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Leveraging Clinical Preceptorship to Enhance Nursing Students' Readiness in Digital Health

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Introduction

As technology continues to advance rapidly and digitalization becomes more prevalent in health care, the nursing profession must also adapt to these changes (Booth et al., 2021; Kleib et al., 2022). Broadly, digital health refers to the use of information and communication technologies to provide health care services and enhance the efficiency of transmitting relevant health information to improve care quality (World Health Organization, 2021). Examples of such technologies include clinical information systems (CISs) such as electronic health records (EHRs) and personal health portals (Mitchell & Kan, 2019; Organisation for Economic Co-operation and Development [OECD], 2019; Rouleau et al., 2017; Snowdon, 2020). Apart from the many technologies that digital health encompasses, its real value is in how it "connects and empowers people and populations to manage health and wellness, augmented by accessible and supportive provider teams working within flexible, integrated, interoperable, and digitally enabled care environments that strategically leverage digital tools, technologies, and services to transform care delivery" (Snowdon, 2020, p. 24).

As the transition into a digital space for delivering care and sharing information continues in the profession of nursing, it is important for nurses to become digitally literate. However, the integration of informatics and digital health into nursing education and practice should go beyond achieving proficiency in using digital tools (Nagle et al., 2020). It should serve as a catalyst for shaping future nursing leaders who can drive innovation, influence policy, and contribute to the advancement of health care (Giuliano et al., 2022; Honey et al., 2020; Mitchell & Kan, 2019; Myrick & Pepin, 2023; OECD, 2019). Nursing students who have been exposed to the possibilities and potential of technology in clinical practice are more likely to view themselves as agents of change. They recognize the transformative power of technology and its role in improving patient outcomes, streamlining workflows, and promoting interdisciplinary collaboration. By having the knowledge and opportunities to access these technological tools in their practice, students will quickly integrate themselves into the profession and improve their abilities to deliver high-quality care. Therefore, upgrading the nursing education standards and employing multifaceted teaching methods to equip future nurses with the necessary informatics knowledge is essential as the digital landscape continues to evolve, even though challenges persist (Booth et al., 2021; Chauvette et al., 2022; Kleib, Chauvette, et al., 2021). This discussion paper illuminates the importance of nursing informatics as a foundational knowledge base for Canadian nurses and argues the need for advancing clinical nursing education, particularly preceptorship experiences, as a potential pathway for enhancing nursing students' readiness in digital health and facilitating their transition into the registered nurse role in digitally enabled work environments.

Background Literature

Informatics and Nursing Practice: Opportunities and Challenges

Many health care organizations are investing in CISs and require nurses and nursing students to learn how to use and manage these tools and other forms of digital health technologies and services (Mitchell & Kan, 2019; OECD, 2019; Rouleau et al., 2017; Snowdon, 2020). As the largest group of front-line health care professionals, nurses share the responsibility with other members of the health team for collecting, sharing, and documenting patient information in CISs to allow for the smooth transition of care within a site or multiple sites over time (Harerimana et al., 2021; Kleib, Jackman, et al., 2021; Kleib et al., 2022; Mollart et al., 2021). It is important that nurses recognize the reason behind the implementation of technological advancements in health

care in general and within their own practice settings (Booth et al., 2021; Canadian Nurses Association & Canadian Nursing Informatics Association, 2017; Honey et al., 2020). Further, they must work towards building their informatics knowledge and skills so they can better navigate the broad spectrum of digital health technologies, use data analytics, and understand the ethical and legal implications of technology implementation and its impact on patient care and health outcomes (Booth et al., 2021; Canadian Nurses Association & Canadian Nursing Informatics Association, 2017; Kleib et al., 2022). Similarly, with the increased use of technology both in the classroom and in clinical settings, it is becoming increasingly important for nursing students to receive education on nursing informatics to be able to practise competently during their clinical practicum rotations and upon entering the workforce as registered nurses (Chauvette et al., 2022; Nagle et al., 2020).

