Study of Digital Health in Canadian Schools of Nursing:

Curricular Content and Nurse Educator Capacity

A Report of the Findings — 2018

Canada Health Infoway
Inforoute Santé du Canada

CASN ACESI
Canadian Association of Schools of Nursing
Association canadienne des écoles de sciences infirmières

Acknowledgements:

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ABSTRACT

Canada's health sector is increasingly relying on the adoption and successful use of information and communication technologies (ICTs) in all care settings. Therefore, care providers, such as registered nurses, must possess the required knowledge and skills to effectively and safely utilize these tools. As the largest group of care providers in Canada, development of digital health competencies among practicing and future registered nurses is of the utmost priority. These core competencies are not isolated skill sets rather they are essential to the provision of safe, quality patient care in today's technology intensive clinical settings. To date, the integration of digital health/informatics content exists in some, but not all undergraduate nursing curricula within schools of nursing across Canada. Prior to this study, the extent to which undergraduate and graduate nursing curricula include digital health knowledge and skills was largely unknown. The purposes of this study were to (1) describe the current state of integration of digital health content in nursing education and curricula as self-reported by Canadian nurse administrators and educators, (2) understand needs of nurse educators in promoting their capacity and future development of digital health integration, (3) identify teaching and learning exemplars of digital health integration in nursing curricula, and (4) identify recommendations for advancing the development of informatics and digital health in nursing education. A mixed methods approach was used to answer the research questions including: a survey of nursing school administrators (n=35) and nurse educators (n=360), ten telephone interviews, and one focus group meeting. Findings highlight the need for additional digital health/informatics awareness and education among both educators and administrators in responding to shifting core nursing competencies. Further there appears to be a disconnect between the views of school of nursing administrators and nurse educators as their perceptions vary in respect to educator capacity and the extent of digital health content integration. To this end, recommendations are linked to a need for ongoing educator capacity building, a call for improved administrative supports and concrete strategies to guide future digital health curriculum integration within Canadian schools of nursing.

BACKGROUND AND SIGNIFICANCE

Canada's health sector has focused on the adoption and use of information and communication technologies (ICTs) in all care settings. The design, implementation and use of ICTs (referred to broadly as *digital health* within the context of this proposal) is considered fundamental knowledge among all health professions; to varying degrees, nursing students and practicing nurses are using ICTs to support care delivery. However, the extent of undergraduate and graduate nursing curricula integrating digital health knowledge / skill as foundational to the education of professional practice for nurses is unknown. To date the integration of digital health content exists in some, but not all undergraduate nursing curricula within schools of nursing across Canada.

Results of a national Canadian study conducted in 2003 indicated less than 30% of schools of nursing reported having digital health content integrated into their basic entry to practice programs, either theoretical or applied (Nagle & Clarke, 2004). Since then, a number of schools of nursing have incorporated digital health content into their basic curricula, while others offer elective courses at the graduate and undergraduate level, and the remainder provide little to no content in any of their nursing programs. However, anecdotal evidence suggests a continued lack of digital health content integration into nursing curricula suggesting that the status remains relatively the same as reported nearly 15 years ago. Additionally, there is a limited number of nurse educators who have the requisite knowledge, skills and confidence to address students' learning needs associated with digital health.

In 2011, the development of nursing informatics (i.e., digital health) competencies for new graduates was initiated with the support of the Canadian Association of Schools of Nursing (CASN) and funding from Canada Health Infoway (Infoway). Rationale for this work included: 1) known limitation in the integration of informatics content in existing nursing curricula, 2) a need to establish entry-to-practice indicators reflecting skills and knowledge needed to work in technologically enabled practice environments, 3) a lack of shared understanding and consensus among educators on required informatics competencies for entry-level practice, and 4) a need to better prepare registered nurses to safely practice in technology rich environments. This work was completed in 2012 and CASN published national, consensus-based entry to practice informatics competencies for adoption by all Canadian Schools of Nursing (CASN, 2012). Additional details of the competency development activities have been described elsewhere (Nagle et al, 2014). In recognizing these competencies might present a challenge for nurse educators, a Nursing Informatics Teaching Toolkit was developed to support the integration of entry-to-practice informatics competencies into nursing curricula across Canada (CASN, 2013).

Efforts continue to disseminate and integrate the digital health / informatics competencies into the undergraduate curricula of Canadian schools of nursing. An initiative launched in the winter of 2015 included a mentorship and networking program whereby designated digital health

faculty peer leaders supported colleagues' digital health knowledge and skill development from coast to coast. Details of this work are further described at: http://www.casn.ca/2015/03/project-background-digital-health-nursing-faculty-peer-network/. This Digital Health Faculty Peer Network was designed to engage nurse educators in learning activities to develop their capacity for integrating informatics content into undergraduate nursing curricula. This network supported approximately 90 nursing faculty from 49 schools across the country. Within their local regions, peer leaders engaged in a wide variety of activities with their colleagues including: workshops, seminars, faculty meetings, webinars and the provision of more than 130 hours of mentoring. Additionally, peer leaders developed resources intended to support integration, including a whiteboard animation on the use of social media in practice (Available at: http://www.casn.ca/2016/03/whiteboard-animation-student-nurses-story-social-media-use/) and a reference document for the inclusion of content related to Consumer Health Solutions into nursing curricula (Available at: http://www.casn.ca/2016/04/consumer-health-solutions-resource/).

Nonetheless, the digital health knowledge of nurse educators and the extent of necessary content integration into undergraduate and graduate nursing education in Canadian schools of nursing remains poorly understood. There is some preliminary evidence suggesting the majority of nurse educators have not been responsive to a call to reframe nursing competence relative to digital health advances in practice settings. A 2017 national Canadian survey of practicing nurses found a minority of nurses were familiar with the CASN entry-to-practice informatics competencies for registered nurses and the Faculty Informatics Teaching Toolkit. In addition, findings indicated a lack of understanding about the importance of common terminologies and data standards (e.g., ICNP and C-HOBIC) (Canada Health Infoway, 2017). Survey findings also suggested ongoing difficulties in offering student nurses opportunities to develop basic entry-level informatics competencies: A majority of nurse educators are not using EHR training systems to support the teaching of these basic digital health skills and there was also uncertainty regarding future plans to acquire these essential resources. Half of the educator respondents reported student nurses learn EHR functionality during their clinical placements, not within schools of nursing. Current or planned use of the entry-to-practice digital health / informatics competencies in curricula was reported as largely unknown. These findings require additional exploration as this survey was primarily directed to graduate nurses in clinical practice settings with an unidentified number of nurse educator participants. Overall, the current study was warranted in order to identify the degree of uptake and impact of digital health / informatics teaching and learning development opportunities in Canadian nursing education. Furthermore the current study was deemed important as the landscape of digital health in Canada has significantly evolved since the last study of this nature more than 15 years ago; these changes are placing a more urgent demand to assist practicing nurses and future graduates in acquiring core informatics competency development.

The term "informatics" has been largely used in previous studies and publications in this area, but for the purposes of this study, the terms "informatics" and "digital health" are used together to denote the knowledge and skills associated with the understanding and use of *clinical* information and communication technologies in nursing education and practice. The use of technology (e.g., Blackboard, Moodle, PowerPoint) to support course delivery or facilitate teaching and learning in classroom and clinical settings was not the focus of this study.

Purposes of the Study

1. To describe the current state of Canadian nurse educator integration of digital health in nursing education and the current state of digital health content integration into nursing curricula.
2. To identify teaching and learning exemplars of digital health integration in nursing curricula.
3. To understand nurse educators' knowledge, experiences and needs in promoting/enhancing their development of digital health capacity now and in the future.
4. To identify recommendations for advancing development of informatics and digital health in nursing education.

Research Questions

1. What are Canadian nurse educators' self-reported knowledge and experiences in integrating digital health/informatics in nursing education?
2. How and where digital health/informatics is integrated in nursing education, as self-reported by nurse educators and nurse administrators in Canadian Schools of nursing?
3. What are some teaching and learning exemplars currently being used/applied to integrate digital health teaching practices and nursing curricula, as self-reported by nurse educators and administrators?
4. What factors impede or facilitate educators' capacity of informatics/digital health integration in nursing education in Canada?
5. What do nurse educators/administrators recommend to advance educators' capacity and ongoing development of digital health/informatics in nursing education?

METHODOLOGY AND APPROACH

Using a mixed methods approach, this study included the dissemination of two surveys, one focus group, and one-on-one telephone interviews.

Surveys

The nurse administrator survey explored perceptions of digital health capacity and content integration. Similar quantitative questions were posed within the educator survey with a key difference being a focus on the availability of leadership support.

The **Administrator Survey** (Appendix A) was directed to the Deans, Directors, and Chairs of Canadian schools of nursing and focused on the:

- use of the CASN resources;
- informatics/digital health knowledge;
- current informatics/digital health teaching and curricular integration;
- digital health supports provided to nurse educators; and,
- support for informatics/digital health curricular integration within their school of nursing.

The **Nurse Educator Survey** (Appendix B) was directed to individual nurse educators working in permanent full-time and contract full-time and part-time positions in Canadian schools of nursing, and focused on their:

- use of the CASN resources;
- informatics/digital health knowledge;
- current informatics/digital health teaching and curricular integration;
- confidence in requisite ability to teach basic digital health/informatics content;
- perceived administrative leadership support for continuing education in informatics/digital health;
- perceived value of informatics/digital health curricular integration; and,
- suggestions of future strategies to increase educator capacity and curricular integration within schools of nursing.

A panel of 10 digital health experts (researchers and educators) vetted each of the surveys for readability, clarity, comprehensiveness, and length to ascertain the face validity of each survey. This group was also asked to provide feedback on surveys once they were built into the online survey platform. Both surveys were available in French and English and hosted electronically via the Lime Survey platform provided by Canada Health Infoway. User testing of surveys was also completed with a group of Infoway staff prior to survey dissemination to test the quality of survey links and to identify any potential technical issues that participants might experience upon completing the surveys.

