ten (29 per cent) say their faculties use EHRs. Other similar systems that were mentioned by 29 per cent of respondents include demo or simulation EMR/EHR, computerized physician order entry (CPOE) system, e-portfolios, wikis, and hospital/clinic based EHR/EMR. One in four respondents (26 per cent) indicate that their faculty uses no type of e-health software or system.

Approximately four in ten survey respondents are aware of specific educational opportunities for learners regarding e-health offered by their faculty (38 per cent). More than a third of respondents (35 per cent) said these opportunities are not available through their faculty, and 26 per cent are unsure. Only about one-quarter of respondents (23 per cent) say that their faculty has specific curriculum objectives for learners related to digital health records. About half (46 per cent) says their faculty does not have specific curriculum objectives, and 31 per cent are unsure.
2.3 Faculty Resources

Table 2.2 summarizes responses to interview questions that asked specifically about resources in key informant interview respondents’ faculties.

Table 2.2: Faculty Resources

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Number of Faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Does your faculty have an e-health/informatics department?</td>
<td>1</td>
</tr>
<tr>
<td>Does your faculty have an e-health committee(s)?</td>
<td>2</td>
</tr>
<tr>
<td>Are there funding envelopes dedicated to e-health at your faculty?</td>
<td>2</td>
</tr>
<tr>
<td>Do you have a designated faculty lead for e-health?</td>
<td>5</td>
</tr>
<tr>
<td>Are there faculty development opportunities offered on e-health at your school?</td>
<td>9</td>
</tr>
</tbody>
</table>

* Faculties for which there was no information or conflicting information.
Source: AFMC Environmental Scan Key informant interviews 2012

a) E-Health/Informatics Departments

According to key informant interviewees, most faculties do not have a department dedicated to e-health or informatics (although at a few faculties there was not a consensus between the respondents as to whether an entity with some responsibilities for e-health or informatics could be considered a “department”). Some respondents note the existence of entities that aren’t considered
“departments”, which would be similar to an e-health department (such as an IT support department or program, staffed by technicians).

b) Funding/Professional Development

Based on interviews, it is uncommon that faculties have dedicated funding allocated to e-health: just two could confirm that there are funding envelopes available for e-health. A few key informants indicate that money has been allocated for other projects or initiatives that might touch upon e-health (e.g., research, library or technology projects), rather than an organized approach to funding e-health. A few also indicate accessing funding from external sources for e-health projects. According to key informant interview responses, nine of 17 medical faculties offer professional development opportunities for faculty on e-health.

c) E-Health Committees and Projects

Based on interviews, few faculties confirm that they have designated committees for e-health, although this is also a source of conflicting views between informants within the same faculty (potentially due to different levels of awareness or understanding of the role or mandate of a committee). On the other hand, a majority of survey respondents (63 per cent) indicate that they have personally participated in a committee-based activity at some level – locally, nationally, or internationally – related to e-health in the last two years. Examples of such committees and organizations that respondents have conducted this work for are provided in Table 2.3 below. These findings suggest that many faculty/staff who were surveyed are engaged in committee work related to e-health even if their faculties do not have a committee with such a focused mandate.

Table 2.3: Examples of Local and National Committees/Organizations Conducting Work Related to E-Health

<table>
<thead>
<tr>
<th>Committee Name and/or Host Organization</th>
<th>Local/Regional/Provincial</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>› Information Working Group, Faculty of Medicine, University of British Columbia</td>
<td>› National Institutes of Health Informatics</td>
<td></td>
</tr>
<tr>
<td>› Informatics Group, Ontario Health Study</td>
<td>› Informatics Resource Group, AFMC</td>
<td></td>
</tr>
<tr>
<td>› Plan d’action en NTIC</td>
<td>› Teaching and Learning Committee, Association of Academic Health Sciences Libraries</td>
<td></td>
</tr>
<tr>
<td>› Clinical Information Systems Steering Committee, Alberta Health Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>› EMR Superusers group, U Western Ontario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>› Hospital/city-wide wireless committee</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AFMC Environmental Scan Online Survey, 2012
Some of the committees and organizations noted have undertaken projects related to e-health. Survey respondents noted some of the projects they have been involved in, examples of which are provided in Table 2.4 below.

**Table 2.4: Examples of E-Health Related Projects**

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulated physiology</td>
<td>Educational Technology Strategy</td>
</tr>
<tr>
<td>Information design of patho-physiology graphics</td>
<td>Curriculum development on EMR and patient/physician communication</td>
</tr>
<tr>
<td>Simulated Electronic Medical Record system</td>
<td>Outpatient team based communication platform</td>
</tr>
<tr>
<td>Mobile health project submissions</td>
<td>Evidence-based medicine literacy</td>
</tr>
<tr>
<td>Unified communications for city hospitals</td>
<td>Developing virtual patients</td>
</tr>
<tr>
<td>Medical Student Online Toolkit</td>
<td>Development of self-learning modules</td>
</tr>
<tr>
<td>Mobile Learning Strategy Development</td>
<td></td>
</tr>
<tr>
<td>Educational Technology Strategy</td>
<td></td>
</tr>
<tr>
<td>Curriculum development on EMR and patient/physician communication</td>
<td></td>
</tr>
<tr>
<td>Outpatient team based communication platform</td>
<td></td>
</tr>
<tr>
<td>Evidence-based medicine literacy</td>
<td></td>
</tr>
<tr>
<td>Developing virtual patients</td>
<td></td>
</tr>
<tr>
<td>Development of self-learning modules</td>
<td></td>
</tr>
</tbody>
</table>

Source: AFMC Environmental Scan Online Survey, 2012

**d) Faculty Leadership**

Interviews and survey responses indicate there are various professionals leading the development of e-health curriculum in medical faculties. About one-third of the faculties confirm through key informant interviews that they have designated faculty leads in the area of e-health; a few other respondents note that there are “natural leaders” in their faculty, even though they may not have an official designation. According to key informants, there is no consistent title given to designated faculty in the e-health field – while a few hold a title that is related to e-health, others may be known as e-health leaders based on their involvement on a committee or their interest in it as an area of research or teaching. When asked whether they can identify anyone else in their faculty who is involved in the advancement of the teaching and learning of e-health, interviewees at most faculties are able to provide at least one name, and often can provide more than one. Individuals considered to be part of the e-health community at the various institutions include curriculum designers, undergraduate officers, librarians, informaticians, clinical physicians, and individuals holding hospital positions.

The majority of survey respondents indicate that they are contributing to e-health at their faculty most often through faculty development training, development of learning resources, and curriculum development or renewal, and a majority is also involved in paving the way for e-health through development of enabling policies.

- 97 per cent of respondents have contributed to the development of learning resources – 66 per cent as a leader on this initiative and 31 per cent as a participant.

---

Most respondents did not specify the organization through which these projects were undertaken.
More than eight in ten (83 per cent) have contributed to faculty development activities (like presentations, workshops and courses), with 63 per cent as leaders in this area and 20 per cent as participants.

More than eight in ten (82 per cent) have contributed to curriculum development or renewal – 52 per cent as leaders and 30 per cent as participants.

79 per cent used e-learning resources related to e-health to support teaching – 53 per cent as a leader on this initiative and 26 per cent as a participant.