Nursing informatics "science and practice integrates nursing, its information and knowledge and their management with information and communication technologies to promote the health of people, families and communities world wide" (International Medical Informatics Association, 2009, para. 2). Globally, nursing informatics is evolving as a specialty practice area and is also a core nursing competency (Kleib et al., 2022). In response to that, the Canadian Association of Schools of Nursing (CASN, 2012) endorsed the Entry-to-Practice Nursing Informatics Competencies for the Registered Nurse with associated competency indicators, including information and knowledge management, professional and regulatory accountability, and the use of information and communication technologies in the delivery of patient care, to inform nursing programs about the core concepts and applications of informatics and digital health that should be taught during undergraduate education.

Incorporating nursing informatics throughout the nursing program means that students can gain a solid foundation that will serve as a basis for their future practice and development as leaders. This knowledge enables them to effectively use technology as a tool to enhance patient care, improve clinical outcomes, and contribute to evidence-based practice (Booth et al., 2021; Chauvette et al., 2022; Harerimana et al., 2021; Honey et al., 2020; Kleib et al., 2022; Nagle et al., 2020).

Even though nursing informatics concepts are increasingly being incorporated into nursing programs, there seems to be a disconnect between what is being taught in the classroom and the application of that knowledge in the clinical environment (Brown et al., 2020; Chauvette et al., 2022; Choi et al., 2016; Harerimana et al., 2021; Kleib et al., 2022; Mollart et al., 2021). Additionally, although nursing students are often described as tech-savvy and may be able to adapt more quickly to digital environments, they face challenges in relating to technologies applied in the context of patient care (Brown et al., 2020; Chauvette et al., 2022; Harerimana et al., 2021; Kleib et al., 2022; Mollart et al., 2021; Purnell et al., 2020).

Research involving senior-level nursing students in Western Canada who were near graduation identified that participants felt unprepared and largely overwhelmed, with the majority not being able to fully convey a clear understanding of digital health and how it affects their daily practice or patient care (Kleib et al., 2022). Participants also shared that they do not have hands-on opportunities to use digital health technologies in their schools; rather, they learned about these technologies and their applications for managing patient care during their clinical placements, often with challenges because of limited access to technology or permission to use it, which is the case for most students globally (Choi et al., 2016; Hansbrough et al., 2020; Kleib, Jackman, et al., 2021; Kleib et al., 2022; Ochs et al., 2022).

Clinical Nursing Education and Preceptorship

The nursing profession involves continuous learning and adapting to the constant changes that occur within the health care system and in society (Booth et al., 2021; Dahlke et al., 2016; Giuliano et al., 2022; Honey et al., 2020). Because nursing is a practice-based profession, in addition to developing a solid theoretical understanding of nursing, students also require in-depth and hands-on involvement in various clinical settings and in the community to gain direct experience and learn how to apply this knowledge in caring for patients (Chicca, 2020; Chicca & Shellenbarger, 2021; Dahlke et al., 2016; Ewertsson et al., 2017; Pépin et al., 2022). Typically, clinical education is introduced early in the nursing program, and students develop knowledge in core nursing concepts incrementally, that is, from simple to more complex. The range of clinical experiences is planned strategically to introduce students to nursing practice in diverse clinical contexts so they can develop a generalist knowledge level in nursing and learn to work effectively in the delivery of patient-centred care in collaboration with members of the interdisciplinary team and in line with the entry-to-practice requirements and standards for the RN role (Chicca, 2020; Chicca & Shellenbarger, 2021; College of Registered Nurses of Alberta, 2019; Ewertsson et al., 2017; Pépin et al., 2022).

Typically, education in clinical placements occurs in small groups of nursing students who are supervised and directed by a clinical instructor (Chicca, 2020; Chicca & Shellenbarger, 2021; Dahlke et al., 2016; Ewertsson et al., 2017; Ragsdale & Schuessler, 2021). This method of teaching is beneficial for socializing nursing students into nursing and enabling them to begin learning about nursing practice in real health care settings, as well as to apply their psychomotor clinical skills and competencies in the provision of safe care to patients. Throughout their clinical education experiences, nursing students also receive support and guidance from their clinical instructors in developing and integrating other core competencies, including critical thinking, collaborative practice, decision-making, patient advocacy, relational practice, and informatics competency, which are integral to the nursing role. In addition to the support of clinical instructors, nurses providing care in clinical practice settings serve as role models to nursing students, and by rotating to various clinical placements, students have opportunities to observe nurses and learn from them, helping them become further enculturated into the nursing role (Dahlke et al., 2016; Smith & Sweet, 2019; Turale & Kunaviktikul, 2019).