The Canadian Association of Schools of Nursing (CASN) assumed responsibility for disseminating surveys, primarily through email invitations that included an embedded link to either a nurse educator's or nurse administrator's survey. Surveys were anonymous and individual responses were stored on a secure server with access limited to the Infoway support staff who provided periodic data downloads to the research team to monitor response rates and in supporting ongoing data analysis.

In addition to surveys, all participants, including both educators and administrators, were offered opportunities to participate in one-on-one telephone interviews, a focus group interview, or both.

Interviews were offered in both, English and French languages, but all were completed in English. All survey participants were invited to participate in a telephone interview and/or focus group meetings. The one focus group meeting occurred during the CASN Educator Conference held in Montreal on May 29-30, 2018.

Telephone Interviews

The purpose of ***telephone interviews*** was to further describe factors that influence both digital health capacity building and content integration within their school's nursing curriculum (Appendix C). Interviewees provided consent prior to participating in these interviews.

Focus Group

Similarly, the ***focus group*** also offered insights to the current state and provided recommendations for the future development of nurse educators' capacity for integrating digital health into nursing curricula. Questions were developed to guide the focus group but participants also had the opportunity to offer additional perspectives (Appendix D). Participants provided consent for participation in the focus group. The focus group was discussion was documented by a CASN staff person with no attribution of contributions made by individual participants.

Sample

Prior to data collection, ethics approval was obtained from the Ethics and Research Board at the University of Alberta. Using a combination of convenience and snowball sampling approaches, the existing CASN database of schools of nursing and nurse educators was used to invite all CASN accredited schools of nursing to participate in the study (n=94). Additionally, the CASN educator database (n=2925) was used to invite educators to participate in the study. In the interest of encouraging participation beyond the CASN database, Canadian nurse educators were encouraged to share survey links with their colleagues. Each member of the research team also circulated survey links to their educator networks and colleagues within Canada. As of May 2018, the two surveys were available online in both French and English. At the end of June and September 2018, CASN sent email reminders to participate. Surveys remained open for 6 months. This lengthy data collection period was necessary to achieve a representative sample. An estimated sample size based on a population of 13,894 educators, at a confidence level of 95% and a margin of error of 5% showed a total of 374 respondents would be a representative sample.

A total of 12 individuals indicated their willingness to participate in a telephone interview and 10 interviews were ultimately completed between June and October, with no response from 2 individuals after repeated follow-up (see Appendix C for initial interview guide). Interviews lasted between 25-30 minutes Transcriptions were used for the purposes of analysis with no individual attribution of participants' comments. Interviews were offered in both, English and French languages, but all were completed in English.

Although focus groups in both French and English were planned in conjunction with the 2018 CASN Educator Conference held in Montreal at the end of May, only one focus group occurred with 10 participants. There was an insufficient number of participants for a focus group to be conducted in French. The majority of focus group participants were English speaking, nonetheless, a few of these participants were French-speaking.

DATA ANALYSIS

Survey data for both administrative and educator responses were separately coded, aggregated and analyzed. Descriptive statistical analysis (i.e. counts/percentages) was completed using SPSS V. 25.0 and discussed in this report. Further analysis for correlations and inferential statistics is in progress. Written comments provided in response to some of the survey questions were summarized and examined for further insights relevant to the survey data. A concurrent analysis of these comments served to support the refinement of questions posed during one-on-one interviews. For example, there was an attempt to explore specific details of digital health content integration during interviews when differences in perceptions were identified through comparing educators' and administrators' quantitative responses. Data from the telephone interviews and the focus group were transcribed and analyzed by two independent researchers to identify key themes. Similar to the quantitative analysis, this work is ongoing.

FINDINGS

This report includes preliminary findings from the two surveys, and the telephone and focus group interviews. Results from the administrator survey are presented first, followed by results from the educator survey along with an analysis of qualititative comments to some open-ended questions included in this survey. Focus group and telephone interviews results are also presented, followed by a discussion of overall findings and implications.

Nurse Administrator Survey

The respondents (n-35) to the nurse administrator survey included 17 deans, directors and chairs, 5 associate deans, academic; and an additional 13 individuals with a variety of administrative titles (e.g., program manager, coordinator, assistant dean). These individuals represented different schools of nursing while 4 schools had more than one administrative response to the survey. The administrative work of a majority was focused on the undergraduate nursing program (n=33), with 11 reporting engagement with a graduate program and 3 others with an interprofessional program. The administrator respondents included cross-country representation with 43% from Ontario, 40% from the Western region, 8.6% from the Atlantic region and another 8.6% from other parts of the country (e.g., Nunavut) as shown in Figure 1 below.

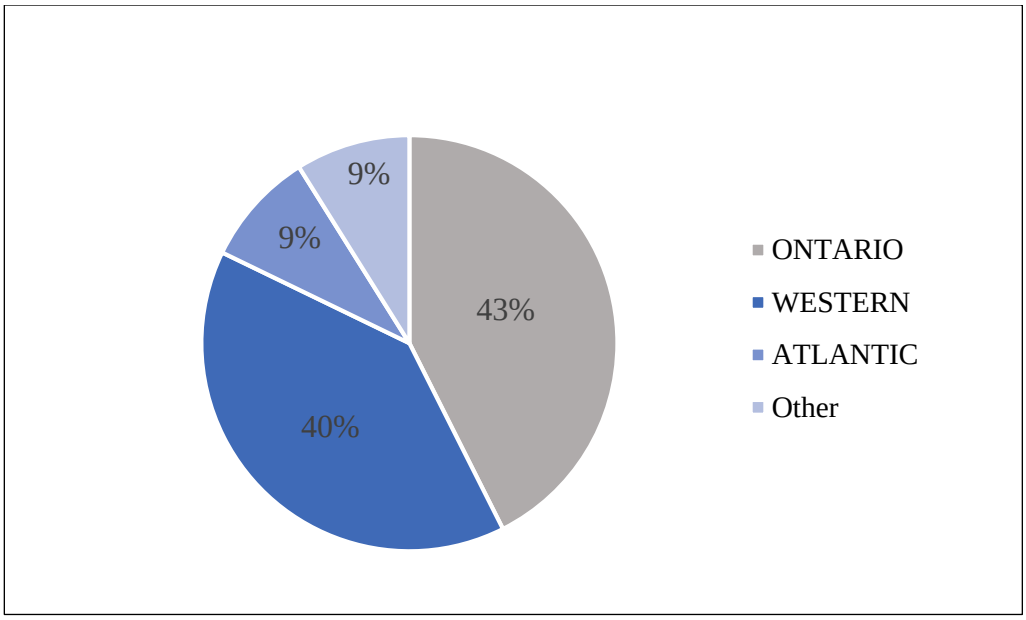

Figure 1. Geographic distribution of administrator respondents (n-35).

Administrators' years of experience varied, with the majority (34.3%) reported having more than 6 years of experience. In addition, most Administrator's reported their own competency in digital health/informatics as either beginner (41%) or intermediate level (50%).

The administrators' reported proportion of educators with digital health competency varied.

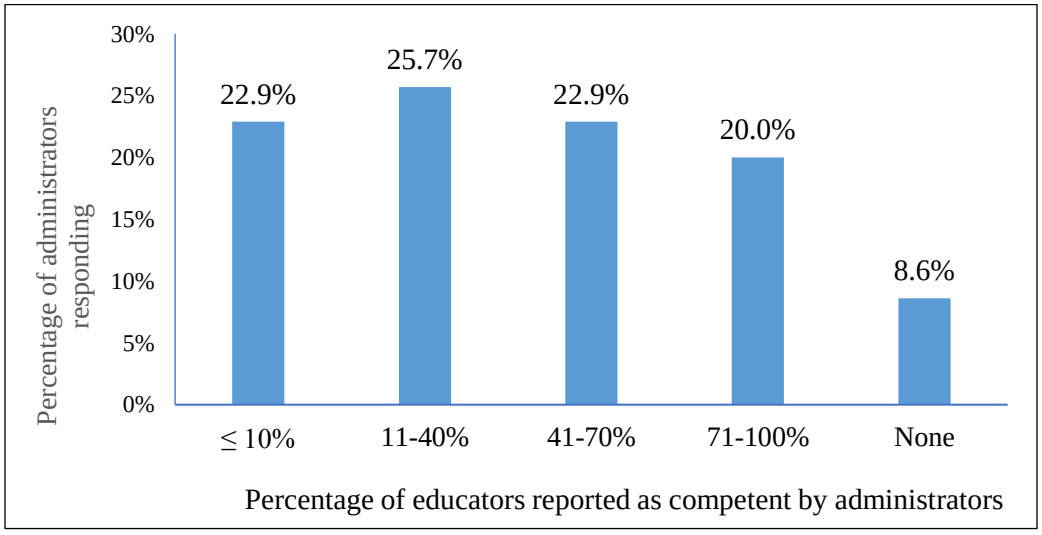

Figure 2. Administrator report of proportion of educators with digital health competency (n=35).

Fifteen administrators rated educators with digital health competency in their program was greater than 40% while the others (n=20) reported that fewer than 40% to none held relevant competency (see Figure 2 for additional details).

Use of CASN Resources by Educators

More than half of Administrator respondents (63% - moderately to extensively) indicated the CASN entry-to-practice informatics competencies are used by educators to support student learning in their programs while other resources are used less extensively. A significant number of administrators reported they did not know if educators were using these resources.

Table 1. Administrators' views of CASN resource use by educators (n=35).

	Not at all	Minimally	Moderately	Extensively	Unknown
Entry-to-practice informatics competencies	6%	11%	49%	14%	20%
Faculty Teaching Toolkit	14%	23%	37%	0%	26%
Consumer Health Solutions Resource	26%	34%	6%	0%	34%
Social Media whiteboard animation	29%	23%	3%	3%	43%
Clinical Data Standards whiteboard animation	31%	26%	0%	3%	40%

Current Teaching of Informatics/Digital Health

Addressing Select Informatics Competency Indicators. Administrators reported that educators do address informatics competency indicators in their teaching, reporting an emphasis on credible web sites and internet resources, multimedia applications and legal and regulatory requirements (see Figure 3).

