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Best Practice Guideline

MARCH 2024

Clinical Practice in a Digital Health Environment

RNAO
Registered Nurses' Association of Ontario
L'Association des infirmières et infirmiers autorisés de l'Ontario

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This work is funded primarily by the Government of Ontario. All work produced by RNAO is editorially independent from its primary funding source.

Declaration of conflict of interest

In the context of RNAO best practice guideline development, the term "conflict of interest" (COI) refers to situations in which an RNAO staff member or expert panel member's financial, professional, intellectual, personal, organizational or other relationships may compromise their ability to conduct panel work independently. Declarations of COI that might be construed as constituting a perceived and/or actual conflict were made by all members of the RNAO expert panel prior to their participation in guideline development work using a standard form. Expert panel members also updated their COI at the beginning of each expert panel meeting and prior to guideline publication. Any COI declared by an expert panel member was reviewed by the RNAO best practice guideline development and research team and expert panel co-chairs. No limiting conflicts were identified by members of the expert panel. See Declarations of Conflicts of Interest Summary.

Land acknowledgement

We recognize that RNAO's office is located on the traditional and unceded territory of the Huron-Wendat, Haudenosaunee, and the territory of the Mississaugas of the Credit. This territory was the subject of the Dish with One Spoon Wampum Belt Covenant, which is an agreement between the Iroquois Confederacy and the Ojibwe and allied nations to peaceably share and care for the resources around the Great Lakes. We also acknowledge that Toronto is covered by Treaty 13 under the Toronto Purchase Agreement with the Mississaugas of the Credit. Today, this land is still the home to many First Nations, Inuit and Métis peoples from across Turtle Island and we are grateful to have the opportunity to work on this territory. By making a land acknowledgement, we are taking part in an act of reconciliation, honouring the land and Indigenous heritage which dates back more than 10,000 years. We encourage readers to learn about the land where you reside on and the treaties that are attached to it. Land acknowledgements are an act of reconciliation and we must all do our part.

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Clinical Practice in a Digital Health Environment

Greetings from Doris Grinspun,

Chief Executive Officer, Registered Nurses' Association of Ontario

The Registered Nurses' Association of Ontario (RNAO) is delighted to present the new clinical best practice guideline (BPG) Clinical Practice in a Digital Health Environment. Evidence-based practice supports the excellence in service that health providers are committed to delivering every day.

We offer our heartfelt thanks to the many partners who made this BPG a reality. First, and most important, we thank the Government of Ontario that recognized in 1999 RNAO's capacity to lead a program that has gained worldwide recognition and is committed to funding it. We also thank the co-chairs of the RNAO expert panel, for their invaluable expertise and stewardship of this BPG.

- Dr. Vanessa Burkoski, RN, BScN, MScN, DHA, O. ONT, Former Chief Nursing Executive & Chief, People Strategy, Humber River Health
- Maureen Charlebois, RN, BScN, MHA, CHE, Chief Nursing & Clinical Officer, Bayshore HealthCare

For their intense and expert work in the production of this BPG, many thanks go to RNAO staff Christine Buchanan (acting senior manager, guideline development and research), Lauren Bailey (guideline development methodologist), Glynis Gittens (guideline development project coordinator), and Nafsin Nizum (associate director, guideline development and research), and the whole RNAO best practice guideline development and research team. Special thanks to the expert panel for generously providing their time, knowledge and perspective to deliver a rigorous and robust evidence-based resource that will guide the education and practice of millions of health providers. We couldn't have done it without you!

Successful uptake of BPGs requires a concerted effort from educators, clinicians, employers, policy-makers, researchers and funders. Nurses, other health professionals and persons with lived experience, with their unwavering commitment and passion for excellence in care -- provide the expertise and countless hours of volunteer work -- needed to develop new and next-edition BPGs. Employers have responded enthusiastically by becoming Best Practice Spotlight Organizations® (BPSOs®), joining more than 1,500 service and academic institutions in Canada and abroad, committed to implementing RNAO's BPGs. They have sponsored best practice champions, now numbering more than 150,000 – all eager to advance person-centred evidence-based care. BPSOs are also diligently evaluating the impact of BPG implementation on patients, organizations, and health system outcomes.

We invite you to share this BPG with nurses, interprofessional team members, client navigators and advisors in the wider health systems and communities within which you work. We all have much to learn from one another -- and together -- we must ensure the public have access to and receive the best possible health services, always.

Doris Grinspun, RN, BScN, MSN, PhD, LLD (hon), Dr (hc), DHC, FAAN, FCAN, O.ONT.
Chief Executive Officer and Founder of the Best Practices Guidelines Program
Registered Nurses' Association of Ontario

Dedication

Dr. Vanessa Burkoski

This guideline is dedicated to our guideline expert panel co-chair, Dr. Vanessa Burkoski, who's untimely passing, in August 2023, left us all with an even greater duty to serve.

Throughout her career, Dr. Burkoski was a true innovator in provincial health programming and policy, a champion for the community, and a leader in both nursing expertise and strategic advice. She recognized the changing landscape of health care and technology and envisioned the development of a best practice guideline (BPG) that would foster nurses' ability to strengthen professional practice in the context of a digital health environment. Dr. Burkoski's visionary leadership in identifying the need for a guideline to support practice in the area of digital health triggered this BPG. Her guidance and leadership as co-chair were remarkable throughout the development process.

Dr. Burkoski worked as a public health nurse from 1984 to 1990, primary care nurse practitioner (NP) from 1990 to 2002, and director of emergency and critical care services from 2002 to 2006. She was also Ontario's longest-serving chief nursing officer (2007 to 2011). From 2016 to 2021 she served as chief nursing executive and people strategy chief at Toronto's Humber River Health where she led the hospital Best Practice Spotlight Organization®.

She was a fierce advocate for expanding the NP role, giving registered nurses the ability to prescribe medications, enhancing community care, reinstating health coverage for refugees, and supporting medical assistance in dying. She also contributed to the development of a training program for Syrian refugees. Dr. Burkoski was instrumental in securing government funding for 31 attending NP positions in long-term care homes.

A nursing leader par excellence, Dr. Burkoski was recognized for her contributions to the nursing profession with numerous awards – too many to list here. In June 2023, she received the Order of Ontario, the province's highest civilian honour for excellence and achievement in a field and leaving a lasting legacy in our province. At RNAO's 98th Annual General Meeting, Dr. Vanessa Burkoski was honoured with the Lifetime Achievement Award for her dedication to nursing in the areas of practice, administration, policy and research at the provincial, national and international levels.

The RNAO best practice guideline development and research team and the expert panel for the Clinical Practice in a Digital Health Environment BPG express their sincere gratitude for Dr. Burkoski's generous and invaluable contributions as co-chair of this guideline. It was an honour to work with Dr. Burkoski. Her legacy and vision for digital health and the field of nursing will live on, and she will forever be remembered in our minds, hearts and actions.

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NOTES

How to use this document

Throughout this document, terms that appear in **boldface** and are marked with a superscript G ([G]) can be found in the Glossary of Terms in **Appendix A**.

This **best practice guideline**[G] (BPG) is a comprehensive document that provides guidance and resources for **evidence-based practice**[G]. It is not intended to be a manual or "how-to" guide; rather, it is a tool to guide best practices and enhance decision-making for **nurses**[G], the **interprofessional team**[G], educators, **health service organizations**[G], academic institutions, and **persons**[G] and **families**[G]. This BPG should be reviewed and applied in accordance with the needs of individual health service organizations, academic institutions or other practice settings, and with the preferences of nurses, the interprofessional team, and persons and families receiving care in **digital health environments**[G]. This document provides **evidence-based recommendations**[G] and **good practice statements**[G] and descriptions of: (a) practice, education and organizational policy; (b) benefits and harms; (c) values and preferences; and (d) health equity considerations.

Nurses, members of the interprofessional team, educators and administrators who lead and facilitate practice changes will find this document invaluable for developing policies, procedures, protocols and educational programs to support service delivery. Nurses and members of the interprofessional team in direct care will benefit from reviewing the recommendations and supporting evidence.

If your organization(s) (or integrated system of care) is adopting this BPG, the Registered Nurses' Association of Ontario (RNAO) recommends organizations establish change teams whose responsibilities include, but are not limited to, the following:

1. Conduct a gap/opportunity analysis: assess your existing policies, procedures, protocols and educational programs in relation to the good practice statements, recommendations and supporting discussions of evidence in this BPG, and identify any strengths, needs or gaps.
2. Note the recommendations or good practice statements that are applicable to your setting and that can be used to address existing priorities, needs or gaps within your organization(s).
3. Develop a plan for implementing recommendations and good practice statements, sustaining best practices and evaluating **outcomes**[G] by applying frameworks in the Leading Change Toolkit, including the Social Movement Action Framework (1,2) and/or the Knowledge-to-Action Framework (3).

Implementation science[G] resources, including the Leading Change Toolkit, are available online (4). A description of the Leading Change Toolkit can be found in **Appendix J**. For more information, see **Implementation strategies**.

All RNAO BPGs are available for download, free of charge, from the RNAO website. To locate a particular BPG, search by keyword or browse by topic.

We are interested in hearing your feedback on this BPG and how you have implemented it. Please share your story with us at RNAO.ca/contact.

The two-decade journey of RNAO BPGs is documented in: Grinspun D, Bajnok I, editors. Transforming nursing through knowledge: best practices for guideline development, implementation science, and evaluation, Indianapolis (IN): Sigma Theta Tau International; 2018. Available at https://www.sigmamarketplace.org/transforming-nursing-through-knowledge.html

Purpose and scope

Purpose

RNAO's BPGs are systematically developed, evidence-based documents that include recommendations on a variety of topics within the categories of: children and youth, clinical, equity, diversity and inclusion, foundational, health system, healthy work environment, mental health and substance use, older adults; and population health. They are intended for nurses, members of the interprofessional team in direct care positions, health professional students, educators, administrators and executives, policy-makers and researchers in health-service and academic organizations. **Persons with lived experience**[G] are encouraged to become familiar with the BPG to support their involvement in evidence-based decision-making related to their care and services. BPGs promote consistency and excellence in clinical care, administrative policies, procedures and education, with the aim of achieving optimal health outcomes for people, communities, and the health system as a whole.

The purpose of this BPG is to foster nurses' ability to maintain, advance, and strengthen professional practice in the context of a digital health environment. Broadly, this guideline includes information related to:

1. the skills and competencies required by clinical nurses to ensure safe, quality, **person-centred**[G] and compassionate clinical care through therapeutic relationships in a digital health environment;
2. the skills and competencies required by nurses to engage in the design, development and evaluation of digital health environments;
3. the skills and competencies required by nurse leaders and other leaders in all domains of clinical care, administration, education, research, and policy to support the intersection between nursing practice and technology; and
4. the organizational policies and procedures required to support and enable nurses within health systems to effectively influence, implement and utilize digital health technologies.

This BPG recognizes that persons and their families are experts in their health and shared decision-making. Collaboration among nurses, the interprofessional team, persons receiving care and their families is therefore essential to achieving improved health outcomes.

In June 2021, RNAO convened an expert panel to determine the scope of this BPG and to develop **recommendation questions**[G] to inform the **systematic reviews**[G]. The RNAO expert panel included persons with lived experience, and it was interprofessional in composition. The expert panel was composed of individuals with knowledge and experience in clinical practice, education, research and policy across a range of health service organizations, academic institutions, practice areas and sectors where digital health technologies are integrated into care. These experts shared their insights on collaborative nursing practice in digital health environments when working with persons and families to deliver the highest quality of care across the continuum of care (e.g., public health, home and community care, primary care, acute care, rehabilitation, and long-term care [LTC]). The expert panel determined the purpose to primarily focus on nurses, however many of the good practice statements and recommendations are applicable to support the intersection between practice and technology for interprofessional teams of all domains of clinical, administration, education, research, and policy.

The RNAO best practice guideline development and research team and the RNAO expert panel completed a comprehensive review and analysis to determine the scope and priority recommendation questions for this BPG (see **Appendix C**).

Scope

To determine the scope of this BPG, the RNAO best practice guideline development and research team:

- reviewed two relevant RNAO documents identified by the expert panel: the BPG, *Adopting eHealth Solutions: Implementation Strategies (5)* and the *Nursing & Compassionate Care in the Age of Artificial Intelligence (AI)* report (6);
- conducted an environmental scan of existing guidelines and standards on this topic;
- undertook a review of the literature to determine available evidence on clinical practice in a digital health environment for nurses in all domains of practice;
- led 22 key informant interviews with **health providers**[G], administrators, educators, researchers, and persons with lived experience;
- held two virtual discussion groups with health providers, managers, administrators, educators and persons with lived experience; and,
- consulted with the expert panel.

This BPG is to be used by nurses and members of the interprofessional team across the continuum of care (e.g., home and community care, primary care, acute care, rehabilitation, and LTC) in all domains of practice (e.g., clinical, administration, education, research, and policy). It is also to be used by organizations that employ nurses and members of the interprofessional team, including health service organizations and academic institutions.

For the purposes of this BPG, digital health technologies include stand-alone software applications as well as integrated hardware and software systems that can utilize platforms such as computers, smartphones, tablets and/or wearables (7). Specific digital health technologies within scope include: **virtual care**[G]; **electronic health records**[G] (EHRs) (including documentation, lab results, and imaging results embedded in these systems); bedside terminals; smart technologies (e.g., smartphones, falls sensor devices, smart home assistant devices); **wearables**[G]; apps; closed-loop medication systems; **predictive analytics**[G]; **robotics**[G]; **chatbots**[G]; phone calls; emails; text messaging; **social media**[G]; virtual reality; holograms; and 3D printing.

Topics outside the scope of this best practice guideline

As determined by the expert panel, the following digital health technologies are not covered within the scope of this BPG:

- pagers
- patient portals
- robotic surgery
- point of care technologies (e.g., glucometers and ultrasound devices)

It was determined that these technologies have less intersection with nurses specifically (e.g., robotic surgery devices are used by surgeons; patient portals are used by persons receiving care) and the point of care technology was not considered as using novel digital health applications.

Key concepts used in this best practice guideline:

Digital health[G]**:** The field of knowledge and practice associated with the development and use of digital technologies to improve health (8). Digital health encompasses other uses of digital technologies for health such as **artificial intelligence**[G] (AI), **machine learning**[G], **big data**[G] robotics and it also encompasses **eHealth**[G], **mHealth**[G], **health informatics**[G], as well as emerging areas such as advanced computer science techniques (8). Digital technologies refer to tools, systems or devices that can generate, create, store or process data, enabled through microprocesses that are programmed to perform specific functions (9).

Digital health environment: Any setting where health providers, administrators, managers and persons/families receiving care work in supportive teams to provide care and leverage digital tools, technologies and services in order to optimize care delivery and empower and activate people to manage their health and wellness.

Digital health literacy[G]**:** Having the personal competencies to use digital health technologies and services efficiently, competently and safely (10,11). It includes eHealth literacy, which refers to having the skills and abilities necessary to seek, find, understand and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem (12).

Health provider[G]**:** Both regulated (e.g., nurses, physicians, dieticians and social workers) and unregulated (e.g., personal support workers) workers that are part of the interprofessional team. With regards to unregulated health providers, the individual and the organization they work for must ascertain that they have the knowledge, skill and judgment to carry out an intervention.

> **Regulated health provider:** In Ontario, the *Regulated Health Professional Act*, 1991 (RHPA) provides a framework for regulating 26 health professions, outlining the scope of practice and the profession-specific controlled or authorized acts that each regulated professional is authorized to perform when providing health care and services (13).
>
> **Unregulated health provider:** Unregulated health providers fulfill a variety of roles in areas that are not subject to the RHPA. They are accountable to their employers but not to an external regulating professional body (such as the College of Nurses of Ontario). Unregulated health providers fulfill their roles and tasks that are determined by their employer. Unregulated health providers only have the authority to perform a controlled act as set out in the RHPA if the procedure falls under one of the exemptions set out in the Act (14).