77 per cent of respondents have contributed to the development of e-learning resources related to e-health – 54 per cent as a leader on this initiative and 23 per cent as a participant.

Three in four respondents (75 per cent) have contributed to the development of enabling policies – 30 per cent as leaders and 45 per cent as participants.

68 per cent have been involved in the implementation of an education program – 50 per cent as a leader on this initiative and 18 per cent as a participant.

66 per cent contributed to the evaluation of e-health learning resources (their usability and validity, knowledge transfer) – 36 per cent as a leader on this initiative and 30 per cent as a participant.

63 per cent have contributed to the development of innovative education programs – 49 per cent as a leader on this initiative and 14 per cent as a participant.

54 per cent have contributed to medical education opportunities specifically related to EMR, EHR or similar tools – 27 per cent as a leader on this initiative and 27 per cent as a participant.

51 per cent have contributed to the evaluation of competencies related to e-health (the usability, reliability or knowledge transfer of these) – 30 per cent as a leader on this initiative and 21 per cent as a participant.

### Table 2.5: Faculty Leaders and Participants in E-Health

<table>
<thead>
<tr>
<th>How have you contributed to e-health at your faculty?</th>
<th>As a Leader (%)</th>
<th>As a Participant (%)</th>
<th>N/A (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributed to the development of learning resources</td>
<td>66</td>
<td>31</td>
<td>3</td>
</tr>
<tr>
<td>Participated in faculty development training activities</td>
<td>63</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Contributed to curriculum development or renewal</td>
<td>50</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>Used e-learning resources related to e-health to support teaching</td>
<td>53</td>
<td>26</td>
<td>21</td>
</tr>
<tr>
<td>Developed e-learning resources related to e-health</td>
<td>54</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Contributed to the development of enabling policies</td>
<td>30</td>
<td>45</td>
<td>24</td>
</tr>
</tbody>
</table>
The Association of Faculties of Medicine of Canada © 2012

<table>
<thead>
<tr>
<th>How have you contributed to e-health at your faculty?</th>
<th>As a Leader (%)</th>
<th>As a Participant (%)</th>
<th>N/A (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented education programs</td>
<td>50</td>
<td>18</td>
<td>32</td>
</tr>
<tr>
<td>Evaluated the usability, validity, and/or knowledge transfer of learning resources related to e-health</td>
<td>36</td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>Developed innovative education program</td>
<td>49</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>Contributed to medical education training opportunities specifically related to electronic medical records, electronic health records, or similar tools</td>
<td>27</td>
<td>27</td>
<td>45</td>
</tr>
<tr>
<td>Evaluated the usability, validity, and/or knowledge transfer of competencies related to e-health</td>
<td>30</td>
<td>21</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: AFMC Environmental Scan Online Survey, 2012

**e) Value of E-Health**

Just over four in ten survey respondents (43 per cent) agree teaching, learning, and research related to e-health are valued at their institution. Nearly one in four respondents (23 per cent) feels that e-health is not valued at their institution and one-third (34 per cent) is not sure. Furthermore, relatively few believe that students in their programs are being prepared for practice in a technology-driven environment when they graduate: 23 per cent agree with this statement, while 40 per cent disagree. More than one in three (37 per cent) is unsure. Though not specifically addressed through interview questions, some key informant interviewees also suggested that teaching, learning and research in e-health are undervalued at their institutions, pointing to lack of clear leadership in this area and relatively low importance accorded to e-health, compared to other aspects of medical education.

### Value of e-health at Institution

“**To what extent do you agree/disagree with the following statements?**”

- Teaching, learning, and research, related to e-health, is valued at your institution
  - **Disagree (1-2)**: 23
  - **Neither (3)**: 34
  - **Agree (4-5)**: 43

- Graduates from our program are prepared for practice in a technology-enabled environment when they graduate
  - **Disagree (1-2)**: 40
  - **Neither (3)**: 37
  - **Agree (4-5)**: 23

n=35  AFMC Environmental Scan Online Survey, 2012
Resources Needed

According to 82 per cent of survey respondents, faculty experts are the single most important resource for ensuring that medical students graduate prepared to practice in a technology-enabled environment. Technical experts are also viewed as an important resource by a majority (58 per cent). Three quarters feel that access to the local health system are important (75 per cent), as are dedicated e-health systems for teaching (73 per cent). Two-thirds (66 per cent) think online modules are important. Half (48 per cent) think that conferences and seminars are important, while decidedly fewer think that video is important (35 per cent).

Key informant interviewees also suggested a variety of resources or conditions that they believe would improve the quality or amount of teaching and learning occurring in their faculty on the subject of e-health, including many of those resources identified as important by survey respondents: the development and training of faculty and technical experts; e-health systems that allow for demonstration, simulation and feedback to be used for teaching and learning; and online resources. Interviewees made it apparent, however, that there are differences in philosophy as to how resources should be focused; for instance, some key informants express the view that resources should help to integrate e-health into various aspects of the medical school and hospital/practical settings, while others think that e-health should be clearly defined as its own subject area within undergraduate medicine (such as having a specific department with its own resources). Other suggestions by interviewees and survey respondents to improve the quality or amount of teaching and learning on e-health include:

> Partnerships, collaboration, centralized sharing of resources, particularly e-resources
A common set of objectives, a national direction or framework

Funding

One single, unified e-health system used across clinical sites

Evaluation activities for e-health in curriculum
Trends, Drivers and Barriers

Key Findings

› Technological developments are seen as a major force driving the adoption of e-health in medical curriculum, especially the ability to use mobile devices to access information anywhere (and especially in a clinical setting) and the maturation of electronic health records (or similar) systems.

› It is unknown precisely how large or important a role accreditation plays in determining whether e-health is covered in medical curriculum. Only a few institutions agree that the accreditation process has already influenced their school’s decisions to include e-health and related topics in their curriculum. There is a lack of consensus among respondents as to whether accreditation standards do in fact explicitly address e-health.

› While many medical faculties have relationships with their local or regional health authorities, it is still unclear how these relationships are or can influence medical curriculum. Some faculties leave teaching and training on e-health topics to the health authority where students will directly access e-health systems during clinical placements.

› There are indirect implications of new technology that are also driving the adoption of e-health in medical curriculum. Virtual patient (e.g.: email, texting) / physician interaction is having an impact on expectations for professional conduct. Information is more widely available and can be accessed easily, which drives a need for information literacy skills such as information acquisition and critical thinking.