Teaching Related to Electronic Health Records. A majority of administrators (62%) reported that students receive electronic health record training **prior** to clinical placements and 68% reported that students receive this training **during** their clinical placements. Only 32.4% reported that their program utilizes a simulated electronic health record system in conjunction with their simulation laboratory teaching activities but 30.4% reported that there are concrete plans to do this in the near future.

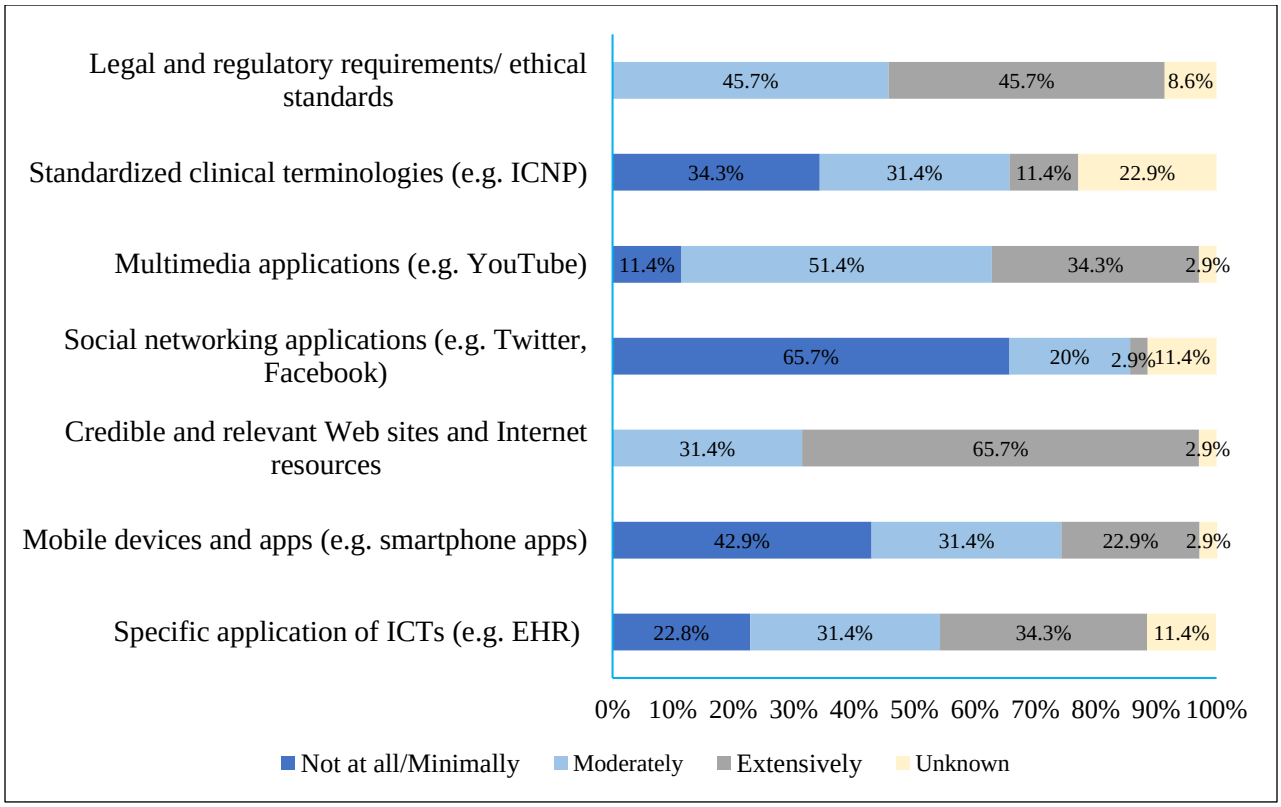

Figure 3. Administrators' views of informatics content addressed by educators (n=35).

Integration of Informatics in the Curriculum. Eighty two percent of administrators indicated that digital health/informatics has been integrated into the undergraduate curriculum including: classroom (66%); clinical settings (60%); and, simulation laboratory (51%). Further a majority of administrators indicated that the educators in their school of nursing have the requisite competencies and knowledge to teach digital health (71%), but 26.5% did not know if this was the case. Educators were also reported to be delivering digital health content within interprofessional programs (26.5%).

Digital Health Supports for Nurse Educators.

> "Currently a major curriculum revision is underway and the integration of digital health is a priority" *(SoN Administrator)*

Only 29% of administrators reported there is a team or committee in place to facilitate the integration of digital health/informatics into their nursing program(s). The majority of administrators (62.5%) indicated they believed it would be helpful to establish such a committee. Forty-seven percent indicated there are onsite opportunities for educators to receive digital health/informatics training and education. Over the past 2 years, participation in the Digital Health Faculty Peer Network by faculty members was indicated by only 23.5% of the respondents. Of these, a majority (62.5%)

participated as mentors or peer leaders, none as mentees, and 37.5% reported that members of their faculty either participated in a workshop or webinar offered by the faculty peer network.

Value of Informatics/Digital Health in Nursing Education.

Administrators agreed or strongly agreed (71%) that the CASN informatics entry-to-practice competencies are essential to undergraduate success. Further 82% indicated their belief (agreed/strongly agreed) that digital health/informatics has the potential to significantly contribute to improving the quality of care delivery. The importance of administrators' support for increasing the digital health capacity among nurse educators and graduates was agreed or strongly agreed by 79% of the respondents.

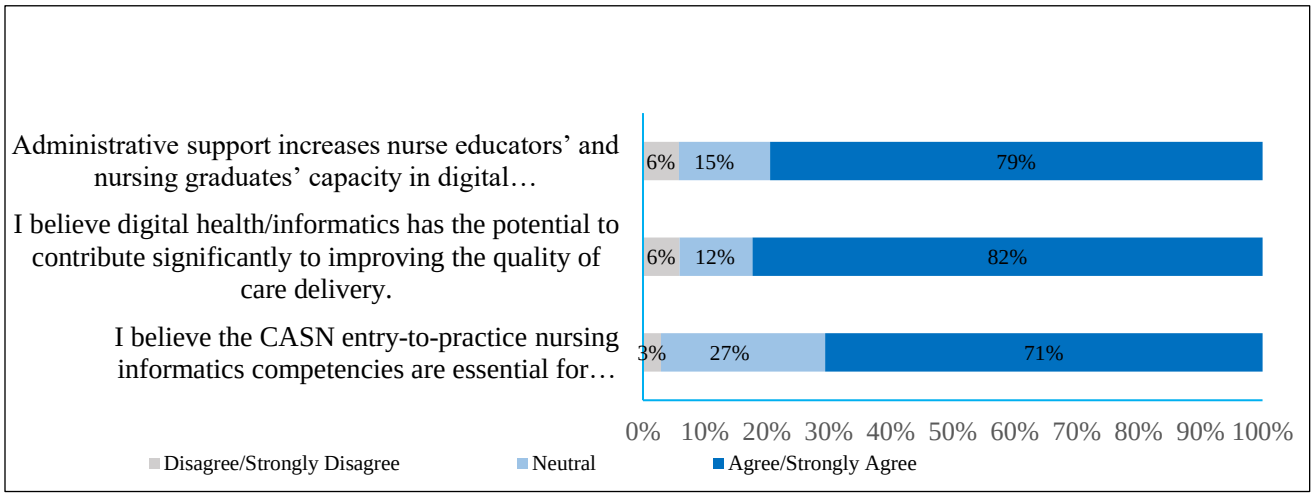

Figure 4. Administrators' views on support for informatics/digital health curricular integration (n=35).

Nurse Educator Survey

Educator survey respondents (n=360) were mainly from the Western region with a smaller proportion from remaining regions as shown in Figure 5 below. The others (5%) category included those from northern jurisdictions (e.g., Nunavut). Sixty-six percent reported having more than 21 years of nursing experience and 57% reported having more than 11 years of teaching experience (See Table 2 for further details about the respondents' positions and educational preparation). A majority reported being in a professorial position with a degree at the masters level. A majority (79%) reported that they teach in the classroom, 54% in clinical, 37% in the simulation lab and 30% online at the undergraduate level.

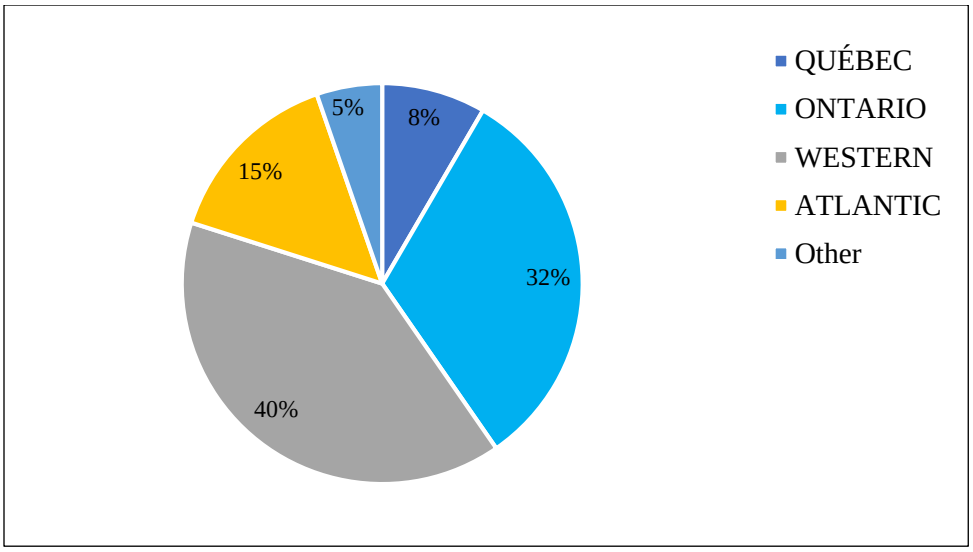

Figure 5. Geographic distribution of educator respondents (n=360).