In most nursing programs, during the final year of their undergraduate education, students are assigned a clinical nursing preceptor for a period of about four months. The preceptorship placement is possibly one of the earliest opportunities for students to gain a sense of autonomy and perform a majority of nursing care duties under indirect supervision (Myrick et al., 2010). The preceptor creates a safe learning environment for the students to work more independently based on their strengths and encourages them to identify any gaps within their learning that need improvement. Working one on one alongside an experienced nurse helps prepare students for managing patient care independently, fulfill any learning needs, immerse them into the nursing work culture, and feel better prepared to transition to their future roles (Chicca, 2020; Chicca & Shellenbarger, 2021; Dahlke et al., 2016; Ewertsson et al., 2017; Hansen, 2021; Jayasekara et al., 2018; Kaihlanen et al., 2020; Myrick et al., 2010; Pullen & Ahchay, 2022; Ragsdale & Schuessler, 2021; Strouse et al., 2018).

During the final stage of their nursing education, students gain substantive nursing knowledge and are exposed to the different schemes of digital health technologies and medical devices used in the delivery of clinical care. However, their ability to assimilate this knowledge

and make sense of how nursing informatics and digital health relate to their nursing role may not be as readily visible to them (Kleib et al., 2022). It is essential for students at this stage to have the opportunity to reflect on that and be given the time and space to experience how informatics involves every action and decision they make in their day-to-day nursing practice and how, if they are not fully informed and engaged, technology can lure them to serve the device as opposed to accomplishing nursing goals. This opportunity can also possibly help students to discover how they can purposefully employ their digital skills to use technology optimally to effect change and improve patient care outcomes, as opposed to using it just because they know how and it is accessible to them (Harerimana et al., 2021; Mollart et al., 2021; Ragsdale & Schuessler, 2021). Nursing preceptors can play a vital role in helping students discover the potential of technology in health care and nursing practice. Yet despite the significance of clinical learning experiences and the important role nursing preceptors play in nursing students' development, there is limited discussion in the literature about their role in relation to digital health readiness among nursing students. In the next section, we discuss opportunities and suggestions for tailoring the clinical education learning experiences, particularly those focused on preceptorship experiences during the final year of nursing education, to support nursing students in assimilating learning experiences about digital health and nursing informatics so that graduates are better prepared to transition to independent nursing practice and advance into their professional careers.

Discussion and Implications for Nursing Education and Practice

Improving the breadth and depth of nursing informatics education and its application in patient care throughout clinical education, particularly during students' final clinical preceptorship experience, has the potential to instill confidence and enthusiasm and can contribute to shaping their perspectives on how they approach technology in the context of care (Kaihlanen et al., 2020; Kavanagh & Sharpnack, 2021; Ragsdale & Schuessler, 2021). Nursing programs, clinical instructors, preceptors, nursing and health care organizations, and students themselves can play a vital role in shaping nursing students' learning experience about digital health and contribute to their development as future leaders in this area and as agents of change.

Nursing programs and educators, in collaboration with preceptors in the clinical setting, can work together to elevate the performance expectations of students during the final nursing clinical preceptorship placement, especially in settings that have some level of digital health technology (Chauvette et al., 2022; Jayasekara et al., 2018; Keiffer, 2018; Ragsdale & Schuessler, 2021; Ryan et al., 2022). For example, nursing students at this level of education should be challenged not only to use EHR systems proficiently to document patient information and retrieve data, such as patient histories, laboratory results, and medication records, to develop a care plan but also to demonstrate how they can contribute to quality improvement initiatives intended to optimize these systems and evaluate their impact on patient and organizational outcomes. This can be accomplished through project work, which can be co-designed with clinical preceptors. Similar expectations can also be integrated into leadership practicum if available in the nursing program. In this context, exposure to and mentorship by nurse managers in relation to digital health roles in leadership practice or opportunities for shadowing nurses employed in nursing informatics roles and positions would be ideal (Kwiatkoski, 2021).