› Several factors are identified by key informants and survey respondents as potentially impeding the preparation of medical students to practice in a technology-enabled environment. Lack of a cohesive approach (particularly a national strategy) and absence of criteria established by an official body to address e-health in medical curricula were named most often as impediments at the national level. At the local (faculty) level, impediments to the preparation of graduates in e-health mentioned by key informants and survey respondents included: insufficient attention and integration of e-health in the medical curriculum; lack of financial and other resources to support e-health; difficulties encountered with technologies; and physician and faculty resistance or scepticism.
3.1 E-Health Drivers and Influencers

a) General Drivers

According to key informant interviewees, numerous factors drive the development of e-health in undergraduate medical curriculum. About one-third of interviewees indicate that interest from key faculty members is a driving force: a few say it is one or two faculty members with a keen research or teaching interest who are champions, while a few others indicate general or overall faculty support for developing curriculum in this area. Approximately another third of interviewees indicate that the technological realities of the health care environment and the educational environment is driving the development of e-health curriculum: the ubiquity of technology both in patient care (e.g., the increasing use of EHR/EMR and related systems across provinces, regions and health care facilities), and the use of technology to teach students makes it essential to incorporate this subject into medical curriculum. Some interviewees observe that students are a driving force, by their interest in e-health and using technology generally in their education and medical practice. Some note that the potential for technology to improve patient care (for instance, by transcending distances between patients and physicians, especially in rural/remote areas) is a driving factor, and some note also that their curriculum objectives and the skills they set out to equip students with make it necessary to include e-health as a topic in their curriculum. To a lesser extent, the role of the general public and government policy/priorities is regarded as a factor (by a few informants) that has led to the development of e-health in undergraduate medical curriculum.

b) Accreditation

Based on key informant interviews, the accreditation process has influenced decisions regarding the inclusion of EMR, EHR, and e-health in curriculum at just a few institutions; for just under half of institutions, the accreditation process is believed to have had no influence in this area (see Table 3.1). A few key informants who say that accreditation has not influenced their school’s e-health curriculum indicate it is because accreditation standards do not explicitly address e-health (which conflicts with the opinions of others who indicate that accreditation has influenced their faculty’s efforts in this area).

<table>
<thead>
<tr>
<th>Table 3.1: Influences on E-health Curriculum in Medical Faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Faculties</strong></td>
</tr>
<tr>
<td>Has the accreditation process influenced your school's decisions regarding the inclusion of EMR, EHR, and e-health in your school's curriculum?</td>
</tr>
</tbody>
</table>

* Faculties for which there was no information or conflicting information.
Source: AFMC Environmental Scan Key informant interviews, 2012
c) Hospitals/Clinical Settings

According to key informant interviewees, more than half of institutions have a collaborative relationship with their Regional Health Authority (or similar, such as a Local Health Integration Network (LHIN) in Ontario) to address e-health, suggesting that hospital-based trends in e-health are likely to have some influence on medical education in the future (see Table 3.1). A few key informants who say there is no collaborative approach with their health region indicate that collaborative relationships are developing, or that relationships exist but e-health is not a topic that has been addressed yet. The relationships that exist sometimes entail an understanding that the health region or clinical setting will provide training for students during clerkship/clinical placements on the local EHR or similar systems. The relationships that exist are not always seamless, however (nor are they always truly collaborative): a few key informants indicate that the progress toward remedying problems (such as with accessing computer systems) is very slow; and may be complicated when institutions deal with multiple health authorities, each with different e-health systems. Furthermore, comments about the nature of the collaborative approaches suggest that collaboration between faculties and hospitals/health regions may be limited to more technical aspects of e-health (e.g., negotiating access to computer systems, determining what technology is needed) rather than teaching and learning per se.

Table 3.2: Influences on E-health Curriculum in Medical Faculties

| Do you have a relationship with your Regional Health Authority to create a collaborative approach? | Number of Faculties |
|---|---|---|
| Yes | No | Unclear* |
| 9 | 3 | 5 |

* Faculties for which there was no information or conflicting information.

Source: AFMC Environmental Scan Key informant interviews, 2012

3.2 E-Health Trends

Based on key informant interview findings, there are a number of trends that are influencing or will influence medical education curricula in the next five years. About one-third of key informants believe that among the most significant e-health trends is the development of (and the ubiquitous use of) technologies that are being/have been translated for use in medical practice. Some respondents feel that mobile and hand-held technologies are an especially important aspect of this trend: medical students’ and physicians’ comfort level and aptitude for using tablets and mobile phones in their everyday lives is resulting in the quick adoption of these technologies for use in patient-care settings. Some key informants also see other issues related to these technological developments: for instance, an increasing awareness of conflict between “face-to-face” and “virtual” (e.g. web chat, email, texting, reading of health records) patient/physician communication, and what this may mean for expectations of professional conduct. Others point out, similarly, an increasing awareness of patient safety issues that
arise from the use of technology (e.g., the potential for errors, issues of privacy and confidentiality). Along with evolving technology has come a trend toward more widely available information that can be accessed easily by these technologies (which, one informant points out, may signal a trend in education toward valuing skills like information acquisition and critical thinking, rather than rote memorization). A few interviewees also point out that the recognition of e-health skills and competencies through professional standards and accreditation is likely to influence the presence of e-health in medical curriculum over the next five years.

On the minds of several interviewees are trends in hospitals, health regions and other health care settings. Several informants note that the evolution/maturation of e-health systems in particular (a further aspect in the development of technology) is influencing medical curriculum – particularly the increasing use of EMR/EHR in hospitals and other patient care settings, which makes it increasingly important to educate students on how to use these systems. Other respondents note the increasing attention in hospital/clinical settings to issues around e-health, including having designated staff in charge or implementing and overseeing these systems. Some key informants say that a growing awareness of the shortcomings of present e-health policies and systems will likely influence medical curriculum (e.g., the fragmentation of e-health between institutions, regions, and provinces), as improvements in policy are made that will address gaps in the way e-health is addressed from an administrative standpoint.

3.3 Barriers and Impediments

Based on survey results, there is little consensus as to what conditions at the national level will stand in the way of learners graduating prepared to practice in a technology-enabled environment over the next five years. One quarter (26 per cent) feels that the need to meet criteria set by an official body, or the lack of specific objectives set out by that established body in the first place, will be an impediment. Equal proportions say that leadership in the area of e-health curriculum (or the absence of it) will be an impediment (12 per cent) as will a lack of common or shared resources for teaching and learning about e-health (12 per cent). One-quarter (26 per cent) thinks that some other impediments will be apparent over the next five years. Other barriers that have been suggested by respondents are summarized in Table 3.3. About one-third of respondents (32 per cent) is unsure or does not know what factors at the national level may impede learners’ preparation in the next five years.
Key National Level Impediments to Graduate Preparation

“At a national level, over the next FIVE years, what in your mind will be impediments to ensuring that learners graduate prepared to practice in a technology-enabled environment?”

- Lack of specific objectives/the need to meet a criteria established by an official body: 26%
- Leadership to implement e-health/informatics in curriculum: 12%
- Lack of common/shared resources: 12%
- Other: 26%
- DK/NR: 32%

In interviews, just under half of key informants mentioned a lack of a cohesive strategy to address e-health as an impediment – for instance, no national or interprovincial framework for developing e-health in the health care field, leading to a fragmented system and medical faculties unsure of what exactly to prepare their students for. According to some key informants, this situation has perhaps exacerbated an absence of a well-defined approach to e-health in medical curricula. Some respondents point out that the stark differences between health regions, provinces, hospitals and medical faculties (in terms of priorities and resources) is leading to disparities in the skills of medical students.