Only 8.6% reported membership in a provincial nursing informatics group in Canada, yet 32% indicated their interest in joining a national or provincial informatics group. Twenty-four percent indicated they are a member of a team/committee planning for the integration of informatics/digital health into the curriculum.

Table 2. Educators' Positions and Educational Preparation (n=360)

		Count	Percent
Educator Position	Professor	69	19.4
	Associate Professor	49	13.8
	Assistant Professor	53	14.9
	Lecturer	31	8.7
	Full-Time Instructor	68	19.2
	Full-Time Term Instructor	10	2.8
	Other	75	21.1
Highest Completed Degree	Baccalaureate in Nursing	95	26.4
	Masters in Nursing	167	46.4
	Masters in other	52	14.4
	Doctorate in Nursing	68	18.9
	Doctorate in other	53	14.7

Informatics/Digital Health Knowledge & Continuing Education

Self-ratings of competency in digital health/informatics were mostly at the beginner level (54%) as shown in Figure 6 below. Twenty percent (n=71) reported having completed an education program and/or course work in digital health/nursing or health informatics while only 5 people reported having specialty education or certification (e.g., CPHIMS) in the field. Thirty-six percent indicated they had participated in continuing education workshops or programs in digital health/informatics while 52% indicated they would participate in an informatics learning opportunity if made available in their region. Of those who indicated previous participation in

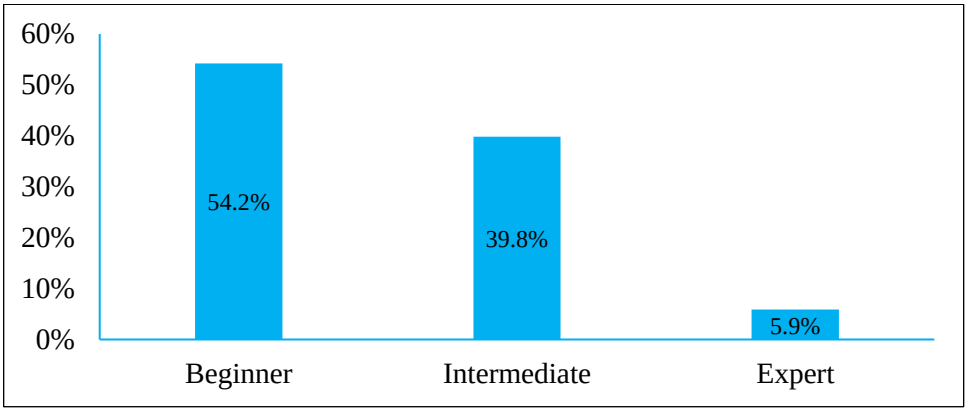

Figure 6. Educator self-rating of informatics competency (n=360)

continuing education programs, many cited the CASN Digital Faculty Peer Network offerings of seminars and workshops. Forty percent indicated support for continuing education (e.g., workshops) in digital health/informatics is provided by their administrative leadership.

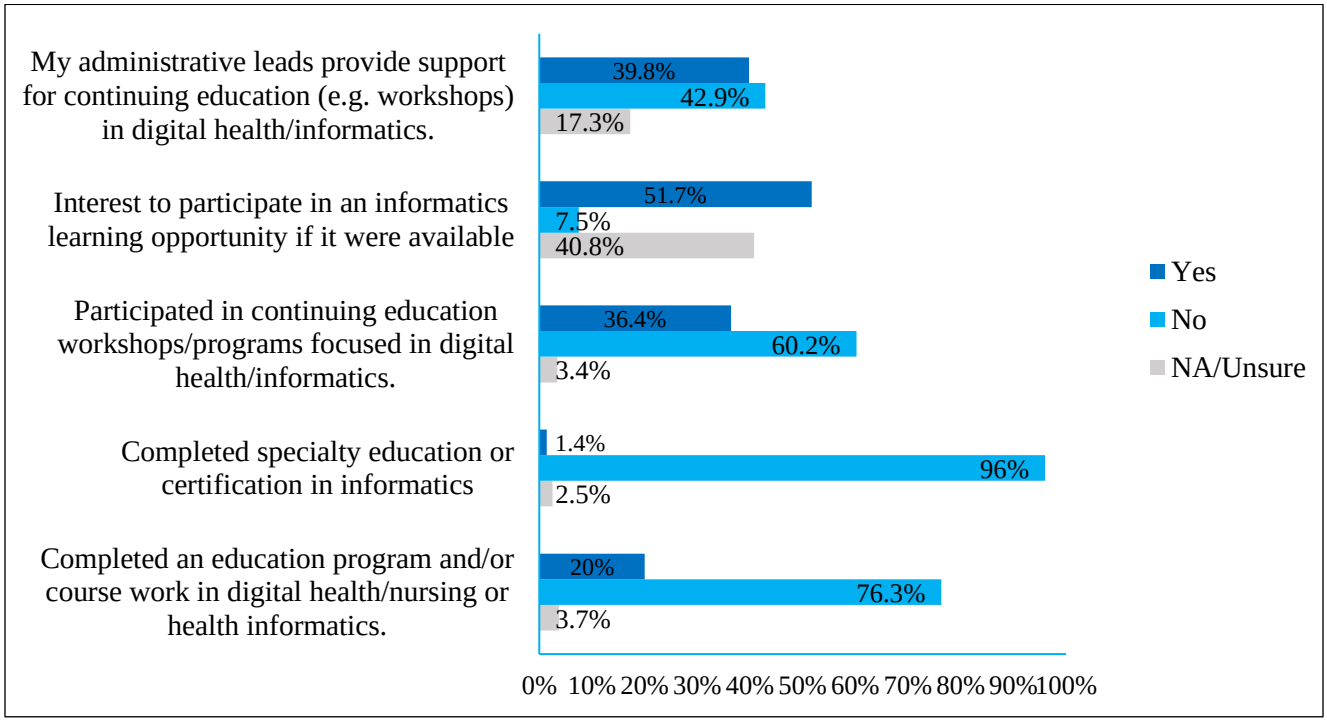

Figure 7. Continuing education in informatics (n=360).

Use of CASN Resources

Only 31% (moderately to extensively) of the respondents indicated the CASN entry-to-practice competencies are used to support student learning in their program while the Faculty Teaching

Toolkit was identified as having moderate to extensive use by only 21% of educators. The Consumer Health Solution resource and white board animations on social media and clinical data standards were reported to have minimal to no use by the majority of participants. (see Table 3 for additional details of educators' use of the CASN resources).

Table 3. Educators' Use of CASN Resources (n=360)

	Not at all	Minimal	Moderate	Extensive	Unknown
Entry-to-practice informatics competencies	28%	33%	19%	12%	8%
Faculty Teaching Toolkit	48%	26%	18%	3%	5%
Consumer Health Solutions Resource	67%	17%	6%	1%	9%
Social Media whiteboard animation	74%	14%	5%	1%	6%
Clinical Data Standards whiteboard animation	79%	10%	3%	2%	6%

Current Informatics/Digital Health Teaching & Curricular Integration

While only 4.7% reported currently teaching a digital health/informatics course in the undergraduate program, 44% reported teaching aspects of same within another course and 17% reported inviting a guest lecturer to provide related content in their course(s). A small number (n=20) identified as someone who helps colleagues by guest lecturing on topics of digital health/informatics.

Use of Electronic Health Records to Support Acquisition of Informatics Competency

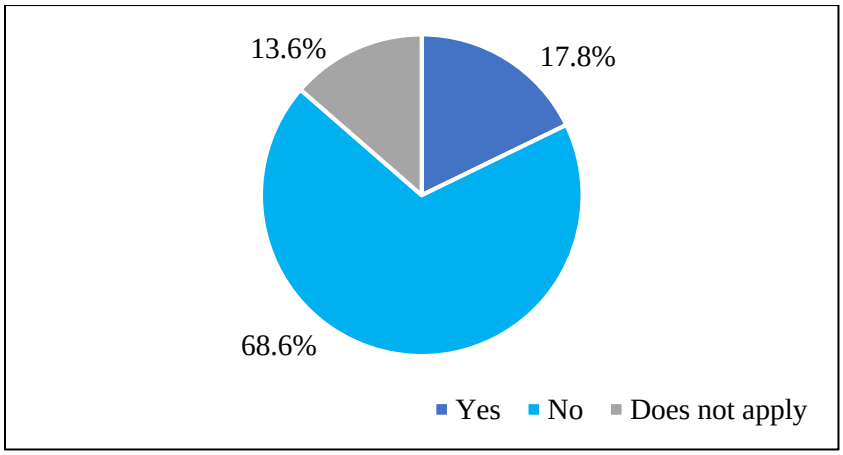

Figure 8. Use of Simulated/Vendor EHRs in Lab Teaching (n=360)

Less than 20% of educators reported using a simulated electronic health record in conjunction with the teaching of clinical skills in a simulation laboratory. Educator comments indicate some schools use a hospital vendor solution for this purpose while others are using a locally developed solution.

Assisting Students with Informatics Competency Indicators

The 15 items rating the educators' support of student learning specific to the competency indicators are discussed below. More than 50% of the respondents indicated they provide ***minimal* to *no support*** to students for the following:

- use of mobile devices and apps;
- social networking applications;
- understanding standardized nursing and other terminologies;
- use of consumer health solutions;
- use of specific electronic health record applications;
- use of electronic records across the continuum of care;
- use of ICTs to collect, document and retrieve data;
- understanding the role of nurses in the design, selection, implementation and evaluation of ICTs;
- understanding how digital health/informatics may improve the health system and overall quality and safety of patient care; and,
- responsibilities to report system process and functional errors.