Interprofessional team[G]**:** A team comprised of multiple health providers (regulated and unregulated) who work collaboratively to deliver comprehensive and quality health services to persons within, between and across health-care settings (15). Examples of key interprofessional team members supporting persons receiving care in digital health environments include, but are not limited to: nurses, physicians, dietitians, pharmacists, peer workers and personal support workers. It is important to emphasize that persons and their families are active participants in their care, and collaborate in partnership with nurses and the interprofessional team.

Good practice statements and recommendations

This BPG includes both good practice statements and graded recommendations.

Good practice statements

Good practice statements are actionable statements that should be done in practice (16). These are believed to be so beneficial that summarizing the evidence would be a poor use of the expert panel's time and resources (16). Moreover, researchers may no longer be conducting studies on the topic, or the alternative to the action may be unethical or studying them may go against human rights (16,17). Given the high level of certainty that the benefits derived from the good practice statement outweigh the harms, they are not based on a systematic review of the evidence and they do not receive a rating of the certainty in the evidence of effects or a strength (i.e., a rating of conditional or strong, which is further discussed below) (18). This does not diminish certainty in the evidence. While the statement may be supported by **indirect evidence**[G], there is a well-documented clear and explicit rationale connecting the indirect evidence to the statement (16). As such, good practice statements should be interpreted as strong recommendations as there is an underlying assumption that there is high certainty in the benefits of implementing the action (16). It is important to note that good practice statements are not made due to a lack of evidence, nor are they based on expert opinion.

RNAO BPGs are developed using the **Grading of Recommendations Assessment, Development and Evaluation**[G] **(GRADE)** methods. For more information about the guideline development process, including the use of GRADE methods, refer to **Appendix C**.

Graded recommendations

Graded recommendations are also about actions that should be done in practice; however, the recommendation statements are formed based on a direct or indirect link to a body of evidence found through the systematic review process (17). Recommendations are formulated as *strong* or *conditional* by considering the *certainty in the evidence of effects*, values and preferences of persons who are impacted by the recommendation, and *health equity* (see **Interpretation of evidence and recommendation statements**).

Despite the fact that good practice statements and recommendations are developed differently, both provide comprehensive guidance on an action/intervention that should (or should not) be done (17). Therefore, both good practice statements and recommendations should follow the same process for implementation (see **Implementation strategies**).

Recommendation questions

Recommendation questions are priority areas of care identified by the expert panel that require a synthesis of the evidence to answer. These recommendation questions inform the **PICO research questions**[G] (population, intervention, comparison, outcomes) that guide the systematic reviews and subsequently inform recommendations. Potential outcomes were brainstormed and prioritized by the expert panel for each recommendation question, and an individual systematic review was conducted for each recommendation question, in alignment with GRADE methods (19). For questions with limited direct evidence available, the population, intervention or outcomes of interest were broadened to include indirect evidence (19). For example, the populations were broadened to include all health providers (not just nurses), and the interventions were broadened to include interventions not specific to digital health technologies, as the expert panel noted this evidence was often sufficiently direct. For more information about the guideline development process and the use of indirect evidence, refer to **Appendix C**.

The RNAO expert panel developed the following priority recommendation questions and outcomes to inform the development of the recommendations in this BPG. The outcomes are presented in the order of importance, as rated by the expert panel. Many of the prioritized questions from the expert panel were focused on interventions for nurses in clinical practice or organizational interventions. Although a few person- and family-reported outcomes were prioritized (e.g., person/family/**caregiver**[G] satisfaction, involvement, and engagement in care), little direct or indirect evidence examined these outcomes. Future research studies should examine the impact of the prioritized interventions on person- and family-reported outcomes (See **Research gaps and future implications**).

- **Recommendation Question #1:** Should practical (e.g., hands-on) professional development education focused on the use of digital health technologies within an organization be recommended or not for all nurses?

  Outcomes: Nurse competence (with using technology), nurse acceptance of technology, nurse sensitive outcomes (e.g., falls, pressure injuries, pain), nurse involvement in the technology lifecycle, nurse confidence (with using technology), and nurse-person therapeutic relationship.

- **Recommendation Question #2:** Should education about **relational care**[G] and interpersonal communication skills be recommended or not for nurses practising in virtual care settings and in-person digital health environments?

  Outcomes: Person/caregiver/family experience or satisfaction, nurse competence (with using technology), nurse confidence (with using technology), nurse-person therapeutic relationship, and person/caregiver/family involvement and engagement in care.

- **Recommendation Question #3:** Should the implementation of interdisciplinary peer champion models in health service organizations be recommended or not to facilitate education for health providers on the use of digital health technologies?

  Outcomes: Health provider competence (with using technology), health provider adoption of technology, health provider confidence (with using technology), health provider sensitive outcomes (e.g., pressure injuries, pain), and sustainability of education (i.e., knowledge and skills retention)

- **Recommendation Question #4:** Should the use of artificial intelligence-driven predictive analytics software or systems (e.g., command centres and risk assessment software tools) for nurses providing care in all practice settings be recommended or not to inform clinical decision-making and improve clinical outcomes?

  Outcomes: Proactive/anticipatory care, critical incidents, failure to rescue, consistent application of evidence-based practice, and nurse sensitive outcomes (e.g., falls, pressure injuries, pain).

- **Recommendation Question #5:** Should a distributive model (versus no distributive model or any other type of change management model) be recommended to integrate digital health competencies into the professional practice roles and responsibilities of nurses at all levels within an organization?

  Outcomes: Nurse competence (with using technology), nurse engagement (with using, developing, acquiring, and participating in education about the technology), nurse confidence (with using technology]), person/caregiver/family experience or satisfaction, and nurses being able to define what their role is.

Note: These priority recommendation questions are condensed versions of the more comprehensive PICO research questions developed by the RNAO expert panel to guide the systematic reviews and development of this BPG. For more on the PICO research questions and the detailed process of how the RNAO expert panel determined the priority recommendation questions and outcomes, please see **Appendix C**.

RNAO best practice guidelines and other resources that align with this guideline

Other RNAO BPGs and evidence-based resources may support implementation of this BPG. See **Appendix B** for RNAO BPGs and other evidence-based resources on the following related topics:

- adopting eHealth solutions
- nursing and compassionate care in the age of AI
- implementation science, implementation frameworks and resources
- interprofessional collaboration
- person- and family-centred care
- transitions in care and services

Summary of recommendations and good practice statements

Many health-service and academic organizations are implementing digital health technologies, and nurses and health providers are increasingly using these technologies in practice. The good practice statements and recommendations below are intended for use in the context of these settings (i.e., digital health environments).

RECOMMENDATIONS AND GOOD PRACTICE STATEMENTS	STRENGTH OF THE RECOMMENDATION
Practice	
Good Practice Statement 1.0: It is good practice that nurses and health providers complete an initial and ongoing assessment to determine accessibility, motivation, knowledge and preferences of persons and families, including the suitability of the digital health technologies being used in their care.	This is a good practice statement that does not receive a GRADE rating of certainty of evidence or strength.
Good Practice Statement 2.0: It is good practice that nurses and health providers provide education to persons and families related to the digital health technologies being used to deliver their care.	This is a good practice statement that does not receive a GRADE rating of certainty of evidence or strength.
Good Practice Statement 3.0: It is good practice that nurses and health providers be actively involved and engaged in the procurement, adaptation, adoption and implementation of digital health technologies when used in clinical practice.	This is a good practice statement that does not receive a GRADE rating of certainty of evidence or strength.
Education	
Good Practice Statement 4.0: It is good practice that organizations provide nurses and health providers with protected time for education related to the digital health technologies being used to deliver care.	This is a good practice statement that does not receive a GRADE rating of certainty of evidence or strength.

RECOMMENDATIONS AND GOOD PRACTICE STATEMENTS	STRENGTH OF THE RECOMMENDATION
Recommendation Question #1: Should practical (e.g., hands-on) professional development education focused on the use of digital health technologies within an organization be recommended or not for all nurses?	
Recommendation 1.0: The expert panel suggests that health-service and academic organizations provide ongoing education to nurses and health providers that includes hands-on training for the use of digital health technologies.	Conditional
Recommendation Question #2: Should education about relational care and interpersonal communication skills be recommended or not for nurses practising in virtual care settings and in-person digital health environments?	
Recommendation 2.0: The expert panel suggests that health-service and academic organizations provide ongoing education to nurses and health providers that focuses on interpersonal communication skills when using digital health technologies.	Conditional
Recommendation Question #3: Should the implementation of interdisciplinary peer champion models in health service organizations be recommended or not to facilitate education for health providers on the use of digital health technologies?	
Recommendation 3.0: The expert panel suggests that health service organizations implement interdisciplinary peer champion models to facilitate education for nurses and health providers on the use of digital health technologies.	Conditional
Organization and Policy	
Good Practice Statement 5.0: It is good practice that organizations implement policies related to digital health technologies to protect privacy, security and confidentiality.	This is a good practice statement that does not receive a GRADE rating of certainty of evidence or strength.

RECOMMENDATIONS AND GOOD PRACTICE STATEMENTS	STRENGTH OF THE RECOMMENDATION
Good Practice Statement 6.0: It is good practice that regulatory bodies embed digital health competencies into nursing and health provider entry-to-practice exams.	This is a good practice statement that does not receive a GRADE rating of certainty of evidence or strength.
Recommendation Question #4: Should the use of artificial intelligence-driven predictive analytics software or systems (e.g., command centres and risk assessment software tools) for nurses providing care in all practice settings be recommended or not to inform clinical decision-making and improve clinical outcomes?	
Recommendation 4.0: The expert panel suggests that health service organizations implement clinical decision support systems (CDSS) or early warning systems that use artificial intelligence-driven predictive analytics to support (but not replace) nurses' and health providers' clinical decision-making.	Conditional
Recommendation Question #5: Should a distributive model (versus no distributive model or any other type of change management model) be recommended to integrate digital health competencies into the professional practice roles and responsibilities of nurses at all levels within an organization?	
No recommendation was made. The expert panel determined that current evidence was insufficient to assess the certainty of effects of a distributive model, or other types of change management models, to integrate digital health competencies into the professional practice roles and responsibilities of nurses within an organization.	Not applicable

Interpretation of evidence and recommendation statements

GRADE provides a transparent framework and a systematic approach for rating the certainty of evidence of effects and determining the strength of recommendations (19).

Certainty of evidence

The certainty of evidence (i.e., the level of confidence we have that an estimate of effect is true) for **quantitative research**[G] is determined using GRADE methods (19). After synthesizing the evidence for each prioritized outcome, the certainty of evidence is assessed. The overall certainty of evidence is determined by considering the certainty of evidence across all prioritized outcomes per recommendation. GRADE categorizes the overall certainty of evidence as *high*, *moderate*, *low* or *very low* (see **Table 1** for the definition of these categories).

Table 1: Certainty of evidence

CERTAINTY OF EVIDENCE	DEFINITION
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very Low	We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Source: Reprinted with permission from: The GRADE Working Group. Quality of evidence. In: Schunemann H, Brozek J, Guyatt G, et al., editors. Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach [Internet]. [place unknown: publisher unknown]; 2013 [cited 2018 Aug 31]. Table 5.1, Quality of evidence grades. Available from: https://gdt.gradepro.org/app/handbook/handbook.html#h.wsfivfhuxv4r.

Strength of recommendations

Recommendations are formulated as *strong* or *conditional* by considering the *certainty* and/or *confidence in evidence* and the following key criteria (see **Discussion of Evidence** for definitions) (19):

- balance of benefits and harms
- values and preferences
- health equity

According to Schunemann et al., "a strong recommendation reflects the expert panel's confidence that the desirable effects of an intervention outweigh its undesirable effects (strong recommendation *for* an intervention) or that the undesirable effects of an intervention outweigh its desirable effects (strong recommendation *against* an intervention)" (19). In contrast, "a conditional recommendation reflects the expert panel's confidence that the desirable effects probably outweigh the undesirable effects (conditional recommendation for an intervention) or undesirable effects probably outweigh desirable effects (conditional recommendation against an intervention), but some uncertainty exists" (19).

When the overall certainty of the evidence is high or moderate, expert panel members can be confident that the evidence is credible and thus will support a strong recommendation. In addition, expert panel members need to ensure that the benefits outweigh the harms, and that there is reasonable confidence and limited variability in the values and preferences of persons (20). However, when the overall certainty of the evidence is low or very low, there is uncertainty regarding the impact of the intervention of interest, and expert panel members should expect conditional recommendations (20).

Table 2 outlines the implications of strong and conditional recommendations.

IMPLICATIONS OF STRONG AND CONDITIONAL RECOMMENDATIONS

POPULATION	STRONG RECOMMENDATION	CONDITIONAL RECOMMENDATION
For health providers	The benefits of a recommended action outweigh the harms. Therefore, most persons should receive the recommended course of action. There is little variability in values and preferences among persons in this situation. There is a need to consider the person's circumstances, preferences and values.	The benefits of a recommended course of action probably outweigh the harms. Therefore, the majority of persons could receive the recommended course of action. There is greater variability in values and preferences, or there is uncertainty about typical values and preferences among persons in this situation. There is a need to consider the person's circumstances, preferences and values more carefully than usual.
For persons receiving care	Most persons would want the recommended course of action and a small portion would not.	The majority of persons in this situation would want the suggested course of action, but many would not.
For policy-makers	The recommendation can be adapted as policy in most situations.	Policy-making will require substantial debate and involvement of many others impacted by the change. Policies are also more likely to vary between regions.

Source: Adapted with permission from: The GRADE Working Group. Quality of evidence. In: Schunemann H, Brozek J, Guyatt G, et al., editors. Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach [Internet]. [place unknown: publisher unknown]; 2013 [cited 2020 May 11]. Table 6.1, Implications of strong and weak recommendations for different users of guidelines. Available from: https://gdt.gradepro.org/app/handbook/handbook.html#h.wsfivfhuxv4r.

Note: The strength of each recommendation statement is detailed directly below it and in the **Summary of recommendations and good practice statements**. For more information on the process used by the expert panel to determine the strength of each recommendation, please see **Appendix C**.

Discussion of evidence

The Discussion of Evidence that follows each recommendation includes the following main sections:

1. **Benefits and harms:** Identifies the potential desirable and undesirable outcomes reported in the literature when the recommended practice is used. Content in this section solely includes research from the systematic review.
2. **Values and preferences:** Denotes the relative importance or worth placed on health outcomes derived from following a particular clinical action from a person-centred perspective. Content for this section may include research from the systematic reviews and, when applicable, observations and/or considerations from the RNAO expert panel.
3. **Health equity:** Identifies the potential impact that the recommended practice could have on health across different populations, settings and/or the barriers to implementing the recommended practice in particular settings. This section may include research from the systematic reviews and, when applicable, observations and/or considerations from the RNAO expert panel.
4. **Expert panel justification of recommendation:** Provides a rationale for why the expert panel made the decision to rate a recommendation as strong or conditional.
5. **Implementation tips:** Highlights practical information for nurses and members of the interprofessional team to support implementation in practice. This section may include supporting evidence from the systematic review and/or from other sources (e.g., the RNAO expert panel).
6. **Supporting resources:** Includes a list of relevant resources (e.g., websites, books and organizations) that support the recommendations and good practice statements. Content listed in this section was assessed based on five criteria: relevancy, credibility, quality, accessibility and timeliness of publication (published within the last 10 years). Further details about this process and the five criteria are outlined in **Appendix C**. The list is not exhaustive and the inclusion of a resource in one of these lists does not imply an endorsement from RNAO. Some recommendations and good practice statements may not have any identified supporting resources

Best practice guideline evaluation

As you implement the recommendations and good practice statements in this BPG, we ask you to consider how you will monitor and evaluate the impact of this BPG's implementation.