Additionally, creating opportunities for students to do their clinical placements where they can learn about and practise with specialized digital health services and technologies is recommended (Ochs et al., 2022). Knowing that the majority of students may not have had a chance to see such technologies during routine clinical rotations, it is imperative that orientation

to the clinical preceptorship introduces students to such options (Kleib et al., 2022). For example, exposure to telehealth and associated technologies to provide virtual consultations, monitor patients remotely, and promote self-management of health conditions can expand students' understanding of the prospects of digital health technology and help them develop better insight into the possibilities of technology in expanding access to care, improving patient convenience, and enhancing health care outcomes (Ochs et al., 2022). These experiences can be offered through traditional and non-traditional clinical placements; for example, students can choose to do their clinical placement with a digital health technology company or in facilities that provide specialized services. Such experiences are vital as students at this stage make choices about practice settings that best match their interests and future career goals, but often they do not know what they do not know. Further, such experiences may motivate them to explore more opportunities for formal education or professional development in the realm of digital health, such as pursuing graduate education or advanced certifications or specializations in nursing informatics. These are critically needed to ensure the continued supply of nurse leaders who can champion the digital health transformation (Booth et al., 2021; Giuliano et al., 2022; Honey et al., 2020; Kwiatkoski, 2021; Pullen & Ahchay, 2022).

Equally important, nursing programs, in collaboration with health care organizations, can develop educational opportunities in nursing informatics and digital health for practising nurses serving as clinical preceptors so they are better supported to mentor the next generation of nurses in digital health (Griffiths et al., 2022; Ryan et al., 2022; Smith & Sweet, 2019; Wu et al., 2018). These programs could be incentivized to increase interest and tailored to help nurses deepen their knowledge and stay updated with the latest advancements in digital health. This would not only strengthen the readiness of nursing students they mentor and enhance their competence beyond digital proficiency but also ensure that they will be work ready upon transitioning to the workplace, which is a win-win situation. When providing education to students during clinical placements, it is crucial for clinical instructors and preceptors to integrate sound pedagogical approaches to facilitate interactive and reflective learning (Booth et al., 2021; Chauvette et al., 2022; Nagle et al., 2020).

As nursing students go through different clinical rotations during their program, an expected amount of knowledge and skills have to be retained and applied competently during their placement. Clinical instructors are specifically trained to supervise students and guide them through the process of applying their classroom learning to the clinical setting (Dahlke et al., 2016; Jayasekara et al., 2018). This is particularly beneficial for students before entering the preceptorship placement because they do have additional support when it comes to reasoning nursing practices, working in a team setting, taking on small-scale leadership and advocacy roles, and meeting planned goals for the duration of the placement. Because clinical instructors are experienced in working with students and understand how they learn best, they can be a great benefit to preceptors in assisting them to know more about the students they mentor and how to assist them in fulfilling their learning needs so they can successfully transition into the role of a nurse (Dahlke et al., 2016; Keiffer, 2018). It must be recognized that preceptors, although experienced in nursing practice, may not necessarily be aware of different teaching strategies or what the students learn about in their programs. By having a collaborative partnership with clinical instructors, preceptors could seek advice on how to enrich student learning through effective pedagogical practices, such as maintaining a balance between teaching and encouraging students to practice independently, and regularly assessing students' competencies through discussions and feedback (Chicca & Shellenbarger, 2021; Griffiths et al., 2022; Jayasekara et al., 2018; Keiffer,

2018). In addition, the partnership can enable preceptors to effectively plan how specific learning gaps in students' preparedness can be addressed during clinicals. For example, most nursing programs have limited resources, such as simulated electronic health records, to teach students the practical applications of these technologies in clinical care. By having collaborative relationships between clinical instructors and preceptors around students' learning about technology, the preceptors' and students' efforts will be better aligned, and their time will be used meaningfully to address gaps in clinical practice (Chauvette et al., 2022; Hansen, 2021; Kaihlanen et al., 2020; Ryan et al., 2022; Strouse et al., 2018).