On the other hand, more than 50% of the educators indicated they ***moderately* to *extensively*** support students to:

- identify credible and relevant websites and internet resources to support learning and practice;
- use ICTs to support nursing practice and knowledge development;
- understand how digital health/informatics knowledge applies to the practice of all nurses in all roles;
- use decision support tools (e.g., clinical alerts, practice guidelines) to support clinical decision-making and safe patient care; and,
- use legal and regulatory requirements, ethical standards and organizational policies and procedures.

Involvement in Research Related to Digital Health/Informatics

Only twelve percent of respondents indicated they are currently involved in research related to digital health/informatics. Areas of research identified included:

- Impact of mobile technology (students' critical reasoning, teaching and learning);
- EHR adoption and use;
- Electronic charting;

- National nursing data standards
- Impact of digital health environments (clinical reasoning);
- Data science and big data;
- Online consumer health tools;
- Health information appraisal (social media);
- Interprofessional education using simulation technologies;
- Gamification (medication administration competency development, anatomy);
- Patient empowerment;
- Remote service delivery;
- Workforce preparedness;
- E-Professionalism;
- Smartphone apps (use in practice, cardiac pain in women);
- Augmented reality with academic EMR; and,
- Technology supporting patient education.

Value of Informatics/Digital Health Curricular Integration & Leadership Support

Sixteen percent of educator respondents indicated uncertainty in relation to the value of the CASN entry-to-practice nursing informatics competencies as essential for undergraduates'success.

While 68% agreed/somewhat agreed/strongly agreed informatics competencies are essential, still 32% disagreed/strongly disagreed or were not sure. Within the respondent's program, educators recognizing the importance of digital health/informatics to enhancing nursing practice and quality of care was somewhat agreed, agreed, or strongly agreed to be the case by 73%.

Seventy-one percent somewhat agreed, agreed, or strongly agreed the educators in their program valued the importance of integrating digital health/informatics content in nursing education. Finally, 59% indicated there is clear and consistent leadership support for the integration of digital health/informatics into their curriculum, while 30% disagreed/strongly disagreed and 12% did not know.

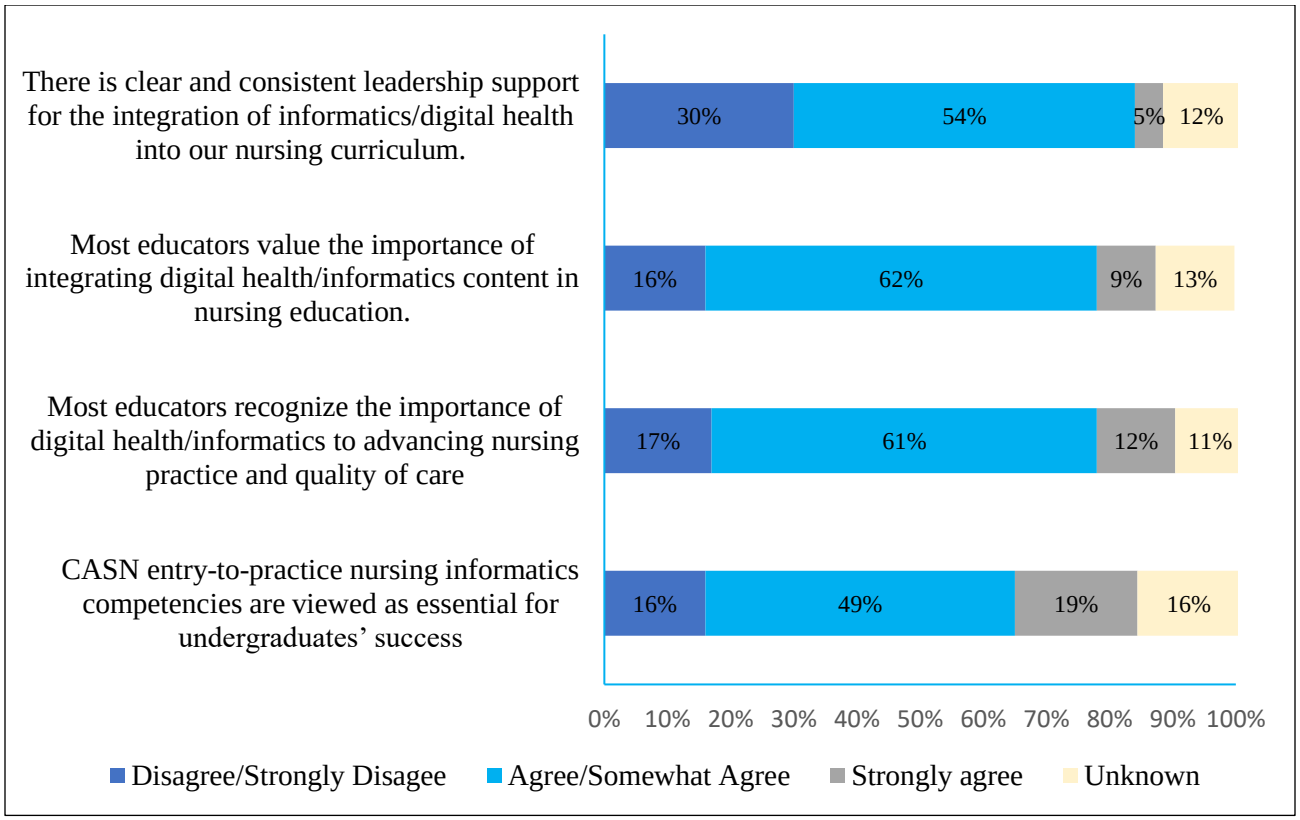

Figure 9. Value of Informatics/Digital Health Integration & Leadership Support (n=360)

Survey Comments

The educator qualitative responses strongly support interest in continuing education opportunities. Educators are engaging in learning experiences with workshops and conferences being cited as the most frequently identified professional development activities. Another noteworthy finding is the description of educators' experiences in teaching digital health content. A significant number of educators responded no when asked if they were teaching digital health content within undergraduate nursing curricula with little graduate or interprofessional teaching experiences in digital health. For those who indicated they were teaching digital health content it was often explored within undergraduate education with limited data supporting a consistent thread or attempt to level this content throughout nursing programs. In the words of one educator, "the occurrence of digital health teaching is currently not intentional, but needs to be".

Another key point made by the educator respondents focused on the fact that many health care organizations are not currently using a fully functional EHR. Therefore teaching students about these tools is problematic when there is no opportunity to observe them in practice settings. Moreover, settings that do have EHRs with relevant nursing functionality do not always permit students to access/use these tools. Several respondents also commented on the need to have an affordable EHR "sandbox" which could be used to teach students how to integrate these tools with their clinical practice.

Finally, there was only one comment text box at the end of the Administrator's survey querying the respondents' views on how to build additional faculty capacity; the few responses support quantitative findings with an apparent interest in the need to build capacity in this area. In addition, a mindset of having faculty champions prevails as one administrator describes how "there are a couple of faculty (members) who have competence in this area but not enough to ensure it is maximally integrated into the new curriculum".

Interview Findings

Interview participants (n=10) mainly discussed undergraduate nursing curricula rather than graduate or interprofessional education. A number of educators expressed a sense of urgency to support educators in building their capacity to teach core digital health content within undergraduate nursing education. However, participants also suggested that this mindset might not be shared by other nurse educators who either do not see it as a priority or within the purview of their specific teaching responsibilities.

> "In this digital age, there is a desperate need for RN's to understand how data, infomration and knowledge can transform into wisdom. While they may figure it out over time, wouldn't it be great if we introduced them to this connection as undergraduates?" *(Nurse Educator)*

During several of the interviews, it was difficult to maintain the focus on digital health content integration. Instead participants often digressed to sharing their experiences with various pedagogical technologies such as learning management systems. In these instances, the researchers had to revisit the purpose of the study and redirect the discussion.

Interview Themes. The themes identified below are preliminary findings as analysis of the interview transcriptions is ongoing.

Digital health content integration is **not**:

- a priority area for nurse educators and there are many unknowns, such as: where does this content fit and who is responsible for digital health integration? It seems many nursing programs rely on champions rather than seeking to engage all faculty to build capacity in this core area of nursing competence. There is also a tendency for educators to depend on healthcare organizations to teach students how to use an EHR;
- wholly intentional, yet there is evidence of work being done to map CASN entry level competencies to core undergraduate curricula; and,
- consistent as there are differences in awareness and understanding among nurse educators.

As was identified in the Educator survey, they also discussed the challenges of inconsistent student access to clinical information systems in the practice and academic settings. For example, not all clinical settings used for clinical practicum experiences allow student nurses partial or full access to the clinical system functionality. Further there is commonly a lack of consistency between academic and practice settings' use of ICTs. While a few academic settings have access to a vendors' clinical information system training environment, others may be using a simulated electronic health record in their simulation lab, and others using none at all.

Interviewees also strongly emphasized the need for additional administrative support in order for them to acquire digital health competency and achieve effective curricular integration. A clear directive and plan for digital health integration into the curriculum was seen by some to be lacking. Consequently, there is no motivation for nurse educators to develop their own informatics competency and address theory and practice gaps in the curriculum.

Interviewee sugestions for building educator capacity included:

- Focusing on comprehensive informatics and digital health education in theory and practice as opposed to mastery of technical skills—typically achieved through ICT vendor training;
- Sharing the findings of this study with professional associations such as COUPN (Council of Ontario University Programs in Nursing) to increase awareness of the current gaps in digital health teaching in nursing curricula;
- Creating workshop opportunities tailored to schools of nursing needs;
- Delivering travelling roadshow to expand awareness about digital health resources;
- Making nursing informatics entry-to-practice competencies explicit in CASN accreditation requirements;
- Expanding educators' awarenesss beyond basic informatics competencies to include a focus on future of healthcare and impact of technology on practice roles (e.g., robotics, big data, artificial intelligence)
- Leveraging digital health savvy nurse educators to support their peers;
- Providing educators with incentives and motivators (e.g. scholarship, bursary for professional development in digital health)

Focus Group Findings

A sample of 10 nurse educators and deans/directors from Canadian schools of nursing participated in the focus group. A single one-hour focus group was held in conjunction with the CASN May 2018 educator conference.