The Donabedian model, which informs the development of indicators for evaluating quality health care, includes three categories: structure, process and outcome (21).

Structure describes the required attributes of the health system or health service organization to ensure quality care. It includes physical resources, human resources, and information and financial resources.

Process examines the health-care activities being provided to, for and with persons or populations as part of the provision of quality care.

Outcome analyzes the effect of quality care on the health status of persons and populations, health workforce, health service organizations or health systems (21).

For more details, see the Monitor Knowledge Use and Evaluate Outcomes sections in the Leading Change Toolkit *(*4). The following indicators have been developed to support evaluation and quality improvement. Consider **Tables 3**, **4**, and **5**, which provide a list of structure, process and outcome indicators to assess the impact of BPG implementation and are derived from both BPG recommendations and good practice statements. Each table also identifies if the indicator aligns with other indicators in local, provincial, national and/or international data repositories and/or instruments. Alignment with data repositories/instruments is determined by comparing the following criteria with the developed indicators: the operational definition, if the indicator is nursing sensitive, and the inclusion/exclusion criteria. Depending on the level of alignment, an indicator may be described to have full, partial or no alignment with external data repositories/instruments. Indicators may be adopted (in their current state) or adapted (modified) from external data repositories/instruments.

The following indicators will support quality improvement and evaluation. Select the indicators most relevant to the changes you are making/planning to make in practice, education and/or policy, based on BPG recommendations and good practice statements that are prioritized for implementation.

Table 3 provides structure indicators associated with specific recommendations that are related to human resources, education or other organizational factors.

Table 3: Structure indicators

RECOMMENDATION	STRUCTURE INDICATORS	ALIGNMENT WITH INDICATORS IN DATA REPOSITORIES/ INSTRUMENTS
Recommendation 1.0	Percentage of health providers who received hands-on training for the use of digital health technologies, during the measurement period ***Numerator:*** *Number of health providers who received hands-on training for the use of digital health technologies, during the measurement period* ***Denominator:*** *Total number of health providers*	Partial alignment with World Health Organization (WHO)
Recommendation 2.0	Percentage of health providers who received education that focuses on interpersonal communication skills when using digital health technologies, during the measurement period ***Numerator:*** *Number of health providers who received education that focuses on interpersonal communication skills when using digital health technologies, during the measurement period* ***Denominator:*** *Total number of health providers*	New

Table 4 supports the evaluation of practice changes during implementation. The indicators are directly associated with specific good practice statements and support process improvement.

Table 4: Process indicators

GOOD PRACTICE STATEMENT	PROCESS INDICATORS	ALIGNMENT WITH INDICATORS IN DATA REPOSITORIES/ INSTRUMENTS
Good Practice Statement 1.0	Percentage of persons who received an assessment to determine accessibility, motivation, knowledge and preferences, including the suitability of the digital health technologies being used in their care, during the measurement period ***Numerator:*** *Number of persons who received an assessment to determine accessibility, motivation, knowledge and preferences, including the suitability of the digital health technologies being used in their care, during the measurement period* ***Denominator:*** *Total number of persons who received care by a health provider using digital health technologies, during the measurement period*	New
Good Practice Statement 2.0	Percentage of persons who received education from health providers related to the digital health technologies being used to deliver care, during the measurement period ***Numerator:*** *Number of persons who received education from health providers related to the digital health technologies being used to deliver care, during the measurement period* ***Denominator:*** *Total number of persons who received care by a health provider using digital health technologies, during the measurement period*	Partial alignment with Canada Health Infoway and Institute for Clinical Evaluative Sciences (ICES)

Table 5 provides outcome indicators to assess the impact of implementing **evidence-based practice**[G] changes.

Table 5: Outcome indicators

OUTCOME INDICATORS	ALIGNMENT WITH INDICATORS IN DATA REPOSITORIES/INSTRUMENTS
Percentage of heath providers reporting an improvement in confidence related to use of digital health technology following training session(s), during the measurement period ***Numerator:*** *Number of health providers reporting an improvement in confidence related to use of digital health technology following training session(s), during the measurement period* ***Denominator:*** *Total number of health providers who have been trained and have access to the digital health technology, during the measurement period*	Partial alignment with Canada Health Infoway
Percentage of persons who were satisfied with the health provider's interpersonal skills when the health provider was using digital health technology in person, at the point of care, during the measurement period ***Numerator:*** *Number of persons who were satisfied with the health provider's interpersonal skills when the health provider was using digital health technology in person, at the point of care, during the measurement period* ***Denominator:*** *Total number of persons who received care by a health provider using digital health technology in person, at the point of care, during the measurement period*	Partial alignment with Canada Health Infoway, Institute for Clinical Evaluative Sciences (ICES), Ontario Health, Partnership for Quality Measurement (PQM), Public Health Agency of Canada (PHAC), Statistics Canada and World Health Organization (WHO)
Percentage of persons who were satisfied with the health provider's interpersonal skills when the health provider was using digital health technology virtually, during the measurement period ***Numerator:*** *Number of persons who were satisfied with the health provider's interpersonal skills when the health provider was using digital health technology virtually, during the measurement period* ***Denominator:*** *Total number of persons who received care by a health provider using digital health technology virtually, during the measurement period*	Partial alignment with Canada Health Infoway, ICES, Ontario Health, PQM, PHAC, Statistics Canada and WHO

Other RNAO resources for the evaluation and monitoring of BPGs:

- Nursing Quality Indicators for Reporting and Evaluation® (NQuIRE®), a unique international data system housed in the International Affairs and Best Practice Guidelines Centre, allows Best Practice Spotlight Organizations® (BPSOs®) to measure the impact of BPG implementation. The NQuIRE data system collects, compares and reports data on human resource structure indicators as well as guideline-specific, structure, process and outcome indicators. NQuIRE indicator definitions are aligned with available administrative data and existing performance measures wherever possible, adhering to a "collect once, use many times" principle. By complementing other established and emerging performance measurement systems, NQuIRE strives to leverage reliable and valid measures, minimize reporting burden and align evaluation measures to enable comparative analyses. The international NQuIRE data system was launched in 2012 to create and sustain evidence-based practice cultures, optimize safety of persons, improve health outcomes and engage staff in identifying relationships between practice and outcomes to advance quality and advocate for resources and policy that support best practice changes (22).
- BPG Order Sets™ embedded within electronic records are technology-enabled implementation tools that provide a mechanism for electronic data capture of process and outcome measures. The ability to link structure and process measures with specific client outcome measures helps determine the impact of BPG implementation on specific health outcomes. In LTC, BPG Order Sets have evolved into RNAO Clinical Pathways™ with the support of senior nurses with extensive expertise in this setting. RNAO Clinical Pathways have been embedded within a commonly used EHR system and are accessible to all Canadian LTC homes.

Background context

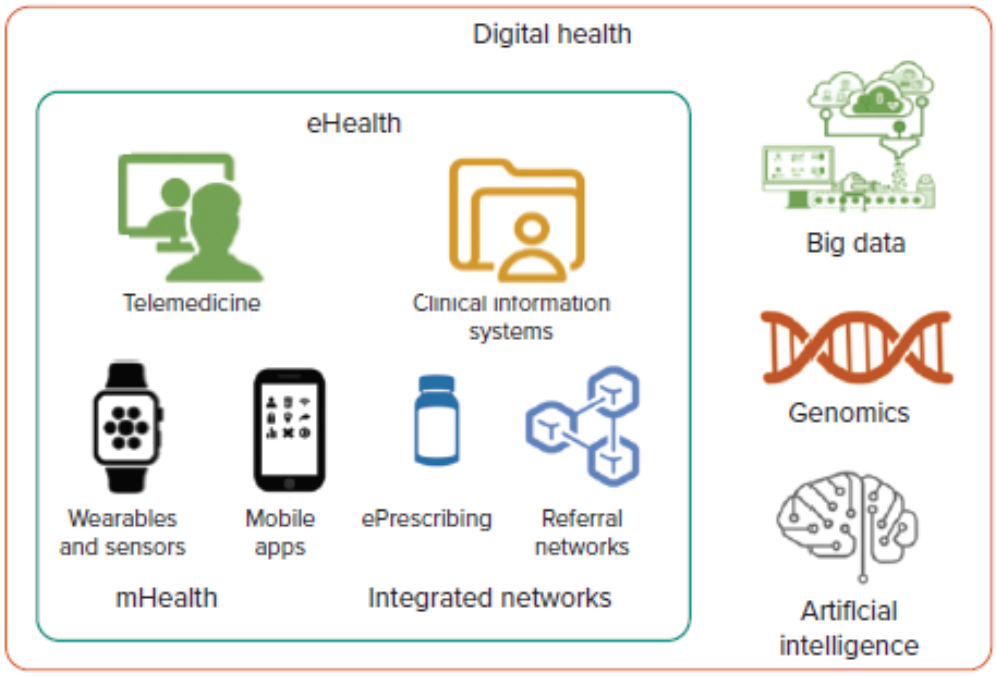
Digital health

Digital health technologies are being increasingly embedded into all aspects of life, including within the health-care sector (169). Digital health is a broad term that refers to the field of knowledge and practice associated with the development and use of digital technologies to improve health (8). Digital technologies refer to tools, systems or devices that can generate, create, store or process data, enabled through microprocesses that are programmed to perform specific functions (9). Digital health also encompasses other uses of digital technologies for health such as AI, machine learning, big data and robotics; it encompasses eHealth, mHealth, health informatics, as well as emerging areas such as advanced computing sciences (8). **Figure 1** depicts the domains of digital health and eHealth. Digital health encompasses big data (i.e., large data sets that may be analyzed using computers to reveal patterns and trends); genomics (i.e., reading genes through genome sequencing and/or other more targeted strategies and using this information for more personalized health care (23)); and AI, as well as the broader domains of eHealth, mHealth and integrated networks. eHealth includes telemedicine (e.g., virtual care platforms) and clinical information systems (e.g., EHRs). mHealth includes wearables, sensors, and smartphone mobile apps. Integrated networks include electronic prescribing systems or referral networks (24,25). Additionally, interoperability (the ability for nurses and other health professionals to access and or seamlessly exchange structured patient information with health providers outside of their practice setting/organization (174)) has started to become more common across health systems both locally and internationally, and has been shown to have numerous improvements for both practitioners and persons such as cutting wait times, improving clinical decision making and reducing medication errors (174, 175).

For the purpose of this BPG, a digital health environment includes any setting where health providers, informatics professionals, administrators, managers and persons or families receiving care, work in supportive teams to provide care and leverage digital tools, technologies and services in order to optimize care delivery and empower and activate people to manage their health and wellness. Digital health technologies that nurses may use in practice include EHRs, **clinical decision support systems**[G] **(CDSS)** that use predictive analytics, robotics, mobile apps, virtual care platforms, wearable devices, remote monitoring systems, smart home technologies and others. For example, in oncology nursing, advanced analytics and AI techniques are being integrated into these digital health technologies in order to better support persons receiving cancer care services (170). As nursing practice evolves to include more digital health technologies across all settings and sectors, it is of the utmost importance to provide nurses (and other health providers) with the proper guidance to support safe and effective use of these technologies.

Digital health technologies, including technologies that utilize AI, are becoming increasingly prevalent in clinical settings around the world (26). Furthermore, the increased use of digital technologies has changed attitudes and expectations of persons entering the health system. Consumers are demanding more personalized care that is facilitated by digital health technologies and is unique to their values, needs and life circumstances (27). As noted by the World Health Organization (24), digital health technologies introduce novel opportunities to address health system challenges, and thereby have the potential to enhance the quality of health practices and services across different sectors and settings. Appropriate use of digital technologies, those that can be adapted to different countries and contexts, can help address key health system challenges and support equity in access to health-care services (8). The use of social media is also prevalent across all ages and professions, including health providers. Social media is a broad and evolving term that refers to Internet-based tools that allow individuals and communities to gather and communicate; to share information, ideas, personal messages, images, and other content; and, in some cases, to collaborate with other users in real time (28). Nurses and health providers may use social media to develop their professional network or provide health information to the public and their communities (28). However, they must be cognizant that social media must be used in a responsible way that aligns with professional standards of practice and codes of conduct.

Figure 1: Domains of digital health and eHealth



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Person- and family-centred care in digital health environments

Nurses, persons and families receiving care, technology, and the environment exist in relation to each other (29). The nature of these relationships should be further examined in order to effectively leverage digital health technologies to enhance the experience of persons receiving care and to improve health outcomes (30). Digital health technologies are increasingly supporting nursing practice on a global scale, yet despite advances in technology there continue to be challenges in supporting nurses to effectively use these technologies (31). Nurses are at the forefront of the health system and so it is important to recognize the unique capabilities of technology to help meet health system demands and, ideally, provide more personalized, person- and family-centred care. It is essential that nurses gain a broader understanding of how these emerging technologies shape the future of the profession and influence decisions about aspects of nursing care (26).

There is great potential for digital health technologies such as predictive analytics, CDSS, and others, to enhance the experience of persons receiving care (6). However, some may have concerns that digital health technologies could have a negative impact on the nurse-person therapeutic relationship, and this could lead to some reluctance among nurses to adopt the use of digital health technologies (31). Despite some concerns about negative impacts of digital health technologies, there are many important benefits for nurses and persons receiving care when technologies are used. For example, these technologies allow nurses to make informed decisions based on high quality, real-time data about a person's clinical status and circumstances, and thus facilitate more timely diagnoses and treatment decisions (6,8). Furthermore, the use of digital health technologies to achieve efficient and coordinated services — by streamlining the nursing process and improving workflow — creates the potential for nurses to spend more time with persons receiving care and less time documenting or completing administrative tasks (6). When utilized appropriately, digital health technologies can promote person- and family-centred care, as digital connectivity can transcend physical barriers and allow increased access for persons receiving care (8).

Social and digital determinants of health and equity considerations

Digital health has the potential to transform health systems, and engage people and populations more meaningfully in their care, yet, several questions on how to effectively incorporate these technologies into practice remain unanswered (32). The WHO's global strategy on digital health promotes the appropriate use of digital technologies to be adaptable to different countries and contexts to help address key health system challenges, while incorporating equity, diversity and inclusion principles in order to ensure that access to digital resources leaves no individual left behind (8). However, we recognize that the application of digital health solutions may have unintended consequences and access may not be equitable to all persons and populations (33). For example, access to digital health technologies is limited by socioeconomic status, under-resourcing of certain health systems or neighbourhoods, **health literacy**[G], digital or eHealth literacy levels, and other factors (33). This concept has also been described as the "**digital divide**[G]," which refers to the growing gap between **underserved and underserviced populations**[G] — that may not have access to the internet or many technologies — and urban populations that have greater access to technologies and advancements (34). Underserved and underserviced populations include, but are not limited to: Black & **Indigenous**[G] People of Colour (BIPOC) Communities, Two-Spirit, lesbian, gay, bisexual, trans, queer, intersex, and other people who identify as a sexual or gender minority (2SLGBTQI+), persons experiencing homelessness, persons in rural communities, older adults, persons living with substance use disorder, persons living with mental health issues, and persons with disabilities. Other factors such as education levels and race are also contributing to the widening digital divide (34). As digital health technologies become prevalent in global health systems, it is imperative that the "digital determinants of health" (i.e., literacy in information and communication technologies, access to equipment, and access to the internet) are considered in order to optimize equitable care delivery (8).