All survey respondents mentioned at least one impediment at the local/faculty level that will prevent learners from graduating prepared to practice in a technology-enabled environment. More than two in five (44 per cent) feel that lack of integration and implementation of e-health into the curriculum at their faculty will be a barrier. One-third (32 per cent) thinks that lack of faculty expertise will be an impediment, and a quarter each think that impediments at their faculty will include lack of resources (26 per cent) and faculty resistance, lack of interest, or refusal to support e-health (26 per cent). One in five (21 per cent) is also concerned about other barriers, which are summarized in Table 3.3 below.
Many of these local factors were also identified by key informants as potentially impeding the preparation of medical students to practice in a technology-enabled environment. Most notably is that about half of key informants identify a lack of commitment of resources dedicated to e-health, including funding and personnel, as an impediment. Key informants indicate that a lack of resources both for acquiring and maintaining technology and for developing curriculum in this area is potentially problematic. A large number of informants (just under half) also point out that the technology itself may be an impediment; the different systems used and the differences in quality of systems (e.g., the amount/type of information that is captured, the user-friendliness, security features) will impede the development of some students in faculties that encounter difficulty with the technology. Costs of keeping up with changing technology, as well as other difficulties encountered with implementing the technology, are said to lead some hospitals to not effectively use the technology available to them – further disadvantaging the students who train at these facilities. To a lesser degree, but still notable, several key informants point out that the reluctance of physicians or faculty to adopt technologies or to teach e-health can also act as an impediment to preparation of medical students.
<table>
<thead>
<tr>
<th>Local-level/Faculty Barriers</th>
<th>National Level Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>› Quality of equipment, software and systems available for teaching and learning/Issues with software, vendors, e-health platforms</td>
<td>› Lack of national policy and investment in e-health</td>
</tr>
<tr>
<td>› Issues with licensing, proprietorship of tools</td>
<td>› Inability to show the tangible benefits of e-health to population health/Potential benefits outweighed by the cost of implementation</td>
</tr>
<tr>
<td>› Rigid/limited understanding of e-health by leaders</td>
<td>› Competition between faculties/lack of a uniform approach between universities</td>
</tr>
<tr>
<td>› Absence of a fully integrated EHR/EMR environment in which to practice/Lack of use of EMR/EHR in clinical settings</td>
<td>› Lack of consultation between provinces and faculties in developing e-health systems</td>
</tr>
<tr>
<td>› Disinterest of students</td>
<td></td>
</tr>
<tr>
<td>› Internal competition/politics around resources, curriculum</td>
<td></td>
</tr>
<tr>
<td>› Lack of awareness of the role that other professionals play in developing e-health (librarians, learning strategists, educational technologists)</td>
<td></td>
</tr>
<tr>
<td>› IT systems/inadequate user-driven and user-oriented system designs</td>
<td></td>
</tr>
<tr>
<td>› Absence of customizable online tools for teaching about e-health, and lack of experience/knowledge of how to navigate tools that are available</td>
<td></td>
</tr>
</tbody>
</table>

Source: AFMC Environmental Scan Online Survey, 2012
Curriculum Implementation, Indicators and Measures

Key findings:

› In the majority of faculties, e-health is covered in the undergraduate curriculum, and a majority indicate that curriculum mapping tools are available to identify curricular components related to e-health. In most faculties where e-health is present in the curriculum, it is integrated into the rest of the curriculum; in other words, it is embedded within other topic areas, although standalone sessions or courses were available in a few faculties (although usually very limited).

› While about half of faculties have their curriculum objectives on e-health aligned to a national framework or standard (most often the CanMEDS Physician Competency Framework), the assessment of these objectives is quite variable, and in a few cases key informants note there is little or no assessment.

4.1 Curriculum Requirements

Based on key informant interviews, e-health is covered in the undergraduate curriculum in the majority of faculties of medicine. Of these faculties, most indicate that e-health is embedded or integrated across the medical curriculum, rather than there being a standalone course. A few respondents note that their faculties offer a standalone session, module, or course in addition to e-health being embedded across the curriculum. There is also evidence that faculty have access to curriculum mapping tools to be able to identify components related to e-health in the curriculum; two-thirds of faculties affirm that they have these tools. However, a few respondents qualify that while mapping tools may be available, their quality is limited, or the presence of e-health within their faculty’s curriculum may be too minimal for this to be relevant.

Table 4.1: E-health Curriculum

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Number of Faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Is e-health covered in your curriculum?</td>
<td>11</td>
</tr>
<tr>
<td>Do you have curriculum mapping tools to allow you to identify curricular components related to e-health?</td>
<td>11</td>
</tr>
</tbody>
</table>

* Faculties for which there was no information or conflicting information.
Source: Key informant interviews
Interviewees say that topics considered to be part of curriculum on e-health (or that respondents identify as being covered in curriculum even if e-health is not covered in a formal sense), include:

› Patient physician communication and professionalism, privacy, confidentiality, ethics and rules of accessing patient records;
› Information literacy, information management, searching for information, web and library databases, critical appraisal and evidence-based medicine;
› Specific instruction on local EMR/EHR or similar system;
› Different types of technologies and records used (EMR, EHR and similar);
› E-health in other specific applications, such as use in rural areas;
› Using mobile devices;
› Medical imaging, PACS;
› Tele-health; and
› Social media for use in discussion and information sharing.

Examples of specific courses and other student learning opportunities offered at Canadian medical faculties that were mentioned by survey respondents from selected faculties are listed below.

Table 4.2: Examples of Courses and Other Student Learning Opportunities that Address E-health at Canada’s Medical Faculties

<table>
<thead>
<tr>
<th>Institution</th>
<th>Courses and Other Student Learning Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie University</td>
<td>› Professional Competencies II course, Undergraduate Medical Education</td>
</tr>
<tr>
<td>McMaster University</td>
<td>› E-health internships</td>
</tr>
</tbody>
</table>
| University of Western Ontario      | › Yearly lectures to the anesthesia department on e-health  
|                                    | › Web-conferencing to bring rural students into Academic Half Day sessions in 3rd year clerkship  
|                                    | › Integration, Consolidation & Enrichment (ICE) - Health Informatics (year 4 medical curriculum)  |
| University of Toronto             | › Art and Science of Clinical Medicine (I and II)  
|                                    | › Transition to Clerkship                       |
| University of Saskatchewan        | › Professional Sills courses Year I and III      |
| Université Laval                  | › Internship course of Social and Preventive Medicine (Faculty of Medicine)  |
| University of BC                  | › IHHS302: Introduction to Health Informatics for Life Sciences Students |
| University of Alberta             | › Health Information Literacy                    |
| University of Manitoba            | › UGME Year 1 Block 1, Introduction to Clerkship |

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### 4.2 Assessment

Two in three survey respondents (66 per cent) are aware of curriculum objectives in their institutions’ programs related to e-health. Twenty per cent are not aware of any such objectives, and a further 14 per cent are not sure. According to interviewees, almost half of medical faculties have specific curriculum objectives related to e-health.