Focus Group Themes

- Lack of awareness of CASN resources
- Need for student and faculty digital health champions

- Need to partner with clinical settings
- Need for a cultural shift in clinical settings (e.g., accepting nurses' use of smartphones)
- ICT use is setting dependent – clinical information systems are varied, making it difficult to know what to teach nursing students
- Clinical information systems do not effectively support nursing practice. Hence we need nurses at the decision-making tables to advocate for inclusion of nursing data and functionality that facilitates their integration with clinical workflow.
- Need to teach students how to use information in the context of patient care and health system management rather than computer literacy

DISCUSSION

In 2006, the Canadian Nurses Association (CNA) published an e-Strategy for Nursing (CNA, 2006) suggesting that all nursing stakeholder groups, professional associations, regulators, unions, employers, educators and researchers have an important role to play in advancing nursing's position relative to digital health. The strategy identified 3 key strategic directions for nurses including increased: 1) access to ICT to support evidence-based decision-making, 2) increased participation at ICT decision-making tables, and 3) the development of ICT competencies More than a decade later, we still require concerted and concentrated efforts to achieve a cultural shift manifested by nurses embracing digital health.

> "Development and ongoing use of ICT skills are key to improving nurses' competencies. It is necessary that competencies be embedded in undergraduate and graduate nursing curricula and in continuing education" *(CNA, 2006, p. 11).*

Need to Further Increase Awareness of the CASN Resources. There is a developing awareness of CASN's entry to practice informatics competencies as there is a strong interest to advance their use among both educator and administrator constituents. The desire to successfully respond to the digital health learning needs of future nurses is evident for each group of respondents. Strategies to further engage educators and administrators are strongly linked to hands on, in-person sessions such as workshops and conferences.

Inconsistent Perceptions of Educators' Digital Health Competency. It seems administrators deem educators as being more capable than educators' self-reports of digital health integration capacity. Educators indicate they need more administrative support; it is perceived as somewhat of a prerequisite to their ability to build digital health capacity. In general, they appear to continue to find it challenging to learn about the rapidly evolving area of digital health.

Need for Educator Knowledge and Competency Development. There are visible gaps and challenges in current approaches to digital health content integration. Although participants are

aware of entry to practice informatics competencies it seems many still do not fully understand them or perhaps lack the insight to appreciate how the digital health era is changing core nursing competency requirements. This knowledge gap should be a starting place for future discussions and one that will hopefully result in all nurse educators accepting responsibility in response to this urgent call for digital health integration. It is with this lens that we will be successful in shifting the thinking of educators and administrators alike. These entry-to-practice competencies should be within the purview of all who have a role in undergraduate nursing education. The mindset of seeking champions to assume responsibility to teach future nurses these core competencies should become obsolete.

Emphasis on Technologies of Teaching Rather than Practice. Comments offered by the educators in the surveys, interviews and focus group reflect an ongoing confluence of views about the use of technology for teaching and learning as opposed to the technologies used specifically in the delivery and management of health care services. In particular, the interview and focus group participants largely focused on technology mediated pedagogy. Additionally, many educators continue to express a view that the undergraduate nursing students of today are highly computer literate therefore minimizing a need for specific education related to digital health. Equating computer literacy with digital health literacy continues to be offered as a reason why educators do not focus on digital health content in undergraduate curricula. Given computer literacy is an expectation and a pre-requisite to university education, more emphasis is needed to promote information and knowledge management competencies within the context of clinical practice. This is vitally important given that practicing nurses, who typically function as preceptors for nursing students, also report inadequate informatics competency, specifically in relation to information and knowledge management and ICT use to support patient care (Kleib & Nagle, 2018; Canada Health Infoway, 2017).

Variability of Clinical Information Systems in the Practice Realm. Clinical settings within regions, jurisdictions and across Canada utilize an array of solutions to support the management of health records electronically (Kleib, Chauvette, & Nagle, 2018), which is congruent with the findings in this study. This variability creates challenges for nurse educators to identify what should be taught to prepare students for their use; additionally, there appears to be varied views as to who should be responsible for preparing students to use an organization's particular EHR. It would appear that EHR training continues to be delivered to a large extent by the clinical practice settings rather than schools of nursing. Educators envision value to be derived from having simulated EHR education for student learning.

Administrator Views in Contrast to Educator Views. Administrators perceive that their educators are reasonably well prepared to teach these core nursing competencies and are delivering digital health content in undergraduate curricula. However, educators indicate a need to further develop their competency and confidence to integrate digital health into curricula and indicated that they would take advantage of additional learning opportunities if made available. Overall there was also a difference in the perceptions of administrators versus educators as it relates to the use of CASN resources. It would appear that the administrators believe that their faculty are making more use of the CASN resources than the educators report.

LIMITATIONS OF THE STUDY

The findings of the study represent the views of the survey respondents and interview participants and may not represent all instances of digital health integration into undergraduate nursing programs in Canada. There may also have been response bias in relation to those who chose to participate in the surveys and interviews; individuals interested in the topic of digital health might have been more inclined to participate in the study. Although there were respondents to the French version of the surveys, all interviews and the focus group were conducted in English. Hence the sample may not provide a comparable representation of perspectives from the French schools of nursing.

IMPLICATIONS

School of Nursing Administrators

School of nursing administrators need to identify the specific learning and development needs of educators in the area of digital health. In particular, administrators should identify educator leads and support those charged with the curricular integration of digital health content. So there may be champions to lead the work of integration yet all educators will be charged with the responsibilities for teaching digital-health related content. Awareness and use of the CASN resources should be increased with encouragement to utilize same where appropriate within curricula. Support can also be channeled for continuing education (e.g., conferences and workshops) and other knowledge development activities (e.g., courses, certification). Educators should also be encouraged to participate in nursing informatics activities including engagement in local and national specialty groups. Administrators might consider developing a working group to focus on digital health curricular integration including the adoption of a simulated EHR to be utilized in the clinical teaching lab in conjunction with the teaching of clinical skills.

School of Nursing Educators

All nurse educators need to reflect upon their courses and other teaching responsibilities and identify possibilities for curricular integration of digital health content. Most importantly, the evolution of relevant future curriculum and course design will be contingent on the development

of each educator's competency in digital health/informatics. Educators need to be cognizant of the difference between digital health/informatics competency and basic computer literacy and the fact that nursing students do not inherently have the latter just because of their computer literacy. Furthermore educators need to be aware of the distinct difference between issues related to the use of digital health in clinical practice rather than their learning needs and use of technology to deliver course content. All educators are encouraged to continue to seek out learning opportunities where ever and whenever possible. The sharing of experiences and digital health teaching strategies with other faculty are encouraged through publications, presentations, and faculty networking. In addition, students should be encouraged to elevate and advance digital health discussions in classroom and clinical settings.

Health Care Organizations

Organizations who host undergraduate students from the health professions need to be clear and consistent in the development of policies and procedures that govern students' access and use of electronic health records and other ICTs. It needs to be recognized that students can learn and benefit from having access to digital tools that support and guide clinical decision-making. Clear directions need to be provided to educators relative to their responsibilities in adequately preparing students to appropriately use the ICTs within health care organizations. Perhaps it is time to revisit organizational policies – this work could begin by assisting administrators to be more aware of the need to advocate for change in this area.

Canada Health Infoway

While the investments by Canada Health Infoway have netted numerous benefits for clinicians, educators and health care consumers, much more work remains to be done within academia. Findings of this study are somewhat consistent with the Infoway 2017 nursing survey (Canada Health Infoway, 2017) as it is evident that knowledge gaps among nurse educators still need to be addressed. Another salient finding is that developing resources such as toolkits and whiteboard animations is not directly addressing current educator capacity issues. Knowledge gaps seem to be inhibiting use of these tools. Educators need additional guidance and support to develop the necessary competence and confidence in themselves, improving subsequent uptake and use of teaching and learning tools. Ultimately, nurse educators and administrators should build partnerships with Canada Health Infoway – a collaborative effort to further advance the evolution of digital health content in undergraduate nursing curricula. Further, Canada Health Infoway might consider investing in the development of a simulated EHR to support student teaching and learning; this would likely be a worthwhile endeavour for nursing and the other health professions.

Canadian Association of Schools of Nursing (CASN)

While CASN has provided significant leadership in the development of tools and activities to support nurse educators in the integration of digital health into nursing curricula, additional

strategies need to be considered to raise the awareness and use of these resources. Opportunities to bring educators and administrators together to discuss and share their strategies would be welcomed by both groups. Previous experience with the Digital Health Faculty Peer Network showed consistently positive responses to in-person and on-line interactive learning opportunities. CASN should also consider advancing explicit school of nursing accreditation standards relative to digital health in conjunction with nursing regulators.

Nurse Regulators

The nursing regulatory bodies need to continue to advance standards of practice related to digital health and informatics. Advancing explicit standards related to the appropriate use of digital health solutions will further endorse the need to integrate relevant content, knowledge and skills into undergraduate curricula.

Policy directions

The lack of consistency and integration of electronic health records within regions and jurisdictions continues to present challenges for educators. There is a frustration with the variability of the solutions being used for electronic health records; the inconsistency compounds the challenge of teaching undergraduate nursing students the functional components of EHRs. Further health care organizations have varied policies in place to guide the use of mobile devices and associated clinical applications. In particular, while there are many smart phone applications that support clinical decision-making, health care organizations have different policies regarding their use. Specifically, the use of smartphones may not be permitted or at the very least, frowned upon by some organizations.