Furthermore, some underserved or underserviced populations may be particularly hesitant to use digital health technologies due to fear around how their personal information will be stored and used by health providers. Historical trauma around misuse of personal health information may contribute to this hesitancy. It is of the utmost importance that health providers use digital health technologies in a culturally safe manner. They must provide persons and families with education on: how the technology is being used to enhance care delivery; security/privacy measures; how to get support for technology issues; how the data is used to enhance health; and when to call a health provider (see **Good Practice Statement 2.0**).

Digital health offers an opportunity to enhance health system efficiency and sustainability, and strengthen health programs across settings and sectors, but technologies can only be valued and adopted if they are accessible and support equitable, universal access to health services (8). For further information on digital health equity, refer to the *Framework for Digital Health Equity* in **Appendix E**.

Ethical considerations when using or implementing digital health technologies

It is vital that leadership teams and researchers consider the many ethical situations that may arise as health service organizations increasingly adopt digital health technologies (6). Ethics must be a key consideration as policies and procedures are created to support new models of care, new nursing roles, new workflows, and changes to scope of practice.

For example, new organizational policies are required to address the ethical concerns pertaining to the use of AI-driven predictive analytics and robotic devices in nursing (35). One such concern pertains to the impact of AI on clinical judgment arising from a health provider's inability to validate the accuracy of risk scores generated by AI-

driven predictive analytics. The ability to provide clear rationale for one's clinical decisions is a professional and ethical responsibility (35). Many existing professional codes of ethics and standards of practice do not address the current or future use of digital health technologies and AI in clinical decision-making. Professional codes of ethics and standards of practice must be updated to clearly stipulate that the use of digital health technologies, including AI technologies, is intended to support rather than replace nurses' and health providers' clinical judgement (36,37). As well, there is the potential for bias in the data used to develop algorithms for AI-driven technologies (38,171) , and health providers must be educated on and be aware of these biases when they interpret the judgments made by the technology.

Additionally, as more organizations adopt EHR systems, there are significant privacy and confidentiality considerations that have an impact on both providers and organizations. It is essential that electronic health information is only used within the circle of care for clinical purposes, and that organizations have systems to monitor adherence to these laws and ensure that system-wide data leaks are avoided. As per the Information and Privacy Commissioner of Ontario, the circle of care is defined as the ability of certain health information custodians to assume an individual's implied consent to collect, use or disclose personal health information for the purpose of providing health care, in circumstances defined in Personal Health Information and Privacy Act (37,38). Nurses and other health providers would be contravening the Act if they used an EHR to search for confidential health details about a family member or friend, or any other person outside their circle of care.

Finally, there are ethical considerations around virtual care platforms. Virtual care refers to interactions between persons and families with their health providers that occur remotely, use any form of communication or information technologies, and that aim to facilitate or maximize the quality and effectiveness of patient care (41). Organizations and health providers that implement virtual care platforms are to ensure that these platforms have been validated and meet appropriate security, privacy, and confidentiality standards. For example, Ontario Health has created a list of verified vendor platforms to help health service providers identify virtual care solutions that are appropriate for clinical use and that meet standards (42). Health provider preference for a specific virtual care platform may not align with an approved platform, and there are inherent risks to using alternative platforms.

Enhancing community care for ontarians and alignment with the quadruple aim

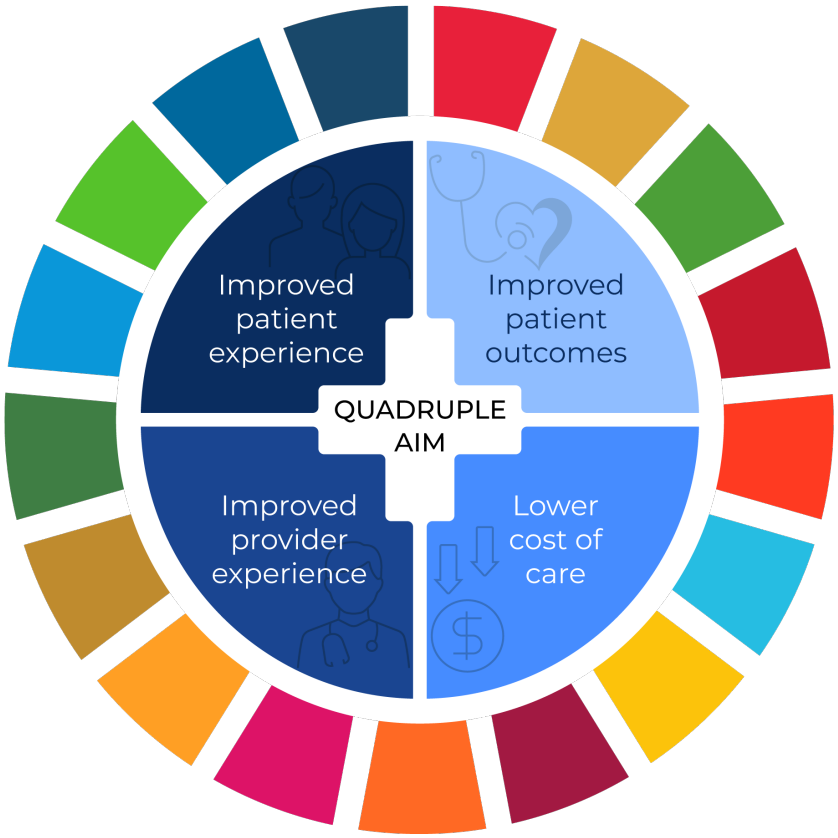
RNAO's Enhancing Community Care for Ontarians (ECCO) 3.0 model seeks to optimize the potential of digital health technologies to improve access and integration across the health system, to support person-centred care and to increase system efficiency (43). Collection and shared use of health data across sectors and settings through digital health technologies aids in informing decisions and ensures accountability (43). Furthermore, when digital health technologies are used to improve access to population health data and personal health information, they can support better integration and collaboration among health providers and persons receiving care (43).

The **quadruple aim**[G] is an internationally recognized framework for the delivery of health care that is centred around four overarching goals: (1) Enhanced experiences for persons receiving care (2) Enhanced experiences for health and social care providers delivering care (3) Improved health outcomes (4) Reduced health-care costs (44). The United Nations sustainable development goals (SDGs) were launched in 2015 as a universal call to action to end poverty, protect the planet, and ensure peace and prosperity for all persons (45). RNAO has added to the outer ring of the quadruple aim framework a graphic that depicts the United Nations SDGs in order to reflect the need for nurses and other health providers to address the broad social and environmental determinants of health, which include population health, supporting underserviced populations and promoting health equity (see **Figure 2**).

When developing this particular BPG and prioritizing outcomes, the expert panel considered outcomes that align with the quadruple aim and SDGs. In line with the SDGs, it is also important to consider the environmental impact of digital health technologies. Many digital health technologies are purposely designed to become obsolete over a certain period of time, which can lead to increasing amounts of digital waste when these technologies are discarded (i.e., "e-waste") (46). The carbon footprint elicited by digital health technology power usage and bandwidth use are another important consideration when it comes to digital health technologies and their environmental impact (46). These issues can be addressed by examining the way that digital health technologies are used by health service organizations and health providers, and keeping conservation and sustainability in mind (46).

Ultimately, the recommendations in this guideline reflect evidence-based practices focused on improving patient and provider experiences (i.e., persons and families, nurses, and other health providers), and person and family outcomes. Evidence-based practice is central to achieving the quadruple aim and enhancing the care of persons in Ontario, nationally, and internationally.

Figure 2: The Quadruple Aim and the Sustainable Development Goals



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Emerging evidence considerations

Digital health is an emerging topic of research. Very little empirical evidence exists on the impact of digital health technologies on nurses, persons and families receiving care, including potential or actual risks to persons, families and caregivers, and to their experiences of compassionate care when digital health technologies are used (6). Furthermore, issues related to access to technologies and ethical considerations are lacking high quality empirical evidence (6) (see **Research gaps and future implications**). In this BPG, most of the evidence for the prioritized research questions is of low or very low certainty as per GRADE methodology. This is due to the lack of high-quality **randomized controlled trials**[G] (RCTs) in the areas of digital health, and the fact that many **non-randomized studies**[G] had high risk of bias, small sample sizes, and inconsistency in the results.

Differences in the language and terminology used in the areas of digital health may increase the difficulty in finding literature. However, the publication of the recommendations and good practice statements in this BPG will lead the way and promote more research and evidence-based practice in the area of digital health. Given the forecasted surge in the use of digital health technologies by nurses, other health providers, and persons receiving care, researchers should proactively lead this change and assist in the development of structures to support new and emergent domains of research (6).

Conclusion

Nurses are the largest group of regulated health professionals in Canada, representing about half of the total health workforce. They are the backbone of our health system, and are responsible for much of the direct care provided (47). There is a need for up-to-date evidence to guide nursing practices regarding safe and effective use of digital health technologies in clinical practice environments. This BPG provides evidence-based recommendations — for nurses, members of the interprofessional team, organizations, and health systems — to support clinical practice in a digital health environment. In collaboration with persons with lived experience and a wide array of expert panel members, this BPG was developed to offer recommendations that support care across settings and sectors, and ultimately improve health outcomes and health equity for persons and families receiving care in digital health environments.

Recommendations and good practice statements

PRACTICE

GOOD PRACTICE STATEMENT 1.0:

It is good practice that nurses and health providers complete an initial and ongoing assessment to determine accessibility, motivation, knowledge and preferences of persons and families, including the suitability of the digital health technologies being used in their care.

Conducting an assessment before developing a plan of care or implementing any intervention is a standard of professional practice. This good practice statement did not require a review of the evidence, but is important to communicate to nurses and health providers (48). Additionally, actively partnering with persons when developing a care plan, and identifying their goals, wishes and preferences, is a standard of professional practice (49–52). It is of the utmost importance to engage persons and their families in an assessment related to the digital health technologies being used in their care, and to the appropriateness of the technology (6).

The digital health technologies being used in care could refer to technologies used independently by the person and/or family receiving care (e.g., self-management apps, chatbots), or technologies used by both the nurse and person receiving care together (e.g., virtual care platforms). For specific considerations on whether a teleconsultation or virtual care appointment is appropriate, refer to **Appendix H** (**note:** this appendix is specific to children, adolescents and their families).

When discussing the use of a digital health technology with the person and/or family, it's important to take the following into account: their preferences and goals; their capability and motivation for using the technology; their digital, health and reading literacy levels; the digital platforms available; how frequently they are willing to use the digital health intervention; how it would fit into their current care routines; how their personal information and data may be used within the technology; and any costs associated with the digital health technology (53). Digital health literacy refers to the specific degree of skills and abilities necessary to use digital health technologies and services (10,11). An assessment to determine the person's digital literacy levels and identify care needs related to the technology being used in their care is good clinical practice. Assessing digital health literacy can help identify persons who may encounter difficulties when using digital health technologies and services (54). This assessment may include broader accessibility considerations as well, such as whether the technology can provide service in various languages if needed.

When nurses or health providers conduct an assessment, one of their key roles is to analyze the digital health technology's potential to interfere with the interpersonal relationship between the person, family and health provider, and with the experience of person- and family-centred compassionate care (6). Person- and family-centred compassionate care is central to nursing practice and the use of digital health technologies should not interfere with this core practice.

Furthermore, underserved or underserviced populations are at higher risk of poor clinical outcomes, and health literacy is an important contributor to the digital divide (55). One study aimed to determine the relationship between health literacy level and technological access, use, and capability among hospitalized adults in the United States (55). It found that participants with low health literacy were more likely to report needing help performing online

tasks (55). Conducting an assessment and understanding the impact of these health equity factors can help nurses and other health providers tailor the digital health technology being used in care to the persons' unique needs. It is fundamental that an assessment on the appropriateness of digital health technologies focuses on the needs identified by the person and their family as they are experts of their own circumstances (56).

A new assessment or re-assessment may be required if the type of digital health technology being used in care changes, new technology is added to the person's care plan, or there is a change in the persons' health status. As a standard of practice, nurses are accountable to reassess persons receiving care in order to make sure the care plan still meets the needs of the person and family, and address any changes to the person's health condition (57). All assessments should be documented, along with any changes to the person's care plan (57).

Implementation tips

From the expert panel: For health providers and organizations

- It can be advantageous to (when possible) conduct an assessment in the person or family's own home environment in order to identify factors that may impact the use of digital health technologies.
- Note whether or not the person uses, in their daily life, digital health technologies (e.g., personal cell phone, smart phone, smart watch, computer). A person's use of such technologies may indicate some level of comfort with using digital technologies.
- If there is a family member or caregiver involved in care, consider assessing whether they can be an added user of the technology to help facilitate uptake, guidance, education and monitoring.
- Assess how the person or family learns best (e.g., visual learning through video, hands-on learning, verbal instructions, etc.) and incorporate that into the plan for educating them on the use of the digital health technology.
- Consider a trial period with the technology to help identify and address any barriers the person and family may encounter when using the technology.
- If another team member has conducted an initial assessment, this should be documented and communicated to the nurse, health provider, or other members of the interprofessional team. If the assessment changes over time, the nurse or health provider is to perform a reassessment and update the care plan accordingly.
  - If there is a change in a person's health condition, it may create new opportunities to utilize different digital health technologies (when appropriate).
- Establish a feedback system to gather input from persons and families regarding their experiences with the technology at multiple touch points during the course of their care.
- Assessments are to be culturally sensitive. Assess if the digital health technology can be provided in other languages, or if a translator is needed.
- Consider issues related to privacy and the comfort level of the user, as the person may not feel comfortable sharing sensitive information through online platforms.
- For persons and families participating in virtual care appointments, health providers are to consider a comprehensive risk assessment; particularly for vulnerable populations such as persons living with mental health issues or substance use disorders. For example:
  - Increased risk of domestic abuse/violence: Consideration should be given to the heightened vulnerability of persons who may experience domestic abuse or violence in their home environment, especially due to the lack of privacy during virtual care sessions.
  - Crisis and escalation: anticipate scenarios when persons may face a crisis or an escalation of their condition during a virtual care session. Accordingly, have access to the person's current address, phone number, and an emergency contact number to facilitate immediate response in case of emergencies.

Table 6: Components and details of assessment

COMPONENTS OF ASSESSMENT	DETAILS OF ASSESSMENT
Assessment of the person and/or family's understanding of the technology and its purpose	■ Is the person and/or family familiar with the technology? ■ Explain to the person and/or family what the technology is being used for and ask if they have any questions. The "teach-back method" can be used (i.e., asking persons or their families to explain in their own words how the technology can be used (58)). ■ Engage in a conversation with the person and/or family to mutually agree on how the technology can fit into their current care routines.
Assessment of the person and/or family's digital health literacy level and comfort with technology	■ Does the person and/or family use technology in their daily life (e.g., computer, smart phone)? ■ What is the person and/or family's comfort level with technology (e.g., using a Likert scale)? ■ Does the person and/or family have the skills and abilities necessary to use the digital health technology or services efficiently, competently and safely? ■ Does the person and/or family understand how to interpret information conveyed in the digital health technology (e.g., a wearable device that provides information about vital signs and that may send 'alerts' or notifications to the person)? ■ Does the person and/or family know when to seek care from a health provider?
Assessment of the person and/or family's understanding of the benefits and potential risks of using the technology	■ Does the person and/or family understand the benefits of using the technology in their care plan? ■ Does the person and/or family understand the risks of using (or not using) the technology in their care plan?