Among survey respondents who are aware of curriculum objectives (n=23), about three quarters (74 per cent) say these objectives are based on the CanMEDS Physician Competency Framework, and a further quarter (26 per cent) says that the CanMEDS-Family Medicine Undergraduate Perspective (College of Family Physicians of Canada) is the basis for their objectives. Local program objectives are the basis according to 26 per cent of respondents. Fewer say that the Royal College of Physicians and Surgeons of Canada guides their curriculum objectives (17 per cent). One respondent provided a response that was not listed: the COACH competency framework. Nine per cent are not sure what source their objectives are based on.
Table 4.3: Curriculum Objectives

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Number of Faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you aware of specific curriculum objectives or outcomes at your school related to e-health?</td>
<td>Yes: 7, No: 6, Unsure*: 4</td>
</tr>
</tbody>
</table>

* Faculties for which there was no information or conflicting information.  
Source: AFMC Environmental Scan Key Informant Interviews, 2012

About a quarter of institutions interviewed who say they have specific curriculum objectives also say they have their objectives mapped to either the Medical Council of Canada Objectives for the Qualifying Examination or the Royal College CanMEDS Physician Competency Framework. Several informants indicate their faculty is in the process of aligning their objectives with these frameworks, once curriculum renewal changes are made, but a few interviewees indicated that the standards are not useful to the undergraduate context, or not specific enough to e-health. Further, some interviewees pointed out that assessment related to these objectives and outcomes is variable. Some indicate there being no or very little assessment, while a few respondents are able to identify multiple tools that are used to assess students, including multiple choice exam questions, projects, written papers, observations, clinical examinations, self-assessment, and formative assessment during learning exercises.
Tools and Resources

Key findings:

Survey respondents and key informants identified a variety of tools and resources for both students and faculty learning and teaching on e-health, including a number of e-learning resources. About half of faculties use electronic medical records (EMR), electronic health records (EHR) or similar systems as teaching tools in their faculty, while students in almost all faculties have exposure to these systems at some point during their medical education, typically in a clinical or hospital setting. Resources for faculty development on the topic of e-health include peer-to-peer methods, conferences/workshops and online tools and supports.

5.1 Teaching/Learning Tools

The majority of survey respondents were able to identify tools that are available for teaching and learning about e-health. General tools and resources that were identified include: access to local health systems or some type of e-health system for teaching (45 per cent); online modules or integrated online learning about e-health (40 per cent); courses, seminars, workshops, sessions and conferences (30 per cent); and 55 per cent named some other type of tool (examples listed below). Only ten per cent of respondents were unable to think of any specific tool for teaching/learning about e-health.

Interviewees from about half of the 17 faculties also demonstrated awareness of learning resources related to e-health, including some e-learning resources. Some interview respondents acknowledge not being aware of any resources specifically having to do with e-health, but are of the opinion that some resources and tools already used could be modified to touch on e-health – for instance, virtual patients and web streaming tools that aren’t currently being used to address e-health could be modified to incorporate this aspect.

Table 5.1: Teaching/Learning Tools

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Number of Faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you aware of any learning resources used within the faculty to support medical education curriculum on e-health?</td>
<td>Yes: 7, No: 6, Unsure*: 4</td>
</tr>
<tr>
<td>Are you aware of any e-learning resources used within the faculty to support medical education curriculum on e-health?</td>
<td>Yes: 9, No: 7, Unsure*: 1</td>
</tr>
</tbody>
</table>

* Faculties for which there was no information or conflicting information.
Source: AFMC Environmental Scan Key Informant Interviews, 2012
Specific examples of tools and resources identified by survey respondents and key informants for teaching and learning about e-health are summarized in Table 5.2 below.

Table 5.2: Resources for Learners Related to E-health

<table>
<thead>
<tr>
<th>E-learning Resources</th>
<th>Other Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>› Podcasts on Canadian EMR: <a href="http://www.canadianemr.ca">www.canadianemr.ca</a></td>
<td>› Orientation modules on how to use EHR/EMR or health-system specific software, practice sessions, introductory technology workshops</td>
</tr>
<tr>
<td>› Social networking for sharing knowledge and decision support</td>
<td>› Case studies that address e-health issues or that incorporate an EHR/EMR</td>
</tr>
<tr>
<td>› A wiki for students to reflect on their medical encounters</td>
<td>› Modules on various topics: health information literacy, critical appraisal, personal information management, shared information management, clinical physician support, electronic communications, privacy, confidentiality, security</td>
</tr>
<tr>
<td>› Health Informatics Forum Massive Open Online Course (MOOC) <a href="http://www.healthinformaticsforum.com/profiles/blogs/health-informatics-forum-massively-open-online-course-mooc">http://www.healthinformaticsforum.com/profiles/blogs/health-informatics-forum-massively-open-online-course-mooc</a></td>
<td>› Biomedical informatics textbooks, such as <em>Guide to Health Informatics</em> by Enrico Coiera and <em>Medical Informatics: Knowledge Management and Data Mining in Biomedicine</em> (Integrated Series in Information Systems) by Hsinchun Chen, Sherrilynne S. Fuller, Carol Friedman and William Hersh</td>
</tr>
<tr>
<td>› Journal articles available online through the Journal of Medical Informatics and the Journal of Medical Internet Research</td>
<td>› Patient simulators</td>
</tr>
<tr>
<td>› Canadian Healthcare Education Commons</td>
<td></td>
</tr>
<tr>
<td>› Visual Dx, a web-based clinical decision support system</td>
<td></td>
</tr>
</tbody>
</table>

Source: AFMC Environmental Scan Online Survey and Key Informant Interviews, 2012

5.2 Faculty Professional Development

Almost all survey respondents identified some type of specific resources dedicated to faculty development on the topic of e-health. The majority of these mentioned were workshops, sessions, seminars, conferences, etc. (56 per cent). Three in ten identified online modules or integrated online learning (30 per cent), 28 per cent mentioned access to local e-health systems; and 56 per cent noted different kinds of resources. Just 11 per cent were not able to identify any faculty development resources. Table 5.3 provides examples of some specific faculty development resources.
In key informant interviews, representatives from at least half of the faculties identified e-health related professional development activities. Respondents from nine faculties identify some professional development opportunities, although a few qualify that opportunities are limited. Although each of these were infrequently cited, examples of types of professional development opportunities offered formally by faculties include: peer-to-peer sharing through discussions, email, blogs, webinars; funding for conferences; training for EHR; continuing medical education certificate program in informatics; and workshops on using technology (RSS feeds, mobile devices, electronic databases). A few respondents who said professional development opportunities are not available in their faculty say there are opportunities available elsewhere (e.g., at a hospital, through a professional network, offered informally by colleagues).
Challenges and Limitations

Challenges and limitations of the key informant interviews and survey should be noted. First, due to the requirement for approval from university research ethics boards and the summer vacation period, the completion of key informant interviews was extended beyond the original study schedule. Participation in the research, however, was high, though a small number of respondents delegated the interview to another member of their staff. A significant challenge was completing the interviews within the time allotted. Time constraints during the interview and the number of questions of interest led to cursory information being gathered for some items from some faculties. In addition, it should be noted that during the analysis, discrepancies were noted, at times, between the responses of interview respondents from the same faculty. Thus, for some questions at the faculty level (e.g., faculty practices or policies), a definitive response could not be assigned.