Nursing programs can also provide opportunities for students to engage in research and innovation projects centred on digital health. Further, teaching students about system thinking, design thinking, and system transformation as integral leadership competencies is paramount (Bravo, 2023; Fuller & Hansen, 2019; Peters, 2014). By fostering a culture of inquiry and encouraging students to explore the intersection of technology and nursing leadership in health care, nursing programs can further nurture their critical thinking abilities and ignite their passion for making a meaningful impact in the field and in the world (Turale & Kunaviktikul, 2019). Furthermore, nursing programs can facilitate opportunities for students to work alongside other health care professionals, such as physicians, pharmacists, and informatics specialists, in simulated or real clinical settings (Giuliano et al., 2022). These collaborative experiences can expose nursing students to diverse perspectives and encourage creativity on how to co-design the health system in ways that improve interprofessional practice, with the support of digital health tools to render enhanced patient-centred and compassionate care (Booth et al., 2021; Meskó et al., 2017; Pullen & Ahchay, 2022).

Although it is common to see individuals with expertise in informatics lead technological innovations and digital health initiatives, this does not limit students from being directly involved in relevant projects or taking initiatives on their own to support health care digitalization. Students bring their fair share of life experiences and knowledge, along with strong digital and people skills and adaptability, when they enter the nursing profession, and with such diverse backgrounds and qualities, they can certainly make immense contributions to the advancement of health care. Because clinical placement experiences are where students begin to form their professional identities by observing and learning from other nurses, these opportunities should be leveraged to instill a growth mindset among students and motivate them to look beyond just their nursing practice in delivering care and challenge them to become pioneers and innovators so they can contribute to transforming the health systems they work in (Ewertsson et al., 2017; Giuliano et al., 2022; Keiffer, 2018; Myrick & Pepin, 2023; Pépin et al., 2022).

Building on their strengths, students should also take leadership in familiarizing themselves with technological tools used in the current health care system and new emerging technologies that are being developed or piloted for future integration. As they progress in their education, they should actively increase their understanding of how digital tools can facilitate or hinder patient care, as well as identifying areas of digital health that need improvement. Proactive steps to foster a safe and positive learning environment are essential to encourage students to ask questions, challenge the status quo, not shy away from sharing innovative ideas, and feel eager to pursue present and future opportunities in digital health (Booth et al., 2021; Griffiths et al., 2022; Honey et al., 2020; Troncoso & Breads, 2021; Turale & Kunaviktikul, 2019).

Nurse educators can intentionally include coursework or specialized modules focused on health care policy and leadership in relation to digital health (Giuliano et al., 2022; Keiffer, 2018;

Nagle et al., 2020). This would empower nursing students with the knowledge and skills necessary to understand the governance structures, regulatory frameworks, and ethical considerations surrounding technology in health care. By gaining insights into policy development and the legal implications of digital health, future nursing leaders can effectively advocate for changes that promote the responsible, equitable, and ethical use of technology in patient care (Koehle et al., 2022; Troncoso & Breads, 2021). This is particularly important as we navigate the complexity of the next wave of digital innovations powered by artificial intelligence and its implications for health care and nursing practice (Booth et al., 2021; OECD, 2019). As the scope of digital health continues to expand, these improvements can help nursing students be better positioned to become visionary leaders and agents of change, not only in their workplace but also in local and global communities (Koehle et al., 2022; Troncoso & Breads, 2021).

Conclusion

The integration of technology in nursing education and practice and exposing nursing students to the transformative potential of technology are vitally important to nurture their skills, expand their knowledge, and develop their mindsets to drive innovation, influence policy, improve patient outcomes, and advance health care systems. As technological disruption continues in health care globally, new approaches to nursing education should be considered (Myrick & Pepin, 2023; Ochs et al., 2022; Shajani et al., 2023; Stacey et al., 2020). Further, collaborative efforts and innovative approaches are needed to address the challenges in preparing the next generation of nurses so they have the capacity to lead the digital health transformation (Troncoso & Breads, 2021). Considering that nursing students learn about digital health mostly in the clinical setting, nursing preceptorship and non-traditional clinical placement experiences present unique opportunities for developing future nursing leaders in digital health. In addition to helping soon-to-be-graduates expand their understanding of digital health and its application in clinical care, these experiences may also enhance their transition to the workplace and motivate them to pursue further learning about digital health to advance their professional roles in the digital age. Acquiring and maintaining nursing competencies is an ongoing process and a shared responsibility. Despite challenges pertaining to digital health education, nursing students must also advocate for themselves and actively pursue every opportunity to develop their informatics competency. Considering the limited literature relative to clinical nursing preceptorship and digital health, further discussion and research are warranted.

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