COMPONENTS OF ASSESSMENT	DETAILS OF ASSESSMENT
Assessment of person- and family-centred needs related to accessibility and feasibility of the digital health technology	■ Does the person and/or family have accessibility needs that may impact how they use the technology (e.g., hearing or visual impairments)? ■ Does the person and/or family have access to necessary technological equipment (e.g., internet access, laptop, smart phone)? ■ Have the cost and feasibility of the technology been considered (e.g., is use of the technology covered by insurance, is the technology available in their geographic region, are there any internet connectivity issues)? ■ Are there any alternatives to the technology that would better meet the needs of the person and/or family (e.g., a simpler technology, no technology, offering in-person rather than virtual appointments)? ■ Is the digital health technology available in the language spoken by the person or family? ■ Are there any accessible, local virtual care sites in the community that could support the person in accessing care?

Supporting resources

RESOURCE	DESCRIPTION
Canada Health Infoway. Providing safe and high-quality virtual care: A guide for new and experienced users - clinician change virtual care toolkit [Internet]. 2021. Available from: https://www.allianceon.org/resource/Providing-safe-and-high-quality-virtual-care-guide-new-and-experienced-users-Clinician	■ The toolkit shares information and resources to support health providers with the tools they need to provide safe, high quality virtual care. ■ Includes sections on patient and caregiver considerations when making decisions about using virtual care.
Faux-Nightingale A, Philp F, Chadwick D, et al. Available tools to evaluate digital health literacy and engagement with eHealth resources: A scoping review. Heliyon [Internet]. 2022;8(8):e10380. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9449566/	■ This scoping review assesses available tools that can be used by health providers to evaluate digital health literacy.

RESOURCE	DESCRIPTION
National Institute for Health and Care Excellence (NICE). Behaviour change: digital and mobile health interventions [Internet]. NICE; 2020. Available from: https://www.nice.org.uk/guidance/ng183/chapter/Recommendations#using-digital-and-mobile-health-interventions	■ This guideline covers interventions that use a digital or mobile platform, including those delivered by text message, apps, wearable devices or the internet. ■ Includes recommendations related to conducting an assessment prior to using digital and mobile health technologies.
Norman CD, Skinner HA. eHEALS: The eHealth literacy scale. J Med Internet Res [Internet]. 2006; 8(4). Available from: https://www.jmir.org/2006/4/e27/	■ The eHEALS is an 8-item measure of eHealth literacy developed to measure consumers' combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems (12). ■ **Note:** this article is older than ten years but is considered a seminal article.
Ontario Health. Clinically appropriate use of virtual care in primary care [Internet]. Ontario Health; 2022. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/2022-11/ClinicallyAppropriateUseVirtualCarePrimaryCare.pdf	■ This document was developed in response to the rapid uptake and use of virtual care in Ontario. ■ "This guidance is targeted specifically to decision-making related to the clinically appropriate use of virtual care modalities (i.e., e-mail, secure messaging, telephone, video) in the delivery of primary care services" (59).
Registered Nurses' Association of Ontario (RNAO). Person-and family-centred care [Internet]. Toronto (ON): RNAO; 2015. Available from: RNAO.ca/bpg/guidelines/person-and-family-centred-care	■ RNAO Best Practice Guideline (under revision). ■ Outlines best practice recommendations for nurses and members of the interprofessional team to enhance the quality of partnerships with persons receiving care. ■ Recommendations are transferable to digital health environments, and the BPG includes a supporting resource related to person engagement strategies when using technologies.
Yoon J, Lee M, Ahn JS, et al. Development and validation of digital health technology literacy assessment questionnaire. J Med Syst [Internet]. 2022; 46(13). Available from: https://link.springer.com/article/10.1007/s10916-022-01800-8#Sec11	■ The Digital Health Technology Literacy Assessment Questionnaire (DHTL-AQ) is a reliable and valid instrument to measure digital health technology literacy. ■ See supplementary file two located in the article link for the final version of the tool.

GOOD PRACTICE STATEMENT 2.0:

It is good practice that nurses and health providers provide education to persons and families related to the digital health technologies being used to deliver their care.

Providing persons and families with education, information and support is a standard of professional practice (48) and part of the College of Nurses Code of Conduct (60). This good practice statement did not require a review of the evidence, but is important to communicate to nurses and health providers.

Person- and family-centred care has become fundamental to the care and services provided by health systems, organizations, and interprofessional teams, and this care includes providing education to persons and their families. When providing education, it is good clinical practice to provide persons and families with clear and timely information about the benefits and possible risks of digital health technologies being used in their care (61–63), using language and terminology that they understand. Providing persons and families with individualized education about the different technologies that can be used in their care reflects good person-and family-centred care (64). An assessment of the skills, preferences and capacity of persons and families, and the suitability of the digital health technologies used in care, can help to guide the specific education needs of the person and/or family (see **Good Practice Statement 1.0**).

When digital health technologies are being used in care, nurses and health providers should provide education to persons and families about how their personal health information may be collected, accessed and used (23,63) (see **Good Practice Statement 5.0** for more information on policies related to digital health technologies to protect privacy, security, and confidentiality). Persons and families who are educated about the digital health technologies used in their care are better equipped to potentially troubleshoot any issues that arise with the digital health technology (65). For example, a person who has received education about the virtual platform used for their appointments may be able to troubleshoot issues that arise with the technology such as internet connectivity, how to use the chat message function within the platform, or how to turn on their camera.

Person and family education is integral to enhancing a person's knowledge, attitude or skills to maintain or improve their health (66). Health providers should aim to improve the health of persons and families receiving care involving digital health technologies by providing accurate, evidence-based, culturally appropriate, and meaningful education in an inclusive manner (66).

Implementation tips

From the expert panel: For health providers and organizations

- Train front-line health providers to use and introduce the technology to persons and families receiving care (see **Good Practice Statement 4.0**), but do not rely on these trained providers for troubleshooting all technical issues.
- Collaborate with organization information technology (IT) teams to develop a plan for persons and families to receive technological support.
  - Organizations may consider implementation of a 24-hour help desk, or one-on-one 'real-time' support, to provide technological support, troubleshooting, and answer any questions from persons and families using digital health technologies.

- Provide clear, concise, and easy to follow instructions to persons and families using plain language rather than technical or medical jargon and ensure there is time provided for persons to ask questions after education is provided.
- Provide education to persons and families at an appropriate time. For example, meet the person and family at a mutually agreed upon time and do not provide education during an acute phase of illness.
- Assess how the person or family learns best (e.g., visual learning through video, hands-on learning, verbal instructions, etc.) and incorporate that into the plan for educating them on the use of the digital health technology.
  - Depending on the learning style preferences of the person and/or family, consider combining a variety of educational mediums such as visual (e.g., videos and pictures), auditory, hands-on training, and/or reading materials. Where applicable, provide written materials in the person and/or family's language of choice.
  - Consider appropriate education methods for special populations such as pediatric, older adults and persons with cognitive impairments, and work collaboratively with their families and/or caregivers. Consider alternative teaching strategies, such as storytelling, for communities for which a Western teaching and learning approach may not be effective.
- Consider creating an education guide, handout or information tip sheet that covers key concepts regarding the technology being used (e.g., what is the technology; how is it being used to enhance care delivery; security/privacy measures; how to get support for technology issues; using the data to enhance health; and when to call a health provider).
- Use confirmation strategies to ensure that the person or their family understands the education that was provided. For example, use the "teach-back" method, which involves asking persons or their families to explain in their own words what they need to know or do (58).
- Upon admission to LTC homes, notify residents and families of the technologies used in the home and provide education on these technologies using a collaborative decision-making approach.
- Use interpreter services during educational sessions if persons or families have a language barrier.
- Education content may include the role or expectation of the person and family, such as tasks they are expected to complete using the technology.
- Education may include directing persons and families to reputable websites for further health information, and to appropriate government-provided telehealth resources.
- Consider whether administrative staff can support some aspects of the education (e.g., how to log in to digital health platform).

Supporting resources

RESOURCE	DESCRIPTION
Agency for Healthcare Research and Quality (AHRQ). Patient engagement and education. May 2023 [Internet]. Rockville (MD): AHRQ; 2023. Available from:https://www.ahrq.gov/health-literacy/patient-education/index.html	■ This website contains resources for health providers, to help them educate, engage, and involve persons and families in their care (e.g., the "teach back" method, which involves asking persons or their families to explain in their own words what they need to know or do (58)). ■ Contains resources for persons and families receiving care that health care providers can share to help them become informed and take a commanding role in their health.
Health Standards Organization (HSO). Virtual health [Internet]. Ottawa (ON): HSO; Dec 2018. Available from: https://healthstandards.org/standard/virtual-health/	■ This standard provides organizations that receive and/or deliver virtual health services with guidance on how to ensure quality and safety in virtual contexts. ■ Discusses the importance of informing and educating persons and families about the virtual health service(s) they will be using, if applicable to their care (see section five on the "role of the patient in the virtual health service").
Ontario Telemedicine Network (OTN). Checklist: patient consent to participate in a video visit. OTN; Apr. 2020. Available from: https://dropbox.otn.ca/files/checklist-patient-consent_.pdf	■ Checklist designed to ensure a person's readiness for virtual visits and to educate the person on basic consent requirements.

GOOD PRACTICE STATEMENT 3.0:

It is good practice that nurses and health providers be actively involved and engaged in the procurement, adaptation, adoption and implementation of digital health technologies when used in clinical practice.

Procurement, adaptation, adoption and implementation of digital health technologies introduce significant changes for care providers and patients. Change management is the process of making changes in a deliberate, planned, and systematic manner (67). It is important to actively involve nurses as part of the change management process in order to ensure successful adoption and implementation of any change, including new digital health technologies in clinical practice. One of the foundational pillars of a change management framework in health care includes engagement of individuals impacted by the change (65) and nurses are key users of digital health technology. This good practice statement did not require a review of the evidence, but is important to communicate to nurses and health providers.

To ensure successful implementation of digital health technologies, it's important that change management leaders understand the benefits of the technology and potential barriers to successful adoption within the organization (65). Research shows that nurses' technological familiarity and skills influence their technology use; the more well versed nurses are in digital health, the more likely they are to use the digital health systems in their practice (68). It is therefore in the organization's best interest to ensure that nurses at all levels are actively involved in all levels of implementing digital health in clinical practice. Nurses understand clinical care so they are valuable teachers and assessors of whether digital health systems are accurately capturing the appropriate clinical components of care. For example, if an electronic system is missing a field to document if an individual received a blood transfusion, a nurse will easily catch this omission whereas technology specialists may not understand what a blood transfusion is or the importance of capturing this information. Nurses are continuously engaged in care and understand how technology can fit into clinical workflows.

The European Health Parliament's Committee on Digital Health Skills for Health Professionals recommends that health providers are made co-developers of mHealth and eHealth solutions by placing them at the centre of the development process (69). Similarly, the Canadian Association of Schools of Nursing (CASN) has created digital health competencies that recommend nurses be trained in digital health starting in undergraduate nursing programs, and that nurses be involved in the implementation processes of digital health technologies (70).

Large health organizations are already involving nurses in all stages of digital health technology implementation, and there are multiple benefits to enhancing nurses' involvement. Many organizations have trained multiple nurses as "super users" in new digital health technologies such as EHRs to aid in the implementation and adoption of the technologies across the organization. The implementation of digital health technology has benefitted from the use of nurses as "super users", who display positive reinforcement and provide comprehensive explanations when teaching nurses and other interprofessional staff (see **Recommendation 3.0**) (71).

Implementation tips

From the expert panel: For health providers and organizations

- Consider involving a dedicated interprofessional resource team, (e.g., nursing informatics team), to support the procurement, adaptation, adoption and implementation of digital health technologies.
- Involve nurses in the initial design stages of digital health technologies whenever possible.
- When procuring, adapting, adopting or implementing an EHR platform, ensure the EHR is as streamlined as possible, with the least number of steps and clicks, in order to minimize documentation burden for users.
- Appoint and train nurses as "super users" or peer champions to assist with training staff and implementing new digital health technology across an organization (see **Recommendation 3.0**).
- Ensure nurses and executive leadership are actively engaged in order to identify opportunities for education and nurse engagement at all stages of the digital health technology lifecycle.
  - Executive leadership members or teams are to outline requirements or realignment of resources to support the implementation and use of the technology in practice.
- Involve nurses interested in user design testing to provide input on the integration of technology into clinical workflows, both initially and on an ongoing basis.
  - Include a method for users of the technology to provide feedback for ongoing improvements, including identification of workarounds to improve functionality of the technology.
  - Involve nurses from multiple disciplines and experiences levels (i.e., novice to expert) in user testing the technology to ensure it is appropriate for their setting and sector.
- Consider, when applicable, having persons and families involved in user testing of digital health technologies.
- Collaborate with community organizations and health providers within and across health systems to support uptake and adoption of digital health technologies.
- Consider evaluating the implementation of digital health technologies, and whether nurses and health providers were successfully involved in the process. This includes involvement of nurses and health providers in development of evaluation metrics.
- Consider the use of focus groups, communities of practice or formalized committees/groups to engage nurses and health providers in decisions regarding digital health technologies.

Supporting resources

RESOURCE	DESCRIPTION
Canada Health Infoway. Toolkit for implementers of artificial intelligence in health care [Internet]. Dec 2021. Available from: https://www.infoway-inforoute.ca/en/digital-health-initiatives/innovative-technologies/artificial-intelligence/toolkit-for-ai-implementers	■ This toolkit assists health-care organizations in understanding the requirements for implementing AI technologies. ■ Module five includes information on change management for AI adoption.
Dykes S, Chu CH. Now more than ever, nurses need to be involved in technology design: lessons from the COVID-19 pandemic. J Clin Nurs [Internet]. 2020; 30(7-8). Available from: https://onlinelibrary.wiley.com/doi/10.1111/jocn.15581	■ Editorial that highlights the importance of nurse involvement in technology design, acquisition and implementation.
Registered Nurses' Association of Ontario & Associated Medical Services (AMS). Nursing & compassionate care in the age of artificial intelligence: engaging the emerging future [Internet]. October 2020. Available from: RNAO.ca/sites/rnao-ca/files/RNAO-AMS_Report-Nursing_and_Compassionate_Care_in_the_Age_of_AI_Final_For_Media_Release_10.21.2020.pdf	■ This report informs nurses in all roles and sectors, other health professionals, educators, health-service administrators, researchers and policy makers about the opportunities and potential challenges of emerging technologies powered by artificial intelligence. ■ Section that discusses nurses' involvement in the co-design of AI technologies.

EDUCATION

GOOD PRACTICE STATEMENT 4.0:

It is good practice that organizations provide nurses and health providers with protected time for education related to the digital health technologies being used to deliver care.

Continued professional development is central to the nursing profession, and continuing competence is a professional standard of practice (48). Protected time for education provides an opportunity for health providers to address their own learning and professional development needs, and could involve meetings, workshops, and other educational activities (72). This education can be discipline specific or interprofessional in nature (72). This good practice statement did not require a review of the evidence, but is important to communicate to organizations.

A supportive environment is a prerequisite for professional development, and conditions such as protected funded time, and appropriate workplace learning spaces are necessary (73). Quality training takes time and organizations have a duty to provide paid and protected time for their staff to become up-to-date with new technology. Without proper training, nurses and other health providers cannot be expected to quickly adapt to a new and complex technology while also juggling multiple other responsibilities during their workday. Hands-on training may be one method of providing ongoing education to nurses and health providers for the use digital health technologies (see **Recommendation 1.0**). Additionally, the safety of persons receiving care is compromised if nurses are unable to use digital health technologies in a safe way.

The commitment from a health service organization to adopt digital health technologies and digital systems requires preparation, time, and financial resources. There are large gaps in digital health preparedness among nurses, and nursing students (74) often experience challenges in transferring digital skills to the clinical context (75). In one study conducted among senior undergraduate nursing students in nursing programs in western Canada, almost 42 per cent of the nursing student participants indicated awareness of **nursing informatics**[G] competencies (74). If nursing students are not aware, competent, and comfortable with using digital health technologies in nursing school, they will likely have the same issues in practice (see **Good Practice Statement 6.0**).