CONCLUSION

In this study, the researchers examined the views of Canadian schools of nursing administrators and educators about their current integration of informatics/digital health in undergraduate nursing curricula and their educators' capacity to do so. Further to the study of 2003, few schools of nursing report a systematic, comprehensive approach to the integration of digital health knowledge and skills into their undergraduate curriculum. It is clear that additional efforts need to be directed to the development of nurse educators' confidence and competence to ensure that graduates of the future are well equipped to effectively function in the digital health realm of health care organizations now and into the future. Furthermore, administrators in Canadian schools of nursing need to be aware of, address and support the digital health learning needs of their educators and provide directives to ensure the curricular integration of relevant theory and practice content.

To date, investments have been made by organizations including CASN, Infoway and the Canadian Nurses Association to address the informatics/digital health learning needs of nurses. This study revealed that nurse educators were minimally aware of the CASN informatics entry-

to-practice competencies and other available digital health resources. More efforts need to be directed to supporting the Canadian schools of nursing administrators and educators to ensure that they are delivering curricula aligned with the digital health practice requirements of healthcare organizations today and into the future.

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APPENDICES

APPENDIX A – Administrator Survey

You are invited you to participate in this administrator's survey designed to help us better understand current curricular integration of digital health/informatics content in your nursing program(s).

For the purposes of this study, the terms "informatics" and "digital health" are used to denote the knowledge and skills associated with the use of *clinical* information and communication technologies in nursing education and practice. This is different from the use of technology (e.g., Blackboard, Moodle, PowerPoint) to support course delivery or facilitate teaching and learning in classroom and clinical settings.

Canada Health Infoway has funded this research study. The research and ethics board at the University of Alberta has approved this project. **Your participation is voluntary and by completing this on-line survey, you are indicating your consent to participate in this research. You may withdraw from this research at any time.** This online survey is anonymous. All research data generated from surveys and interviews will be housed securely within Canada Health Infoway data center in Montreal, and made accessible to research team members only for the purpose of data analysis. No data will be stored after completion of data analysis and all records will be destroyed as per Canada Health Infoway procedures for data destruction.

Findings of this study may be presented at conferences and published in scientific journals. For more information about this study, please review the study information sheet (embed as link).

This online survey is available in both French and English. The estimated time to complete the survey is 5-10 minutes. If you have questions about the survey or research study, or issues with completing the survey, please contact Lynn Nagle, RN, PhD, FAAN, Lead Investigator of this project – lynn.nagle@utoronto.ca.

Thank you in advance for taking the time to complete this survey.

Link to survey in ENGLISH
Link to survey in FRENCH

Administrators Survey
1. **Your Current Administration Position: (Drop down box):** ☐ Dean ☐ Director ☐ Chair ☐ Associate Dean, Academic ☐ Other, Please specify: _____
2. **Which nursing program(s) is your administrative work most closely aligned? (Check all that apply):** ☐ Undergraduate Nursing Program ☐ Graduate Nursing Program ☐ Interprofessional Program
3. **School of Nursing (Please select): DROP DOWN List**
4. **Region: (Drop down box):** ☐ Eastern Canada (NB, NS, NL & PE) ☐ Central Canada (MB, ON, & PQ) ☐ Western Canada (AB, BC & SK) ☐ Northern Canada (NT, NU & YT)
5. **Years of administrative experience: Include Drop Down Options** ☐ 5 years or less ☐ 6-10 years ☐ 11-20 years ☐ 21 years or more

Please indicate which of the following resources are used to support nursing practice and student learning in the curriculum:	**Not At All 1**	**Minimal 2**	**Somewhat 3**	**Moderate 4**	**A lot 5**	**Unknown 6**
6. **Educators use the following Canadian Association of Schools of Nursing (CASN) digital health resources:** (Check all that apply): ☐ *Entry-to-practice informatics competencies for registered nurses* ☐ *Faculty Learning Resource and Teaching Toolkit* ☐ *Consumer Health Solutions* Resource ☐ Whiteboard animation on: *The Use of Social Media* ☐ Whiteboard animation on: *The Value of Clinical Data Standards*						
7. Educators use specific applications of information and communication technology (ICT) in their teaching of practical nursing skills (classroom, simulation, practice settings).						

8. Educators use mobile software applications and resources (e.g., smartphone apps) to support their teaching.						
9. Educators use credible and relevant World Wide Web sites and Internet resources to support both teaching and learning.						
10. Educators use social networking applications (e.g. Twitter, Facebook) to support both teaching and learning.						
11. Educators use multimedia applications (e.g. podcasts, blogs, YouTube) to support both teaching and learning.						
Please indicate if the following concepts are taught in the curriculum:						
12. Standardized nursing and other clinical terminologies (e.g., International Classification of Nursing Practice [ICNP], C-HOBIC, and SNOMED-CT) in supporting clinical documentation.						
13. Legal and regulatory requirements, ethical standards, and organizational policies and procedures (e.g. protection of health information, privacy, and security) associated with the use of Information and Communication Technologies.						
Digital Health Supports for Nurse Educators	**Yes/No**					**Unknown**
14. Electronic Health Record training occurs for students PRIOR to clinical placements.						
15. There are Electronic Health Record training opportunities DURING clinical placements.						
16. We use an electronic health record (simulated or vendor training system) in conjunction with our simulation lab teaching activities. (SKIP LOGIC, if Yes to question 18, If No, go to question 17)						
17. There are concrete plans to integrate the use of an electronic health record (simulated or vendor training						

system) in our simulation lab teaching activities in the near future.					
18. We have a team/committee responsible for the integration of digital health/informatics in nursing education and practice (SKIP LOGIC, If YES, GO TO QUESTION 20 - If NO – participants will be prompted to respond to question 19)					
19. As an administrator, do you think it would be helpful to establish a committee to support the curricular integration of digital health/informatics content?					
20. There are onsite opportunities for educators to receive digital health/informatics training & education?					
21. Within the past 2 years, educators within our program have participated in the CASN Digital Health Faculty Peer Network as – (Drop down Menu listing) ☐ Mentors ☐ Mentees ☐ Participants in the educational sessions (i.e., workshops or webinars) delivered across Canada.					
22. We have integrated digital health/informatics into our undergraduate-nursing program. (If yes, participants should be prompted to select all that apply) ☐ Classroom ☐ Clinical ☐ Simulation Lab					
23. Within our undergraduate-nursing program there are educators with requisite knowledge and skills required to teach digital health/informatics.					
24. Educators are engaged in teaching digital health/informatics in interprofessional courses.					
Support for Digital Health/Informatics Curricular Integration	**Strongly Disagree 1**	**Disagree 2**	**Somewhat Agree 3**	**Agree 4**	**Strongly Agree 5**

25. The CASN entry-to-practice nursing informatics competencies are viewed as essential for our graduates' success.					
26. I believe digital health/informatics has the potential to contribute significantly to improving the quality of care delivery.					
27. Administrative support increases nurse educators' and nursing graduates' capacity in digital health/informatics.					

28. Self-reported competence in digital health/informatics
(Check One):

- ☐ Beginner
- ☐ Intermediate
- ☐ Expert

OTHER RELEVANT COMMENTS ABOUT YOUR ADMINSTRATIVE ROLE?

As part of this research, we are also conducting telephone interviews and face-to-face focus group meetings. If you would like to be considered for either of these opportunities or both of them, please indicate your choice below and provide contact information. Indicating interest does not imply any commitment to participate.

(Response if answer is NO)
Thank you for completing this survey your participation is greatly appreciated!

(Response if answer is Yes)
Each interested administrator will be contacted to discuss participation in an interview and/or a focus group. Participants will be randomly selected with attention to geographic location to promote adequate representation of Canadian nurse educators from each region. These additional data collection methods are intended to provide administrators with further opportunities to discuss strategies for the integration of digital health/informatics into nursing curricula across Canada.

Telephone interviews will be scheduled at a mutually convenient time. Focus group sessions will be held in conjunction with the CASN National Nurse Educator Conference scheduled in May 28-29, 2018 in Montreal, Quebec.

As a program administrator, I am interested in learning more about participating in:

- ☐ A Telephone Interview (20 – 30 minutes)
- ☐ A face-to-face focus group (one hour)
- ☐ Both

Thank you for completing this survey and your expressed interest in ongoing participation. If your name is selected for an interview and/or focus group, a research team member will contact you via email within three weeks of completing this survey. Please provide your name, region, and email address below.

APPENDIX B – Educator Survey

You are invited to participate in this educators' survey designed to determine nurse educators' knowledge, current integration of basic informatics/digital health content in undergraduate nursing curricula, and support received from schools of nursing for same.

For the purposes of this study, the terms "informatics" and "digital health" are used to denote the knowledge and skills associated with the use of *clinical* information and communication technologies in nursing education and practice. This is different from the use of technology (e.g., Blackboard, Moodle, PowerPoint) to support course delivery or facilitate teaching and learning in classroom and clinical settings.

Canada Health Infoway has funded this research. The research and ethics board at the University of Alberta has approved this project. **Your participation is voluntary and by completing this on-line survey, you are indicating your consent to participate in this research. You may withdraw from this research at any time.** This online survey is anonymous. All research data generated from surveys and interviews will be housed securely within Canada Health Infoway data center in Montreal, and made accessible to research team members only for the purpose of data analysis. No data will be stored after completion of data analysis and all records will be destroyed as per Canada Health Infoway procedures for data destruction.

Findings of this study may be presented at conferences and published in scientific journals. For more information about this study, please review the study information sheet (embed as link).

This online survey is available in both French and English. The estimated time to complete the survey is 10-15 minutes. If you have questions about the survey or research study, or issues with completing the survey, please contact Lynn Nagle, RN, PhD, FAAN, Lead Investigator of this project – lynn.nagle@utoronto.ca.