The sample size for the survey (n=35) limits the types of analyses that can be conducted (i.e., the sample size does not support bivariate analyses). In addition, it should be noted that not all faculties of medicine are represented in the survey results (four faculties are not included in these results, either because sample was not received for these institutions, or respondents from these institutions did not respond).
Literature Review

6.1 Literature Search Strategy

Sources: Peer-reviewed articles, government websites, grey literature, and colleges and professional associations

Inclusion criteria: Canadian, outside of Canada, grey literature

Exclusion: Nursing, Pharmaceutical, studies older than 2006, e-learning not including e-health

**First pass**: based on the search terms

Key term 1: e-health, ehealth, health informatics, medical informatics, electronic health record, electronic health records systems, electronic medical records, information and communication technology, or clinical informatics, and

Key term 2: education, student, residents, undergraduate, postgraduate, professional development, curriculum, education, health education, medical education.

*Databases searched*: PubMed, Mendeley, Medline, Medscape and Google Scholar

**Second pass**: identify common authors from the first pass and search on their parallel work, and surveyed the e-health community on CHEC-CESC and the project Leadership Committee for additional sources.

**Third pass**: base on additional search terms:

Medical Student, computerized patient record, health records, personal (MeSH term), social media (communication technology), telemedicine, fellow, curricula

*Databases searched*: CINAHL (nursing), Handbook of Medical Informatics, Informatics Review

6.2 Literature


Amin, K., and A. Chandrasena. 2012. The uses of the iPhone for the plastic surgeon: Friend or foe?. Plastic & Reconstructive Surgery 129 (2) (Feb): 408e-9e.


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4 ibid

5 ibid


Collier, Roger. Memorial and western are leaders in incorporating technology in med schools. *CMAJ* 182, (7) (April 20, 2010), [http://www.cmaj.ca/content/182/7/E289.full](http://www.cmaj.ca/content/182/7/E289.full).


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*ibid*


Kloda, Lorie A. Health information literacy in Canadian Medical curricula: An opportunity for librarians? *Journal of Hospital Librarianship* 8, (3) (June 2008), [http://mcgill.academia.edu/LorieKloda/Papers/78209/Health_information_literacy_in_Canadian_medical_curricula_An_opportunity_for_librarians](http://mcgill.academia.edu/LorieKloda/Papers/78209/Health_information_literacy_in_Canadian_medical_curricula_An_opportunity_for_librarians).


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10 ibid

11 ibid


Schwartz, B. 2011. The introduction of a medical informatics course into a medical school curriculum. Medical Reference Services Quarterly 30, (1).12


12 ibid


Young Park, Sun, So Young Lee, and Yunan Chen. The effects of EMR deployment on doctors’ work practices: A qualitative study in the emergency department of a teaching hospital. *International Journal of Medical Informatics* 81, (3) (March 2012),

Zvárová, Jana, Štěpán Svačina, Taťjana Dostálová, and et al. 2011. Biomedical informatics education at charles university in prague for undergraduate and doctoral degree studies. *EJBI* 7, (2),
6.3 Other Pedagogical Resources

Virtual Patient Cases Related to e-Health

Tags: Medical students, PGY1 in Family Medicine, Family Medicine, outpatient case, neuropathy, manage chronic medical conditions

Tags: early prenatal care, primarily late stage medical students, Clerks, Residents, common screening measures

Tags: myocardial infarction, TTP as a treatment-related complication, in internal medicine
Competencies and Objectives

A wiki has been created on the Canadian Healthcare Education Commons (CHEC-CESC) where medical faculties and other health professions can continue to contribute and share competencies and objectives related to e-Health. To access the wiki, please request membership to the AFMC - Infoway Physician in Training e-Health Curriculum & e-Learning Community on CHEC-CESC.

7.1 Canadian Faculties of Medicine

Methods
Members of the AFMC - Infoway Physician in Training e-Health Curriculum & e-Learning Leadership Committee were asked to provide competencies or objectives related to e-Health that are being used at their faculty of medicine.

Dalhousie University

University of Alberta
Competencies from the current undergraduate medical education course syllabus. http://homer.med.ualberta.ca/clint/hirex.asp?DNOTIFY=1161@hilhirex

University of British Colombia

Evaluating Electronic Medical Record Competency Skills Using Objective Structural Clinical Examinations (EMR OSCE) http://ehealth.med.ubc.ca/projects/emr-osce/

University of Manitoba

7.2 Medical Council of Canada’s Objectives for the Qualifying Exam

Methods
A search was conducted of the Medical Council of Canada’s Objectives for the Qualifying Exam (for the M.D. licensure).
Objectives Related to e-Health

121-4 CONFIDENTIALITY:
http://apps.mcc.ca/Objectives_Online/objectives.pl?lang=english&role=expert&id=121-4

CanMEDS Competencies Related to e-Health

COMMUNICATOR:
http://apps.mcc.ca/Objectives_Online/objectives.pl?lang=english&role=communicator

MANAGER:
http://apps.mcc.ca/Objectives_Online/objectives.pl?lang=english&role=manager

7.3 Other Health Professions and Associations

Canadian Association of Schools of Nursing

Canadian Association of Schools of Nursing. (2012) Nursing Informatics Entry-To-Practice Competencies for Registered Nurses.

Canada’s Health Informatics Association

Accreditation Standards

Faculties of medicine in Canada and the United States providing undergraduate medical education programs must meet the accreditation standards set out in Functions and Structure of a Medical School: Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree, by the Liaison Committee on Medical Education (LCME), May 2012. http://www.lcme.org/functions.pdf

A review of the standards revealed several which are relevant to e-health.

Educational Program for the M.D. Degree

Structure

1. General Design

ED-7. The curriculum of a medical education program must include current concepts in the basic and clinical sciences, including therapy and technology, changes in the understanding of disease, and the effects of social needs and demands on care.

2. Content

ED-23. A medical education program must include instruction in medical ethics and human values and require its medical students to exhibit scrupulous ethical principles in caring for patients and in relating to patients' families and to others involved in patient care.

The medical education program should ensure that medical students receive instruction in appropriate medical ethics, human values, and communication skills before engaging in patient care activities. As students take on increasingly more active roles in patient care during their progression through the curriculum, adherence to ethical principles should be observed, assessed, and reinforced through formal instructional efforts.

In medical student-patient interactions, there should be a means for identifying possible breaches of ethics in patient care, either through faculty or resident observation of the encounter, patient reporting, or some other appropriate method.

The phrase "scrupulous ethical principles" implies characteristics that include honesty, integrity, maintenance of confidentiality, and respect for patients, patients' families, other students, and other health professionals. The program's educational objectives may identify additional dimensions of ethical behavior to be exhibited in patient care settings.
Educational Resources

Library Services and Information Resources

ER-13. An institution that provides a medical education program must provide access to well-maintained information technology resources sufficient in scope and expertise to support its educational and other missions.

ER-14. The information technology staff serving an institution that provides a medical education program must be responsive to the needs of the medical students, faculty, and others associated with the institution.

The information services staff should facilitate the timely access of medical students, faculty, and others associated with the institution at each instructional site to information resources required by the curriculum and other missions of the institution and have sufficient expertise to facilitate their use.
Glossary of Terms

DEFINITIONS PROVIDED BY CANADA HEALTH INFOWAY

**Electronic Medical Record:** a partial health record under the custodianship of a health care provider(s) that holds a portion of the relevant health information about a person over their lifetime. This is often described as a provider-centric or health organization-centric health record of a person.