Implementation tips

From the expert panel: For health providers and organizations

- Leverage staff orientation time to provide initial education and annual professional development education to nurses about the digital health technologies they will use to deliver care.
- Tailor the education depending on the baseline knowledge and digital literacy level of participants. For example, some health providers may be very comfortable with using digital health technologies, while others may need more training on basic or foundational technological skills.
- Evaluate the impact of providing protected education time on nursing and health provider competence and confidence using digital health technologies. These evaluation measures should be transparent and the results shared with team members.
  - It may be helpful to do a competency assessment of learners pre- and post- education session.

- Consider developing simulation education scenarios to educate staff on various commonly encountered situations when using digital health technologies in clinical practice (see **Recommendation 1.0**).
- Consider reflective educational content related to pondering the meaning of technology and its impact on therapeutic relationships; this may be accomplished through the application of transformative learning experiences which provides individuals the ability to reflect upon a situation (e.g., job shadowing, scenario-based learning, case studies).
- Consider providing education in small groups, to allow a more tailored learning approach and more time for questions and discussion.
  - Education is to be reflective of adult learning principles.

Supporting resources

RESOURCE	DESCRIPTION
Canadian Association of Schools of Nursing (CASN). Digital health in nursing education: strategies for integration [Internet]. 2023. Available from: https://www.casn.ca/2023/04/digital-health-in-nursing-education-strategies-for-integration/	■ Interactive webinar to engage nurse educators on how to incorporate digital health and nursing informatics in the education of undergraduate nursing students. ■ Information and education strategies could also be applied to education for nurses and health providers in health service organizations.
Royal Pharmaceutical Society. Protected learning time [Internet]. 2023. Available from: https://www.rpharms.com/recognition/all-our-campaigns/policy-a-z/protected-learning-time	■ Outlines benefits of protected time for education, and provides recommendations, benefits, and enablers for organizations to implement protected learning time.

RECOMMENDATION 1.0:

The expert panel suggests that health service and academic organizations provide ongoing education to nurses and health providers that includes hands-on training for the use of digital health technologies.

Strength of the recommendation: Conditional

Certainty of the evidence of effects: Very Low

Discussion of evidence:

Benefits and harms

For this recommendation, the intervention of interest was practical (e.g., hands-on) professional development education, compared to standard education (i.e., no hands-on component). For the purposes of this guideline, practical education refers to deliberate practice, hands-on training, or simulation training; it does not include training using e-learning modules alone. Examples of practical or hands-on professional development education for the use of digital health technologies include nurses practicing in a computer lab using EHRs, and hands-on training for using virtual care platforms. Practical or skills lab training follows a structured teaching concept. It takes place under supervision and in consideration of foundational concepts, and ideally creates an atmosphere that allows the repeated, risk-free practice of targeted skills (76).

A systematic search was conducted for evidence on the impact of hands-on education for nurses and health providers on the use of digital health technologies, and on the impact of hands-on education more generally. This broader intervention was considered sufficiently direct by the expert panel (as per GRADE methods, directness is judged based on the target population, intervention, and outcomes of interest (19)). For more information about the guideline development process, including the use of GRADE methods, refer to **Appendix C**.

One systematic review and **meta-analysis**[G] of six RCTs examined the effect of simulation-based learning strategies for midwifery students, registered nurses, or anesthesia students, including high-fidelity simulation (i.e., the use of computerized patient simulators or advanced manikins in realistic clinical environments (77)), low-fidelity simulation sessions (i.e., part-task trainers or basic manikins with limited functions), and actors trained as standardized patients. These approaches were compared to other non-practical learning strategies (78). Another systematic review and meta-analysis of seven RCTs examined the effect of virtual reality training strategies for nursing students and the impact on their practical clinical skills and critical thinking skills (172). This intervention was compared with a control group of nursing students undergoing traditional learning methods (172). Another systematic review and meta-analysis of 47 RCTs and non-randomized studies examined the effect of simulation-based training for undergraduate nursing students, compared to conventional teaching strategies or no intervention (79). Yet another systematic review and meta-analysis of two RCTs and two non-randomized studies examined the effect of high-fidelity simulation training for undergraduate nursing students, compared to other teaching methods (77). For further details of the intervention noted in the literature, please refer to the "Implementation Tips" below.

Research suggests that education for nurses and health providers that includes hands-on training may improve nurse competence, nurse confidence, and the nurse-person therapeutic relationship (while the technology is used with the person receiving care). However, the evidence is very uncertain (77-79, 172). Four quantitative systematic reviews discussed below examined the effects of simulation education for nurses or nursing students on the outcomes of nurse competence, nurse confidence, and nurse-person therapeutic relationship (77-79, 172).

One systematic review and meta-analysis of six RCTs found that simulation education may lead to a significant increase in competence (skill) compared to other learning strategies, but the evidence is uncertain (Standardized Mean Difference [SMD] −1.09) (78). It's important to note that the review authors didn't specify which is the control group, but based on a negative SMD, and the context in favour of simulation strategies demonstrated in the forest plot, it was determined that the control in this study is simulation based training and the intervention group was other strategies (78). One systematic review and meta-analysis of seven RCTs found that virtual reality education may lead to an increase in competence, measured as practical skills and critical thinking, compared to traditional learning strategies (172). Four RCTs in this systematic review showed an increase in practical skills compared to those whose who were offered traditional teaching methods (SMD=0.52, 95% CI [0.33, 0.71]) (172). Additionally, four RCTs included in this meta-analysis found that virtual reality technology compared to the control of traditional education methods improved critical thinking (SMD=0.8 95% CI [0.15, 1.44]) (172). One systematic review and meta-analysis of 47 RCTs and non-randomized studies demonstrated that simulation may result in a moderate increase in confidence (SMD 0.71) (79). Finally, a systematic review and meta-analysis of two RCTs and two non-randomized studies found that a high-fidelity learning environment may lead to a large increase in relational caring among nursing students compared to low-fidelity simulation or case studies (SMD 1.40) (77).

The expert panel noted that nurse acceptance of technology, nurse sensitive outcomes (e.g., falls, pressure injuries, pain), and nurse involvement in the technology lifecycle are critical outcomes that the systematic reviews should focus on. However, these outcomes were not measured.

There was only one harm mentioned in the systematic review evidence. The authors measured stress and anxiety of nursing students during simulation compared to conventional teaching strategies and found that the results were inconclusive. They noted, however, that students may experience higher stress during simulation activities and these psychological and physiological stress reactions may be transposed to the real situation in clinical practice (79). There were no additional harms reported by the expert panel.

The overall evidence was of very low certainty due to the critical risk of bias in the individual studies included in the systematic reviews because of serious indirectness in the outcomes, inconsistency in the results, and the substantial imprecision related to small sample size. Other critical outcomes were not measured, however, and only one harm (stress) was reported in the three included systematic reviews.

For more detailed information on the impact of practical or hands-on education on the prioritized outcomes, refer to the evidence profiles.

Values and preferences

From the systematic review evidence:

One review that examined simulation-based learning found that it decreased nursing students' anxiety about entering clinical practice, compared to conventional teaching strategies (79).

Health equity

From the systematic review evidence:

One review noted that the studies were conducted in different countries and consequently different contexts of education and performance in nursing (79). Another review noted that simulation-based training is rather resource demanding, and the equipment needed for high-fidelity simulation is expensive (78).

From the expert panel:

The expert panel noted that practical or hands-on professional development education on digital health technologies ensures that nurses caring for underserved communities have the knowledge and resources to provide care safely and effectively (e.g., promoting virtual care appointments to improve accessibility, since many individuals cannot see a health provider in person due to financial and geographic constraints).

Expert panel justification of recommendation

The expert panel noted that there may be benefits in health-service and academic organizations providing education for nurses that includes hands-on training focused on the use of digital health technologies. Benefits include improved nurse competence, nurse confidence, and nurse-person therapeutic relationships. Minimal harms were reported in the literature. However, the certainty in the evidence is very low. The expert panel noted an increase in nurses' acceptance of technology when nurses received practical or hands-on professional development education related to digital health technologies, and that hands-on education about digital health technologies and professional development activities are very much appreciated by health providers. The panel noted that most persons will likely benefit from this practice, however there are feasibility considerations when providing hands-on training. Therefore, the expert panel determined the strength of the recommendation to be conditional.

Implementation tips

From the expert panel: For health providers and organizations

- Tailor the education depending on the baseline knowledge and digital literacy level of participants. For example, some health providers may be very comfortable with using digital health technologies, while others may need more training on basic or foundational technological skills.
- Education is to be reflective of adult learning principles.
- Hands-on education is not limited to high-fidelity simulation activities, and may include skills labs or hands-on computer training (e.g., computer lab setting).
- Simulation education may look different in different organizations, and is to be adapted to various contexts. Some health organizations may not have the budget and capacity for high-fidelity simulation education including mannequins.
- When planning and designing education for nurses and health providers practising in a digital health environment, health service and academic organizations are to consider: 1) how the digital tool or technology impacts practice, and 2) how health providers will explain the digital health technology to persons and families receiving care.
- Deliver hands-on education by educators or champions who have received additional training on the digital health technology.
- Provide education on an ongoing basis (e.g., annually or sooner if technology is updated or changed), or when there is evidence of a knowledge gap among staff.

Table 7: Implementation context and details from the evidence

COMPONENTS OF THE STUDIES	DETAILS FROM EVIDENCE
Setting where education was provided	**Hegland et al. (2017)** ■ University ■ Pediatric intensive care unit ■ Military nursing simulation centre ■ Surgical units in a non-university teaching hospital ■ Post-partum or birthing centre in a hospital (78) **Oliveira Silva et al. (2022)** ■ Universities (79) **Liu et al. (2023)** ■ Universities (172)
Practical Education Details	**Hegland et al. (2017)** **Note:** The examples below are from different studies included in this systematic review. ■ Two low-fidelity simulation sessions where a fellow student played the role of a person receiving care, followed by a critical reflection of the session. ■ Low-fidelity simulation using a simple manikin to train RNs ■ High-fidelity simulation with an advanced manikin ■ Online learning course followed by simulation-based live course ■ Low-fidelity simulation with actors trained as standardized patients ■ Self-directed access to simulation room prior to simulation session with an instructor (78) **Oliveira Silva et al. (2022)** ■ Variety of simulation modalities used, including high-fidelity and low-fidelity simulators (79) **Li et al. (2022)** ■ High-fidelity simulation (77) **Liu et al. (2023)** ■ Virtual reality simulation for teaching nursing students (172)

COMPONENTS OF THE STUDIES	DETAILS FROM EVIDENCE
Timing/ Structure of education sessions	**Hegland et al. (2017)** Note: The examples below are from different studies included in the systematic review. ■ Training was provided every three, six and 12 months ■ Three simulation scenarios, each 30 min in length ■ Eight-hour simulation-based live course ■ 90-minute simulation session (78) **Oliveira Silva et al. (2022)** ■ Majority of studies included a pre-briefing session prior to the simulation □ Pre-briefing sessions ranged from 5-60 min □ One study included a pre-briefing session with video benefits and harms ■ High- or low-fidelity simulation sessions □ Number of simulated scenarios ranged from 1-9 □ Length of time for each simulated scenario ranged from 15 min to 2 hours ■ Majority of studies included a debriefing session after the simulation □ Debriefing sessions ranged from 10-70mins (79)

Supporting resources

RESOURCE	DESCRIPTION
Burkoski V, Yoon J, Hutchinson D, et al. Generational differences in hospital technology adoption: a cross-sectional study [Internet]. Nursing Leadership; 2019. Available from: https://www.longwoods.com/content/25812/nursing-leadership/generational-differences-in-hospital-technology-adoption-a-cross-sectional-study	■ Study findings indicate that to enhance adoption, nurses require sufficient time and consistent exposure to digital health technologies (80). ■ Authors identify findings consistent with a similar study, indicating that adequate time for practice using technology in the delivery of nursing education is necessary to strengthen the adoption of technology (80).

RECOMMENDATION 2.0:

The expert panel suggests that health-service and academic organizations provide ongoing education to nurses and health providers that focuses on interpersonal communication skills when using digital health technologies.

Strength of the recommendation: Conditional

Certainty of the evidence of effects: Very Low

Discussion of evidence

Benefits and harms

In the context of this recommendation, interpersonal communication is referring to the communication between a nurse or health provider and the person or family receiving care. Interpersonal communication is defined as verbal and non-verbal communication, listening, and leading skills that enable a person to interact positively and effectively with others in a constructive manner (64). Interpersonal communication includes relational care, which is a core component of nursing practice. Relational care practices are a respectful and reflexive approach to inquire into persons' lived experiences and health-care needs; they are the skilled action of respectful, compassionate, and authentically interested inquiry (81). The term relational care is defined as an understanding of persons' health needs focusing on how personal, interpersonal, and social factors shape persons' lived experience (81,82). From the perspective of relational practice, nurses examine how personal capacities and socioeconomic limitations impact persons' lived experience, decision making, and management of their health care (82). Nurses and all health providers must be prepared to work with individuals from a variety of cultural backgrounds and ensure that their communication and relational care is culturally sensitive. Some cultures may be less well versed in digital technologies, and nurses and other health providers must be equipped to adapt their care to individual needs.

A systematic search was conducted for evidence on the impact of comprehensive education about relational care and interpersonal communication skills in digital health technologies, and in other health related fields, for nurses, nursing students and other health providers. These broader interventions and populations were considered sufficiently direct by the expert panel (as per GRADE methods, directness is judged based on the target population, intervention, and outcomes of interest (19)). For more information about the guideline development process, including the use of GRADE methods, refer to **Appendix C**.

There was one published systematic review of randomized controlled trials and non-randomized studies, five non-randomized primary studies, and one mixed methods study (83–89). The types of education varied in the studies, and included didactic and simulation education (i.e., simulated patients [SPs]) on improving medical students' interpersonal communication when undertaking medical consultations; incorporating a computer or EHR into nurse-person encounters; and, education on telehealth communication strategies (e.g., phone and video consults) (83). Most studies examined focused on medical students (83–87), and one study focused on nursing students (88). For further details of the intervention noted in the literature, please refer to the "Implementation tips" below.

From one published systematic review, five studies reported on education about relational care and interpersonal communication skills. The studies found that there may be a large increase in information gathering about

patient perspectives/concerns (including satisfaction) with the use of interpersonal communication education interventions compared to no intervention or usual training (83). Eighteen of the studies reported on the outcome of nurse competence (measured as communication skills) and found that there may be a large increase in overall communication skills with the use of interpersonal communication education interventions compared to no intervention or usual training (83). However, there may be little to no effect on relationship building scores with training (nine RCTs; SMD 0.18). The certainty of the evidence for these outcomes was low and moderate, due to risk of bias in the individual studies, few participants or inconsistency in the results across the studies.

Six non-randomized studies reported on the outcome of participant confidence, and all six reported an improvement in participant confidence with using the technology after participants received education (84–89). In one study, 90 per cent of students strongly or moderately agreed that the virtual Objective Structured Clinical Examination (OSCE) increased their confidence navigating a patient interview when using a virtual platform (87). In another study, medical residents reported feeling slightly more comfortable using EHR in the consultation after receiving training (89). This evidence is very low certainty.

The expert panel noted that person/caregiver/family involvement and engagement in care was a critical outcome that the systematic reviews should focus on; however, no studies measured this outcome.

No harms were reported in the evidence.

For more detailed information on the impact of education focused on interpersonal communication skills when using digital health technologies on the prioritized outcomes, refer to the evidence profiles.