Thank you in advance for taking the time to complete this survey

Link to survey in ENGLISH

Link to survey in FRENCH

Nurse Educators Survey

Demographics

1. Educator position (please check only one):

- ☐ Professor
- ☐ Associate Professor
- ☐ Assistant Professor
- ☐ Lecturer
- ☐ Full-Time Instructor
- ☐ Full-Time Term Instructor
- ☐ Sessional/Part-Time Instructor
- ☐ Other: (Please specify):

2. Highest completed degree:

- ☐ Baccalaureate in nursing
- ☐ Masters in nursing
- ☐ Masters in other
- ☐ Doctorate in nursing
- ☐ Doctorate in other
- ☐ Other: (Please specify):

3. **Undergraduate teaching responsibilities:** 1) classroom and clinical, 2) classroom only, 3) clinical only 4) None

4. **Graduate teaching responsibility:** 1) classroom and clinical, 2) classroom only, 3) clinical only 4) None

5. School of Nursing (Please select): DROP DOWN List

6. Region: (Drop down box):

- ☐ Eastern Canada (NB, NS, NL & PE,)
- ☐ Central Canada (MB, ON, & PQ)
- ☐ Western Canada (AB, BC & SK)
- ☐ Northern Canada (NT, NU & YT)

7. **Years of nursing experience:**

8. **Years of teaching:**

9. **Are you a member of a national or provincial nursing informatics group in Canada?** (Please specify)
If no ask if there is an interest in joining either a national or provincial informatics group?
Option Yes or No or Unsure

Informatics/Digital Health Knowledge **Please indicate the extent to which you engage in the following activities in your teaching:**	**Not At All** **1**	**Minimal** **2**	**Somewhat** **3**	**Moderate** **4**	**A lot** **5**
10. Help students understand how digital health/informatics knowledge applies to the practice of nurses in all roles.					
11. Use the Canadian Association of Schools of Nursing's (CASN) *Entry-to-practice informatics competencies for registered*					

nurses to support the setup and delivery of my teaching assignments.					
12. Assist students to use information and communication technologies (ICTs) to support nursing practice and knowledge development.					
13. Assist students to use mobile devices and apps (e.g., smartphone apps)					
14. Assist students to use credible and relevant World Wide Web sites and Internet resources to support their learning and nursing practice.					
15. Assist students to use social networking applications (e.g. Twitter, Facebook)					
16. Use multimedia applications (e.g. podcasts, blogs, YouTube) to support teaching and learning.					
17. Assist students to use a specific electronic health record (EHR) application (e.g., online documentation, electronic medication administration record).					
18. Assist students to learn how various types of electronic records are used across the continuum of care (e.g., EHR, EMR, PHR, etc.)					
19. Assist students to use decision support tools (e.g. clinical alerts and reminders, critical pathways, web-based clinical practice guidelines) to support clinical decision-making and safe patient care.					
20. Assist students to understand the importance of standardized nursing and other clinical terminologies (e.g., International Classification of Nursing Practice [ICNP], C-HOBIC, and SNOMED-CT) supporting clinical documentation.					
21. Assist students to use consumer health solutions to assist patients and their families to leverage technology to promote/manage their health (e.g. social media sites, smart phone applications, online support groups).					
22. Assist students to use information and communication technologies (ICTs) to collect, document and retrieve data in hybrid (paper & electronic) or homogenous health record systems.					
23. Assist students to use legal and regulatory requirements, ethical standards, and organizational policies and procedures (e.g. protection of health information, privacy,					

and security) associated with the use of ICTs.					
24. Help students understand roles of nurses in the design, selection, implementation, and evaluation of electronic applications and information systems in health care.					
25. Assist students to understand how informatics/digital health may improve the health system and the overall quality and safety of patient care.					
26. Teach students about their responsibilities to identify and report system process and functional issues/errors.					

Educators' Capacity in Informatics/Digital Health	**Yes**	**No**
27. I have completed an education program/course work in digital health/nursing or health informatics. (If yes, please describe):		
28. I have successfully completed specialty education or certification in informatics? (e.g., CPHIMS) (If YES, please specify):		
29. I have participated in continuing education workshops/programs focused in digital health/informatics. If yes - (Please describe): If No – would you participate in an informatics learning opportunity if it were available in your region?		
30. I participate in a team/committee that is planning for the integration of digital health/informatics in our curriculum.		
31. I am currently teaching a course in which I include aspects of digital health/informatics. Yes – prompt next two questions		
I am currently teaching digital health/informatics course in the undergraduate program. (Please describe):		
I am currently teaching a digital health/informatics course in the graduate program. (Please describe):		
I have experience in teaching digital health/informatics in an interprofessional course or program.		

32. I have invited guest lecturers to provide digital health/informatics content in my course(s).		
33. I am a guest lecturer who helps colleagues who are integrating digital health/informatics in their undergraduate/graduate programs.		
34. I am currently involved in research related to digital health/informatics.		
35. I have participated in a team/committee focused on planning for the integration of digital health/informatics in our curriculum.		
36. As an educator, I use an electronic health record (simulated or vendor training system) in conjunction with our simulation lab teaching activities. (If No, ask – do you think administrators should support the integration of EHR training within simulation labs? (Yes or No Response)		
37. My administrative leads provide support for continuing education (e.g., workshops) in digital health/informatics.		
38. I am confident that I have the requisite competencies, knowledge and skills to teach basic digital health/informatics content.		
39. I feel confident in my ability to integrate digital basic health/informatics content in my teaching assignments (theory/lab/clinical)(Drop down listing settings as confidence may vary based on the setting).		

Value of Informatics/Digital Health Integration in Nursing Curricula	**Strongly Disagree 1**	**Disagree 2**	**Somewhat Agree 3**	**Agree 4**	**Strongly Agree 5**
40. In my program, the CASN entry-to-practice nursing informatics competencies are viewed as essential for graduates' success.					
41. In my program, most educators recognize the importance of digital health/informatics to advancing nursing practice and quality of care.					
42. In my program, most educators value the importance of integrating digital health/informatics content in nursing education.					
43. There is clear and consistent leadership support for the integration of informatics/digital health into our nursing curriculum.					

OTHER RELEVANT COMMENTS ABOUT YOUR EDUCATOR ROLE?

Thank You and Invite for Additional Participation

As part of this research, we are also conducting telephone interviews and face-to-face focus group meetings. If you would like to be considered for either of these opportunities or both of them, please indicate your choice below and provide contact information. Indicating interest does not imply any commitment to participate.

(Response if answer is NO)
Thank you for completing this survey your participation is greatly appreciated!

(Response if answer is Yes)
Each interested nurse educator will be contacted to discuss participation in an interview and/or a focus group. Participants will be randomly selected with attention to geographic location to promote adequate representation of Canadian nurse educators from each region. These additional data collection methods are intended to provide nurse educators with further opportunities to discuss strategies for the integration of digital health/informatics into nursing curricula across Canada. Telephone interviews will be scheduled at a mutually convenient time. Focus group sessions will be held in conjunction with the CASN National Nurse Educator Conference scheduled in May 28-29, 2018 in Montreal, Quebec.

I am interested in learning more about participating in:

☐ A Telephone Interview (20 – 30 minutes)
☐ A face-to-face focus group (one hour)
☐ Both

Thank you for completing this survey and your expressed interest in ongoing participation. If your name is selected for an interview and/or focus group, a research team member will contact you via email within three weeks of completing this survey. Please provide your name, region, and email address:

☐ Name:
☐ Region:
☐ Email Address:

APPENDIX C – Telephone Interview Guide

Date: _____
Time: _____
Length of interview: _____
Setting: _____

Interview Components – Semi-Structured Format

- Introductions followed by the researcher describing the purpose of this study, including reference to the Information Letter previously sent to the interview participant. Allow time for the participant to ask questions. Acknowledge funding from Canada Health Infoway and administrative supports received from the Canadian Association of Schools of Nursing.
- Negotiate interview plans – "conversational" while at the same time there is an expectation that the participant will respond to few predefined questions.
- Obtain written consent for the interview, including permission to audio record the interview.
- Confirm the participant has completed the on-line Educators' survey.

Interview Questions – Reminding participants there are no right or wrong answers.

Could you describe informatics/digital health integration in your undergraduate nursing program(s)?
A sub-question should include asking if the participant/educator uses electronic health record (EHR)(simulated or vendor training systems) in conjunction with our simulation lab learning activities.
Educators who do use simulated EHR training systems should be asked to describe these learning activities.
In contrast, educators who do not use simulated EHR training systems should be asked if they think administrators should support the integration of EHR training within simulation labs.

What factors influence integration/utilization of informatics and digital health in your teaching, curriculum, or program?

What resources and supports are needed to help you integrate digital health and informatics in your teaching practices/curriculum?

Closure of interview: Acknowledge appreciation of contributions to this research.

APPENDIX D – Focus Group Interview Guide

Focus Group Questions – Facilitator Guide

- Remind participants there are no right or wrong answers. The focus of interview questions is in response to survey data trends, understanding survey data collection is ongoing.
- (Facilitators only - Survey data suggests there is limited use of available educator resources intended to support integration of digital health content within core curricula. Consider this data trend during the focus groups.)

Within educator and/or administrator roles, tell us what you know about CASN's entry-level informatics competencies and CASN resources to support digital health content integration, such Nursing Informatics Teaching Toolkit and Consumer Health Solutions a Teaching and Learning Resource for Nursing Education.

Additional probing questions:

Could you describe informatics/digital health integration in your undergraduate nursing program(s)?

- Discuss strategies to promote developing competence for students and educator capacity to teaching entry to practice informatics content. Ask participants to share examples of informatics content integration within undergraduate nursing curricula.
- Can you describe actual or potential barriers to integrating digital health content within core nursing curricula?
- In circumstances where little is known about digital health content integration – consider asking participants for their input regarding how educators can be supported in the future to advance the development of digital health/informatics in undergraduate nursing education.

Closure of Interview

- Make sure the participants are given an opportunity to have the final word or to discuss something they were hoping to share during this focus group interview.
- Acknowledge appreciation of contributions to this research.