**Electronic Health Record:** a complete health record under the custodianship of a health care provider(s) that holds all relevant health information about a person over their lifetime. This is often described as a person-centric health record, which can used by many approved health care providers or health care organizations.

**Personal Health Record:** a complete or partial health record under the custodianship of a person(s) (e.g. a patient or family member) that holds all or a portion of the relevant health information about that person over their lifetime. This is also a person-centric health record.

**Tele-health Service:** The use of information and communications technologies (ICTs), to deliver health services and transmit health information over both long and short distances. Tele-health helps eliminate distance barriers and improve equitable access to services that often would otherwise not be available in remote and rural communities. It is about transmitting voice, data, images, and information rather than moving patients or health practitioners and educators. It encompasses treatment, preventive and curative aspects of healthcare services.

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14 Canada Health Infoway, SC Standards Team. HL7 v3 pan-Canadian Messaging Standards Master Glossary: March 16, 2009. R02.04.00. Note: This document forms part of a standard that was developed through the EHR Standards Collaboration.
Appendix 1: Interview Guide

Introduction

In 2011, The Association of Faculties of Medicine of Canada (AFMC) in partnership with Canada Health Infoway launched the AFMC-Infoway Physician in Training: e-Health Curriculum and e-Learning Project. The goal of the project is to improve clinical practice and patient care by supporting clinicians in their adoption and use of electronic health record systems. The initiative focuses on the integration of e-health including the integration of information and communication technology and informatics curriculum in faculties of medicine across Canada. The environmental scan is one initiative of the project. The environmental scan includes a literature review; key informant interviews with undergraduate deans of medical education and one e-health or informatics expert at each of the faculties of medicine; and an online survey of Informaticians, faculty members who are integrating e-health in their programs, staff/faculty at the undergraduate curriculum office, and other staff members such as Informatics Coordinators at the 17 faculties of medicine in Canada. The environmental scan is designed to help identify medical curriculum, core competencies, policies and other activities related to e-health in undergraduate medical education in Canadian faculties of medicine. You are being contacted for a key informant interview. This interview will take you approximately 30 minutes to complete.

Lexicon

E-health is the use of information and communication technology and innovation to improve or enable health and health care services. E-Health is different from e-learning, which is concerned with the use of Internet-based technologies for educational purposes. It is worth noting that e-health could make use of e-learning, for instance patient education, and e-learning can include aspects of e-health, such as monitoring stress and other learner welfare factors.

Collection Policy

Information gathered from the Interviews and survey will never be matched to individual names or addresses. The interview questions and survey have received ethics approval from <institution research ethics board>. Data is being gathered using a secure online survey tool, hosted on a Canadian-based server. Your information will be kept private and confidential and will not be shared with third parties outside of the AFMC research team. Analysis and publication of survey results will be at the aggregate level only. Please note: Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time.
If you have any questions, please contact Catherine Peirce at: cpeirce@afmc.ca or by phone at 613-730-0687 ext. 239.

General - Defining e-health

1. What are the key terms related to e-health that are used in your faculty (e.g., medical informatics, clinical informatics, e-health, Information and communication technology, etc)?

2. What topics are considered to be a part of e-health in your curriculum? [e.g., EMR, EHRs, coding, imaging, ethics, confidentiality, etc]

3. What factors are driving the development of e-health in your faculty? [e.g. curriculum objectives, the passions and interests of your teaching core, interest from students, other factors]

4. What would you suggest are the significant e-health trends that will influence medical education curricula in the next five years?

Resources

5. Do you have an e-health and/or informatics department at your faculty? If so, how many faculty members are involved in the department or departments?

6. Are there key faculty members that are designated as leaders for e-health in your curriculum? If so, what are their titles and roles?

7. Is there a committee or committees that address e-Health at your faculty? What is the mandate of the committee or committees?

8. Do you offer any faculty development opportunities or special events in the area of e-health or informatics? If yes, please provide examples.

9. Are you aware of any learning resources used within the faculty to support medical education curriculum on e-health? If so, could you provide examples?

   > Are you aware of any e-learning resources used within the faculty to support medical education curricula on e-health (e.g., test bank questions, electronic learning modules, online tutorials, virtual patients, etc)?

10. Are there funding envelopes dedicated to e-health at your faculty? Please explain.

11. At your faculty, what would be the most useful resources for improving the quality or quantity of e-health teaching and learning in medical education over the next five years? [e.g. Online modules, faculty experts, technical experts, access to local health systems, dedicated e-health systems for teaching, conferences and seminars, video and other training materials, etc.]
12. Over the next five years, what in your mind will be impediments (locally or nationally) to ensuring that learners graduate prepared to practice in a technology-enabled environment?

Information & Communication Technologies and Digital Health Records

13. Do you use EMR, EHR or PACS systems in your school as teaching tools?

14. Do your students have other access to EMR, EHR or PACS software or systems technology for learning purposes? If yes, how do they have access to the technology? [e.g. technology is provided at the faculty, access is provided at an affiliated hospital, students have access to technology during clinical electives, etc...]

15. Do you have a relationship with your regional health authority to create a collaborative approach? Please explain.

16. Has the accreditation process influenced your school’s decisions regarding the inclusion of EMR, EHR and e-health in the curriculum?

Curriculum Implementation

17. Is e-health covered in your school’s curriculum? If it is, then where and how is it implemented? [e.g., standalone course, integrated (horizontally embedded), other]

18. Do you have curriculum mapping tools to allow you to identify curricular components related to e-health?

19. What role does accreditation play in driving the presence of e-health in your curriculum?

Indicators and Measurements

20. Are you aware of specific curriculum objectives or outcomes related to e-Health? If so, can you provide examples, or a link or other source that lists them?

21. If you do have e-health curriculum objectives or outcomes have they been mapped to the Medical Council of Canada (MCC) Objectives for the Qualifying Examination or the Royal College of Physician and Surgeons of Canada, CanMEDS Physician Competency Framework?
   - How are students assessed and how does this relate to the objectives and outcomes?
Faculty and Staff involved in e-health Initiatives

22. With your permission, AFMC would like to distribute a survey on e-health to a select group of staff and faculty members within your faculty who have contributed to the advancement of the teaching and learning of e-health. If you agree, could you please identify, and provide contact information for five to ten members of your faculty (staff or faculty)?

Conclusion

23. Do you have any additional comments?

Thank you for your participation
Appendix 2: Online Survey

Introduction
In 2011, The Association of Faculties of Medicine of Canada (AFMC) in partnership with Canada Health Infoway launched the Physician in Training: e-Health Curriculum and e-Learning Initiative. The goal of the project is to improve clinical practice and patient care by supporting clinicians in their adoption and use of electronic health record systems. The initiative focuses on the integration of e-health including the integration of information and communication technology and informatics curriculum in faculties of medicine across Canada. This survey is designed to help identify medical curriculum, core competencies, policies and other activities related to e-health in undergraduate medical education in Canadian faculties of medicine.

This survey will take you approximately 15-20 minutes to complete. You do not have to complete the survey in one session. Each answer will be automatically saved. You can exit and return to complete the survey at a later time.