Values and preferences

From the systematic review evidence:

Six studies reported on values and preferences. In one study, 58 per cent of standardized patients agreed that students who received education on interpersonal communication skills "spent a little bit of time on the computer and did so in a way that enhanced our communication and understanding my story" (90). In two studies, students and faculty reported that training should be required for all students and health providers (84,91). One study stated that several participants gave positive reviews on the training, including comments related to positive aspects of learning how to communicate with a patient (in both face-to-face and in telehealth settings), debriefing and transfer of knowledge after the interaction, and building trust and rapport with patients (88). One study stated that 83 per cent of student participant survey respondents strongly or moderately agreed that the virtual OSCE provided a valuable patient interaction, and that the telehealth education curriculum (which included content on appropriate telehealth communication strategies) should continue, and most agreed it should be permanently incorporated into the obstetrics/gynecology clerkship (87). One study stated that students felt the class introduced new skills and reinforced current ones (86). Students were particularly appreciative of the opportunity for direct observation of skills and immediate faculty feedback, noting that the intimate setting was unique and valuable (86).

Health equity

From the systematic review evidence:

One review noted that the findings have "good external validity and potential generalizability to international medical education, although representation and therefore generalizability of the results to low- and middle-income countries are limited" (83). The review also noted that "generalizability to these lower-resource settings may be improved by further studies in such countries" (83).

Expert panel justification of recommendation

There may be benefits in health service and academic organizations providing education for nurses that focuses on interpersonal communication skills when using digital health technologies in practice. Benefits may include improved person, caregiver or family experience or satisfaction with care received, nurse competence (with using technology), nurse confidence (with using technology), nurse-person therapeutic relationship, and person, caregiver or family involvement and engagement in care. Evidence also suggested no harms, but the overall certainty in the evidence is very low. The panel noted that these skills are likely highly valued by most students and most persons receiving care, and most would likely have similar benefits regardless of setting or country. The panel noted that education about interpersonal communication skills assists nurses in meeting persons and families "where they are" without judgement, and that communication approaches impact persons and families receiving care, particularly those who are equity seeking or underserved. However, there are feasibility considerations around providing education depending on the type of modality used. Therefore, based on the certainty of evidence and other factors, the expert panel determined the strength of the recommendation to be conditional.

Implementation tips

From the expert panel: For health providers and organizations

- Consider a needs assessment to identify specific challenges nurses face when using health technologies; this will help educators to understand knowledge gaps and preferred learning styles, in order to tailor the education appropriately.
- Consider a blended learning approach, including a variety of education modalities (i.e., training delivery methods). See also **Recommendation 1.0**.
  - Education modalities are comprehensive and could include didactic lectures (in-person or over a virtual platform), videos, e-learning modules, and practical and hands on training (e.g., skills labs, simulation training).
- Foster a culture of peer learning where nurses can share their experiences and best practices related to this topic.
- Consider incorporating gaming elements into the training program to increase engagement and motivation.
- Engage in ongoing evaluation and monitoring of the education and training program(s) to identify opportunities for improvement.
- Provide structured feedback during the education and training on interpersonal communication.
- Different communication styles may be warranted depending on the type of technology being used, the population, and/or the setting of the interaction between nurses or health providers and persons receiving care.
- Motivational interviewing is one example of an interpersonal communication strategy. Education on motivational interviewing is to be delivered by an individual who has completed special training on this strategy.
- Consider utilizing additional team members whose role is to manage and maintain the digital health technology in order to facilitate optimal therapeutic relationships (i.e., ensure the technology is working properly). Existing role descriptions can be modified to include management and maintenance of digital health technologies, depending on the roles and expertise of current staff.
- When procuring digital health technologies, consider choosing technologies that enable and are conducive to interpersonal communication (e.g., hand-held devices vs. large desktop computers that cover the health provider's face).

Table 8: Implementation context and details from the evidence

COMPONENTS OF THE STUDIES	DETAILS FROM EVIDENCE
Timing/format of education sessions	**Gilligan et al., 2021:** ■ Most studies in the review delivered face-to-face interventions (e.g., small group workshops, didactic lectures, or seminars), eight studies delivered online interventions. ■ Twenty-four studies that delivered face-to-face interventions included the use of videos as a resource providing key information or examples of interactions. ■ Most interventions involved role-play interventions, with simulated patients, peers, or real patients. ■ Virtual patients were used in five interventions across three studies, with text-based interaction (83). **Additional non-randomized studies:** ■ Two-hour teaching session comprising a 20-min introduction followed by three interactive teaching stations with each station lasting 30-min (85) ■ A three-month training course that included two large group sessions (90 min each) and two to four one-hour individualized coaching sessions (89) ■ Two-hour virtual class that provided best practice suggestions and included two 15-min role play sessions with a simulated patient (86) ■ A novel Telehealth Education Curriculum (TEC) that consisted of two components: □ At least one supervised telehealth patient encounter via video conference with an obstetrics/gynecology patient and attending physician supervising □ A virtual OSCE (87).

COMPONENTS OF THE STUDIES	DETAILS FROM EVIDENCE
Education session content	■ During a lecture, students watched a video, engaged in reflective exercises, and learned best practices for communication when using an EHR (84). ■ Training was comprised of an introductory video and three interactive teaching stations focused on: setting up technology for a consultation; practising with a simulated patient; and, patient ethics (85). ■ Small group discussions of person-centred care when using the EHR (89). ■ Virtual class that provided best practice suggestions for building rapport and earning trust with patients and families during video consults, followed by a discussion of student's patient-centred communication experiences in-person and virtually (86). ■ A prenatal telehealth simulation-based learning experience that focused heavily on communication skills in telehealth settings and the use of a supportive attitude to build rapport with patients living in rural areas (88). ■ A mnemonic was taught on ten tips to enhance person-centred EHR use (HUMAN LEVEL): □ Honor the 'golden minute', which refers to making the beginning of the visit completely technology free. The provider should greet the individual and start by listening to their concerns, and establish an agenda before engaging with technology (84). □ Use the 'triangle of trust', which involves creating a triangle configuration that puts the provider, the individual, and the computer screen at each of the three corners. This allows the provider to look at both the patient and screen without shifting their body (84). □ Maximize the patient interaction □ Acquaint yourself with the chart □ Nix the screen □ Let the patient look on □ Eye contact □ Value the computer □ Explain what you're doing □ Log off (84)

Supporting resources

RESOURCE	DESCRIPTION
Regional Geriatric Program of Toronto. Recommendations for senior friendly virtual care [Internet]. Toronto (ON); n.d. Available from: https://rgptoronto.ca/resource/recommendations-for-senior-friendly-virtual-care/	■ Document that outlines considerations for health service organizations when developing or refining virtual care processes specifically for older adult populations.
Registered Nurses' Association of Ontario (RNAO). Promoting patient and family centred care in a digital era [Internet]. Toronto (ON): RNAO; 2016. Available from: https://www.youtube.com/watch?v=roYiH7n4g30	■ Short video outlining best practices and five guiding principles to incorporate a computer into nurse-patient interactions.
Rouleau G, Gagnon MP, Côté J. et al. Virtual patient simulation to improve nurses' relational skills in a continuing education context: a convergent mixed methods study [Internet]. BMC Nurs; 2022, 21, 1. Available from: https://doi.org/10.1186/s12912-021-00740-x	■ "This study aimed to assess the acceptability of a virtual patient simulation to improve nurses' relational skills in a continuing education context" (92).

RECOMMENDATION 3.0:

The expert panel suggests that health service organizations implement interdisciplinary peer champion models to facilitate education for nurses and health providers on the use of digital health technologies.

Strength of the recommendation: Conditional

Certainty of the evidence of effects: Very Low

Discussion of evidence:

Benefits and harms

For the purposes of this BPG, interdisciplinary **peer champion models**[G] refer to super-users, champions, coaches, change agents, formal or informal leaders, or any individual with additional knowledge and expertise in digital health technology. The expert panel noted that the peer champion delivering the education could be a nurse or other health provider. A peer champion advocates for change, motivates others, and uses their position to facilitate adoption (93).

A systematic search was conducted for evidence on the impact of peer champion models to facilitate education on the use of digital health technologies, and other health topics, for nurses and other health providers. These broader interventions and populations were considered sufficiently direct by the expert panel (as per GRADE methods, directness is judged based on the target population, intervention, and outcomes of interest (19)). For more information about the guideline development process, including the use of GRADE methods, refer to **Appendix C**.

There was one published systematic review of six RCTs (94), and two non-randomized single arm studies (95,96). The systematic review focused on LTC settings (94) and the two non-randomized studies took place in acute care settings (95,96). The types of peer champion models found in the literature varied. In one study, physician champions were used to promote the use of a standard EHR tool for communication between providers (95). In the other study, physicians, nurse practitioners and physician assistants received individually tailored EHR training (96). In the systematic review, LTC staff champions (e.g., RNs, licensed practical nurses, and personal support workers) focused on improved staff adherence to guidelines and clinical resident outcomes (not specific to implementation of digital health technologies) (94). For further details of the intervention noted in the literature, please refer to the "Implementation tips" below.

One of the non-randomized studies found that the use of peer champions increased health provider competence by 17 per cent (95). The same study found that peer champions also increased health provider adoption of technology (95). The other non-randomized study found that peer champions improved health provider confidence by 36 per cent. (96). Finally, the systematic review of six RCTs found that peer champions resulted in little to no effect on health provider sensitive outcomes (i.e., malnutrition, comfort in the last week of life, delirium, infection rate, and pressure injuries) (94). The certainty of the evidence for all outcomes was very low, due to serious risk of bias in the individual studies and few participants.

The expert panel noted that sustainability of education (i.e., knowledge and skills retention) was a critical outcome that the systematic reviews should focus on; however, no studies measured this outcome.

There were no harms reported in the evidence.

For more detailed information on the impact of interdisciplinary peer champion models on the prioritized outcomes, refer to the evidence profiles.

Values and preferences

From the systematic review evidence

No values and preferences were reported in the evidence.

Health equity

From the systematic review evidence

No specific health equity considerations were reported in the studies.

From the expert panel

The expert panel noted that, based on their observations and experiences, peer champion models are often highly valued by internationally educated nurses and health providers who speak English as a second language.

Expert panel justification of recommendation

There was very low certainty in the benefits found in the literature when implementing interdisciplinary peer champion models to facilitate education for nurses and health providers on the use of digital health technologies. No harms were reported in the literature. The panel noted that there is a potential to improve equity when peer champions have an understanding of equity principles, speak out for advocacy on these issues, and bring awareness and understanding to other team members in practice. Although peer champion models have been used in health service organizations for decades, there is little high-quality empirical evidence to demonstrate their impact on outcomes and more research is needed on this topic (see **Research gaps and future implications** for more information). The expert panel determined the strength of the recommendation to be conditional.

Implementation tips

From the expert panel: For health providers and organizations

- Interdisciplinary peer champion models are not the only form of education to be used, and there are additional considerations around education of nurses and health providers. See **Good Practice Statement 4.0**, **Recommendation 1.0** and **Recommendation 2.0**.
- Peer champion models are not a uniform concept. The type of peer champion model will vary depending on the health-care setting, sector, health providers involved, and the digital health technology being implemented.
  - Peer champion models may include interdisciplinary "super users" for in-class education and for ongoing support in a practice area after the implementation of a technology, or for any implementation of new processes involving use of electronic systems.
  - Depending on the technology being implemented, it may be appropriate to consider discipline-specific peer champion models (i.e., a nurse champion providing education to other nurses, a physician champion providing education to other physicians), since digital health technologies such as EHRs may be configured differently for specific health provider disciplines. The appropriateness of the champion may also depend on the specific stage of the implementation process.
- Peer champions support staff during implementation of a technology by addressing issues that arise in "real-time", answering questions, and offering assistance.

- Be aware that peer champion models can overextend individual team members and can create pressure or stress for the champions, particularly if they are not supported with the time and recognition that these champion roles require.
- Select peer champions for their knowledge, expertise and leadership skills related to the digital health technology being implemented.
- Peer champions should receive more extensive training regarding digital health technologies early in the implementation process.
- Organizations are to consider utilizing existing educators to help facilitate the implementation of peer champion models.

Table 9: Implementation context and details from the evidence

COMPONENTS OF THE STUDIES	DETAILS FROM EVIDENCE
Peer champion model details	**Walsh et al., 2018** ■ Physician champions from a variety of medical specialties provided educational outreach to 16 academic departments using 10-minute case-based presentations, customized for each specific clinical audience. ■ When possible, the presenting team included a specialist and a primary care provider and/or a resident trainee. ■ The presentation covered a description of the tool, organizational goals, standards of use, navigation tips, and case examples of communication between providers, specifically created for each target audience specialty. ■ Presentations were followed by a 10-minute question and answer session (95). **Kadish et al., 2018** ■ Two hours of individually tailored EHR training was provided one-on-one with a credentialed trainer. ■ Providers (i.e., physicians, nurse practitioners, and physician assistants) were already familiar with the EHR and content was tailored to reflect their workflows and personal challenges in EHR use (96). **Hall et al., 2021** ■ One study examined a stand-alone or multi-component intervention that used a champion to improve staff adherence to guidelines and resident outcomes (e.g., pressure ulcer prevention). The champion was an internal nursing staff member who had an implementation-related role, had received supplementary training, assumed responsibility for a specific topic area and may have acted as a key contact person with external health providers. ■ Level of involvement of the champion was defined in the review as: □ Minor: Acted as role model and source of information for staff and possibly as a reminder of the intervention but was not responsible for educating staff or enacting any of the intervention components. □ Moderate: In addition to the responsibilities of the minor role, helped the research team to educate or mentor staff or assisted other members of the research team with activities. □ Major: In addition to the responsibilities of the moderate role, independently (i.e., without the research team) educated or mentored staff and enacted other components of the intervention such as action planning or using new clinical tools at the site (94).

Supporting resources

RESOURCE	DESCRIPTION
Canada Health Infoway. Toolkit for implementers of artificial intelligence in health care [Internet]. Infoway; 2021. Available from: https://www.infoway-inforoute.ca/en/component/edocman/resources/artificial-intelligence/3998-toolkit-for-implementers-of-artificial-intelligence-in-health-care?Itemid=101	■ This toolkit provides an overview of the issues related to the implementation and uses of AI solutions in health care. ■ Module five in the toolkit discusses "Change Management for AI Adoption in the Health Sector," including training and system deployment considerations using change management leaders.
Registered Nurses' Association of Ontario (RNAO). Best Practice Champions Network® [Internet]. Toronto (ON): RNAO; n.d. Available from: RNAO.ca/bpg/champions	■ RNAO champions blended learning series prepares participants to be a Best Practice Champion. ■ Best Practice Champions have an opportunity to develop point-of-care leadership and leverage their unique knowledge, skills and enthusiasm to support clinical excellence.
Registered Nurses' Association of Ontario (RNAO), Healthcare Excellence Canada (HEC). Leading change toolkit [Internet]. Toronto (ON): RNAO, HEC; 2021. Available from: RNAO.ca/leading-change-toolkit	■ Online, open-access evidence-informed implementation resource that focuses on the uptake and sustainability of knowledge — or evidence — and uses two complementary frameworks: the Social Movement Action Framework and the Knowledge to Action Framework.
Rysavy M, Merryman A, Dean S. Success story: resident superuser engage residents in optimizing the EHR. AMA STEPS Forward; 2020. Available from: https://edhub.ama-assn.org/steps-forward/module/2759225	■ Case study describing how the University of Wisconsin-Madison (UW Health) and the University of Iowa (UI Health Care) created a Resident Superuser program consisting of a group of resident EHR experts ("super-users"). ■ Outlines the development, implementation, barriers, and results of the super-user intervention.

ORGANIZATION AND POLICY

GOOD PRACTICE STATEMENT 5.0:

It is good practice that organizations implement policies related to digital health technologies to protect privacy, security and confidentiality.