Lexicon
e-health is the use of information and communication technology and innovation to improve or enable health and health care services. E-Health is different from e-learning, which is concerned with the use of Internet-based technologies for educational purposes. It is worth noting that e-health could make use of e-learning, for instance patient education, and e-learning can include aspects of e-health, such as monitoring stress and other learner welfare factors.

Collection Policy
This survey is being distributed to informaticians, faculty members who are integrating e-health in their programs, staff/faculty at the undergraduate curriculum office, and other staff members such as Informatics Coordinators at the 17 faculties of medicine in Canada. Data files generated from completed questionnaires will never be matched to individual names or addresses. The survey has received ethics approval from the xxx. Data is being gathered using a secure online survey tool, hosted on a Canadian-based server. Your information will be kept private and confidential for a minimum of ten years and will not be shared with third parties unless release is required by law. Representatives of the sponsoring company, Association of Faculties of Medicine of Canada, representatives of the xxx. Analysis and publication of survey results will be at the aggregate level only.

Please note: Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time.

If you have any questions about the study, please contact Irving Gold at: igold@afmc.ca or by phone at 613-730-0687 ext. 236.
If you have any difficulty accessing the online version of the survey, please contact EKOS Research, who is administering the survey at ehealth@ekos.com or by phone at 866-211-8881.

**Questionnaire**

1. What are the key terms related to e-health used in your faculty?
   (Select one or more of the options below)
   - [ ] e-health
   - [ ] Medical informatics
   - [ ] Clinical informatics
   - [ ] Health informatics
   - [ ] Information literacy
   - [ ] Other, please specify: __________

   You have been identified as a member of the faculty of medicine who has contributed to the advancement of the teaching and learning of e-health at your faculty.

2. Please indicate how you have contributed to e-health at your faculty. In the LAST TWO YEARS I have...

<table>
<thead>
<tr>
<th>a. participated in faculty development training activities (e.g. presentation, workshop, course), as a:</th>
<th>Leader</th>
<th>Participant</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. contributed to the development of enabling policies, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. contributed to the development of learning resources, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. developed e-learning resources related to e-health, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. contributed to curriculum development or renewal, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. developed innovative education programs, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. implemented education programs, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. used e-learning resources related to e-health to support teaching, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Evaluated the usability, validity, and/or knowledge transfer of learning resources related to e-health, as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Evaluated the usability, validity, and/or knowledge transfer of competencies related to e-health as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. Contributed to medical education training opportunities specifically related to EMR, EHR, or similar tools as a:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Please provide the names of any undergraduate courses or student learning opportunities you are aware of which directly or indirectly address e-health in the LAST TWO YEARS.
4. Have you participated in any committee-based activities (locally, nationally or internationally) related to e-health in the LAST TWO YEARS?

☐ Yes
☐ No

4. a) If yes, please provide the name(s) of any committee(s) including the host organization (s) you are involved with which directly or indirectly address e-health in the LAST TWO YEARS.

5. How important do you feel academic activities and scholarly research, related to e-health, are at your institution?

☐ Very Important
☐ Important
☐ Neutral
☐ Somewhat Important
☐ Not at all Important
☐ Not Sure

6. To what extent do you agree/ disagree with the following statement? I refer to myself as an Informatician:

☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree
☐ N/A

7. To what extent do you agree/ disagree with the following statement? I refer to myself as an e-health specialist:

☐ Strongly Agree
☐ Agree
☐ Undecided
☐ Disagree
☐ Strongly Disagree
8. If you have participated in any projects related to e-health in the LAST TWO YEARS that have not been captured in the questions above, please specify: (e.g. mobile phone-a-librarian project)

9. Are you aware of curriculum objectives related to e-health?
   - Yes
   - No
   - Not Sure

   IF YES
   9 a) To your knowledge are these objectives based one or more of the following:
   - CanMEDS Physician Competency Framework
   - CanMEDS-FMU (College of Family Physician of Canada)
   - Medical School Objectives
   - Royal College of Physician and Surgeons of Canada
   - Not Sure
   - Other, please specify:

10. At your faculty, over the next FIVE years, what would be the most important resources for ensuring that learners graduate prepared to practice in a technology-enabled environment?

<table>
<thead>
<tr>
<th>Dedication</th>
<th>Not At All Important</th>
<th>Somewhat Important</th>
<th>Neutral</th>
<th>Important</th>
<th>Very Important</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated e-health systems for teaching</td>
<td>Faculty experts</td>
<td>Online modules</td>
<td>Video</td>
<td>Technical experts</td>
<td>Access to local health system</td>
<td>Conferences and seminars</td>
</tr>
</tbody>
</table>

11. At your faculty, over the next FIVE years, what in your mind will be impediments to ensuring that learners graduate prepared to practice in a technology-enabled environment?

12. At a national level, over the next FIVE years, what in your mind will be impediments to ensuring that learners graduate prepared to practice in a technology-enabled environment?
13. To the best of your knowledge, does your faculty use any of the following e-health software or systems as teaching tools?

- Electronic Medical Records
- Electronic Health Records
- Other, please specify: ________

14. To the best of your knowledge, does your faculty have specific educational opportunities for learners related to digital health records (e.g. EMR, EHR, personal health record systems)?

- Yes
- No
- Not Sure

15. To the best of your knowledge, does your faculty have specific curriculum objectives for learner related to digital health records (e.g. EMR, EMR, personal health record systems)?

- Yes
- No
- Not Sure

16. To what extent do you agree/disagree with the following statement? Learners are ready to practice in a technology-enabled environment when they graduate.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

17. Please identify three specific resources for FACULTY DEVELOPMENT related to e-health in undergraduate medical education. (e.g. Titles/name/type of: online modules, access to local health systems, dedicated e-health systems for teaching, conferences and seminars, video and other training materials, etc.)

[three open text boxes]
18. Please identify three specific resources for LEARNERS related to e-health in undergraduate medical education. (e.g. Titles/name/type of: online modules, access to local health systems, dedicated e-health systems for teaching, conferences and seminars, video and other training materials, etc.)

[x three open text boxes]

19. Additional Comments:

[x three open text boxes]

1. Please indicate your Gender:
   - Female
   - Male
   - Other
   - Prefer Not to Answer

2. Please specify your age range:
   - Under 25
   - 25-34
   - 35-44
   - 45-54
   - 55-64
   - 65 or Above
   - Prefer Not to Answer

3. Please indicate your PRIMARY University affiliation.
   [drop down menu will appear with 17 faculties of medicine]

4. Faculty: 

5. Department: 

6. Position: 
   (select all that apply)
Assistant Professor (Tenured Track)
☑ Assistant Professor (Non-Tenured Track)
☑ Associate Professor (Tenured Track)
☑ Associate Professor (Non-Tenured Track)
☑ Full Professor
☑ Staff (Non-faculty), please specify:
☑ Other, please specify: ____________

7. Please indicate all of the credentials you hold:
☑ MD
☑ MSc
☑ MEd
☑ DDS
☑ MA
☑ MPH
☑ PhD
☑ Other, please specify: ____________

8. Do you have any teaching responsibilities (as per your job description)?
☐ Yes
☐ No
☐ Not Sure