The implementation of policies related to privacy, security and confidentiality of digital health technologies is consistent with the Ontario Personal Health Information Protection Act (40) and similar legal requirements in other national and international jurisdictions (97,98). These policies help create the infrastructure for the delivery of safe, person-centred nursing care in digital health environments. As such, it is good practice that organizations implement these policies. This good practice statement did not require a review of the evidence, but is important to communicate to organizations.

The delivery of health care includes collection, storage, and access to personal health information, often through electronic means, by health providers and health service organizations (40). Personal health information may be incorporated into a variety of different digital health technologies, including EHRs, electronic audit logs, consumer electronic devices (e.g., smartphones, health apps), and any personal health records accessible in electronic format (40). Within Canada, all jurisdictions (federal, provincial, territorial) have laws in place to protect personal information, and many have legislation specific to digital health information (99).

Appropriate governance structures within health service organizations and health systems ensure that policies and practices safeguard privacy, security, stewardship, data governance and accountability (5,32). Furthermore, organizations may conduct a privacy impact assessment (PIA) for all digital health technologies that are being considered (5,100). A PIA considers the actual or potential effects that a proposed digital health technology, information system or program may have on a person's privacy (100). A PIA helps in assessing the compliance with applicable privacy requirements and identifies mitigation strategies for any identified privacy risks (100).

As the use of digital health technologies increases across health systems, and data becomes more plentiful and complex, there is a greater need to ensure data is managed appropriately, and that privacy, security and confidentiality measures are robust (32). Safety should be at the forefront of the integration of new digital health technologies, and health service organizations will need to work together with regulators to review regulation and compliance requirements alongside cyber security and data privacy requirements (23). Implementation of these policies will ensure transparent, resilient, robust and legally compliant guarantees of the safety of digital health technologies (23). Finally, clear and explicit policies related to the use of digital health technologies by health providers will ensure appropriate use of technologies in alignment with health professional standards.

Implementation tips

From the expert panel: For health providers and organizations

- Organizational policies related to digital health technologies to protect privacy, security and confidentiality may be part of a larger organization-wide digital health strategic plan.
- All staff within an organization should be informed of and educated on the policies and practices related to digital health technologies to protect privacy, security and confidentiality, including code of conduct. Organizations are to consider information or education sessions to update and reinforce these policies to staff as needed.
  - Organizations may utilize already established organizational forums (e.g., "Privacy Week" or "Quality Week") to highlight roles and responsibilities of staff related to digital health technology privacy, security and confidentiality issues.
- Consider providing scripts to help health providers navigate conversations with persons and families about privacy, security and confidentiality concerns, and confidently answer questions.
  - An educational resource for persons and families with frequently asked questions about privacy, security and confidentiality of digital health technologies may also be considered.
- For organizations and health providers using virtual care platforms, a clear consent process related to the technology being used with persons and families is to be implemented.
- As digital health technologies evolve and become more complex and customizable, there is greater likelihood that a PIA will be required for specific uses and configurations of digital health technologies within an organization.
- Seek out expertise and advice on privacy and security issues early on in the planning stage of any new digital health technology initiative.
- Consider consultation with technical teams (e.g., information management technology teams) and a health care privacy officer.
- Given the increasing frequency of cybersecurity threats and ransomware attacks, consider threat risk assessments (from a cybersecurity perspective) in conjunction with PIAs.
- Policies and procedures should be in place that are specific to handling privacy and confidentiality breaches that stem from the use of digital health technologies, including how and when to notify affected persons and families of a privacy breach.
- Consider annual review of policies related to digital health technology privacy, security and confidentiality.
- Policies and procedures related to digital health technologies are to be transparent and available for all health providers, staff, persons and families to access if needed.
- Educate all staff on how to avoid privacy, security and confidentiality breaches (e.g. education about how to identify spam emails, how to choose an appropriate computer password, how and where to store passwords).
- Acknowledge and address concerns around privacy, security and confidentiality without paralyzing the adoption of digital health technologies and opportunities.
- When organizations create new policies related to digital health technologies, they should take note of how these policies align with accessibility considerations (e.g., the Accessibility for Ontarians with Disabilities Act (101)).

Supporting resources

RESOURCE	DESCRIPTION
Canadian Centre for Cyber Security. Cyber security for healthcare organizations: protecting yourself against common cyber attacks (ITSAP.00.131) [Internet]. 2020. Available from: https://www.cyber.gc.ca/en/guidance/cyber-security-healthcare-organizations-protecting-yourself-against-common-cyber-attacks	■ Website provides a summary of common methods that cyber threat actors use to steal personal health data and intellectual property or disrupt the operations of health service organizations.
Canada Health Infoway. Digital health privacy links [Internet]. n.d. Available from: https://www.infoway-inforoute.ca/en/digital-health-initiatives/privacy-security/digital-health-privacy-links	■ Resource includes links to privacy resources, the oversight body, and the Health Ministry/eHealth Agency of each province and territory.
Canada Health Infoway. Privacy as an enabler: sharing personal health information for interoperability primer [Internet]. 2022. Available from: https://www.infoway-inforoute.ca/en/digital-health-initiatives/privacy-security	■ Website has a link to a document that outlines how privacy considerations are an enabler for health system interoperability. ■ It discusses health system interoperability within the privacy context, examining approaches to the sharing of personal health information, and Canadian privacy legislation and principles.
Digital Health Canada: Cyber Security Working Group. Code grey and the cyber security working group [Internet]. n.d. Available from: https://digitalhealthcanada.com/membership/chief-executive-forum/inititatives/cyber-security-working-group/	■ Website provides links to additional resources on cyber security, including guidance on: patching, security actions, backups, multi-factor authentication, and incident response plans.
Government of Ontario. Ontario Personal Health Information Protection Act (PHIPA) [Internet]. Revised 2023. Available from: https://www.ontario.ca/laws/statute/04p03	■ Ontario's health specific privacy legislation. ■ This Act governs the manner in which personal health information may be collected, used and disclosed within the health sector.

RESOURCE	DESCRIPTION
Office of the Privacy Commissioner of Canada. The Personal Information Protection and Electronic Documents Act (PIPEDA) fair information principles [Internet]. Revised May 2019. Available from: https://www.priv.gc.ca/en/privacy-topics/privacy-laws-in-canada/the-personal-information-protection-and-electronic-documents-act-pipeda/p_principle/	■ Act that outlines the ten fair information principles that form the ground rules for the collection, use and disclosure of personal information, as well as for providing access to personal information. ■ The principles are: accountability; identifying purposes; consent; limiting collection; limiting use, disclosure and retention; accuracy; safeguards; openness; individual access; and, challenging compliance.
Ontario Health. Virtual visits solution requirements [Internet]. 2022. Available from: https://www.ontariohealth.ca/sites/ontariohealth/files/2022-10/virtual-verification-solutions-standard.pdf	■ This document describes general functional and non-functional requirements for virtual care solutions used by nurses, health providers and health service organizations to support a virtual clinical encounter with persons and families (102).
Ontario Ministry of Health. Digital health provincial guidance document: digital health cyber security policy [Internet]. Updated 2022. Available from: https://www.publications.gov.on.ca/CL29929	■ Policy that guides Ontario Health Teams to improve the overall cyber security of the health sector.
Registered Nurses' Association of Ontario (RNAO). Adopting eHealth solutions: implementation strategies [Internet]. Toronto (ON): RNAO; 2017. Available from RNAO.ca/bpg/guidelines/ehealth-solutions	■ RNAO Best Practice Guideline. ■ Provides evidence-based individual, organization, education, and system/policy recommendations to: 1) enhance the capacity of all individuals involved in the implementation of an eHealth solution within a health service organization 2) establish suitable infrastructures to support eHealth education needs and 3) facilitate technology-enabled health system transformation.

RESOURCE	DESCRIPTION
Registered Nurses' Association of Ontario (RNAO), AMS Healthcare. Nursing & compassionate care in the age of artificial intelligence: engaging the emerging future [Internet]. Toronto (ON): RNAO, AMS; 2020. Available from: RNAO.ca/sites/rnao-ca/files/RNAO-AMS_Report-Nursing_and_Compassionate_Care_in_the_Age_of_AI_Final_For_Media_Release_10.21.2020.pdf	■ Report to inform nurses in all roles and sectors, other health providers, educators, health-service administrators, researchers and policy makers about the opportunities and potential challenges of emerging technologies powered by AI. ■ Contains recommendations and information related to privacy, security and ethical considerations of AI health technologies.

GOOD PRACTICE STATEMENT 6.0:

It is good practice that regulatory bodies embed digital health competencies into nursing and health provider entry-to-practice exams.

Entry-to-practice competencies are the foundation for nursing practice (103), and align with regulatory requirements for nurses at the national, provincial, territorial and/or state wide level. Entry-level competencies are one of the sentinel documents used by regulatory bodies in the regulation of nursing practice for the purpose of recognizing education programs; development and approval of nurse entry-level examinations; assessment of individual applicants for registration; assessment of ongoing continuing competence; and, providing information to the public, education programs, and employers on the regulatory expectations of nursing practice (104). This good practice statement did not require a review of the evidence, but was important to communicate to regulatory bodies.

Digital health systems improve and enhance clinical care and treatment at the individual, organizational, and health system levels. As health organizations shift towards increased use of digital health technologies, digital proficiency is necessary for all nurses and the interprofessional team. Employers will soon expect all newly graduated nurses (e.g., RNs, RPNs) and internationally educated nurses (IENs) to be knowledgeable in this area. Unfortunately, prior research shows that nursing students have a knowledge gap in this area (74,75).

Comprehensive digital health education must commence in entry-to-practice nursing education programs, and be incorporated into national, provincial, territorial or state wide entry-to-practice exams that nursing graduates are required to take before becoming registered with professional regulatory bodies. Digital health training initiatives should focus on general and discipline-specific competencies, and curriculums should be updated frequently to adapt to evolving novel technology. Brown et al. (2020) found that only 55 per cent of students considered their overall applied computer skills as at least "competent". These skills included using applications for diagnostic coding and extracting data from clinical data sets. Collaborative work with associations of nursing schools (e.g., Canadian Association of Schools of Nursing) to create new curriculums in nursing schools is imperative for initiating important changes in the digital health sector (75). By embedding digital health competencies into nursing entry-to-practice exams, modification of nursing school curriculums to include these competencies will follow.

The National Council of State Boards of Nursing (NCSBN) is responsible for developing and organizing the *National Council Licensure Examinations* for registered nurses (NCLEX-RN) and practical nurses (NCLEX-PN) applying to become a registered nurse or registered practical nurse in both Canada and the United States. At the time of publication of this BPG, the 55-page test plan document on the official NCLEX website did not have specific test questions on the topic of nursing informatics, or digital health, but only a brief mention about nurses learning to communicate and chart in electronic health records (105). Future test plans should consider greater integration of digital health competencies, in order to align with current nursing paradigms and clinical requirements, and ensure that nurses enter the health-care field better prepared to care for persons and families (106).

Many Canadian universities have master's degrees and/or post-graduate certificates in nursing and/or health informatics (107,108). The American Nursing Association (ANA) offers a certification in nursing informatics (109), but this additional certification — which is geared towards registered nurses who already have work experience in this area — is not available for nursing students in Canada. Some of the topics tested for this certification, and

for undergraduate nursing informatics competences taught in other nursing informatics programs, could be embedded into nursing entry-to-practice exams. As health systems shift towards becoming completely digitalized, it is imperative that nursing schools and nursing entry-to-practice exam boards work quickly to include material and testing questions on digital health so that nursing students are prepared for the workforce.

Implementation tips

From the expert panel: For health providers and organizations

- Review and update health professional curriculums frequently to reflect digital technologies being used in clinical practice, and digital health content being tested in entry-to-practice exams.
  - Entry-to-practice digital health competencies are to be continuously assessed and updated as needed, with the evolving nature of digital health.
- Ensure that entry-to-practice competencies cover a broad range of digital health competencies (e.g. privacy/confidentiality, communication, EHR systems, documentation, data integrity).
- Academic organizations are encouraged to train faculty in digital health competencies, in order to effectively teach and prepare students entering health professions.
- Ensure that entry-to-practice digital health competencies are generalizable and applicable to all health-care settings and contexts.
- When they develop informatics curricula, academic organizations should consider partnering with professional digital health organizations (e.g., International Medical Informatics Association, Canadian Nursing Informatics Association, Healthcare Information and Management Systems Society).

Supporting resources

RESOURCE	DESCRIPTION
American Nurses Credentialing Center. Informatics nursing board certification examination: test content outline [Internet]. 2022. Available from: https://www.nursingworld.org/~498f85/globalassets/certification/certification-specialty-pages/resources/test-content-outlines/exam-27-tco_2023-05-03.pdf	■ This test content outline identifies the areas that are included on the Informatics Nursing Board Certification Examination.
Canadian Association of Schools of Nursing. Consumer health solutions: a teaching and learning resource for nursing education [Internet]. 2016. Available from: https://www.casn.ca/wp-content/uploads/2016/04/Consumer-Health-Solutions-A-teaching-and-learning-resource-for-nursing-education-EN.pdf	■ This document is intended to support the integration of digital health content into undergraduate nursing education (110). ■ It is a companion document to the Nursing Informatics Teaching Toolkit (111).
Canadian Association of Schools of Nursing (CASN). Digital health in nursing education: strategies for integration [Internet]. 2023. Available from: https://www.casn.ca/2023/04/digital-health-in-nursing-education-strategies-for-integration/	■ Interactive webinar to engage nurse educators on how to incorporate digital health and nursing informatics in the education of undergraduate nursing students. ■ Information and education strategies could also be applied to education for nurses and health providers in health service organizations.
Canadian Association of Schools of Nursing (CASN). Nursing informatics teaching toolkit: supporting the integration of the CASN nursing informatics competencies into nursing curricula [Internet]. Ottawa (ON): CASN; 2013. Available from: https://casn.ca/wp-content/uploads/2014/12/2013ENNursingInformaticsTeachingToolkit.pdf	■ Toolkit provides key concepts and key learnings summarizing information faculty should know to teach each competency. ■ For each competency there is a case study, a PowerPoint presentation, and discussion/quiz questions that can be used in the classroom.
Nazeha N, Pavagadhi D, Kyaw BM, et al. A digitally competent health workforce: scoping review of educational frameworks [Internet]. J Med Internet Res; 2020, 22(11), e22706. Available from: https://doi.org/10.2196/22706	■ "The review aims to identify and study existing digital health competency frameworks for health care workers and provide recommendations for future digital health training initiatives and framework development" (112).

RECOMMENDATION 4.0:

The expert panel suggests that health service organizations implement clinical decision support systems or early warning systems that use artificial intelligence-driven predictive analytics to support (but not replace) nurses' and health providers' clinical decision-making.

Strength of the recommendation: Conditional

Certainty of the evidence of effects: Very Low

Discussion of evidence:

Benefits and harms

For the purposes of this BPG, predictive analytics include software found in **command centres**[G], risk assessment software tools, **early warning systems**[G] and other clinical decision support systems (CDSS) that use AI machine learning algorithms to interpret data independently. Command centres are centralized operating systems that bring together data that is already being collected across a health service organization so that more informed decisions can be made on how to improve overall efficiency and deliver better care (113). AI-driven CDSS or early warning systems are tools that use EHR data (for example, alterations in vital signs) to rapidly identify clinically deteriorating patients and provide prompts and reminders to assist health providers in implementing evidence-based clinical guidelines at the point of care (114,115). These systems are different from traditional CDSS or early warning systems, which do not use AI or machine learning algorithms to develop clinical recommendations based on real-time patient data.

A systematic search was conducted for evidence on the impact of artificial intelligence-driven predictive analytics to inform nurses' and other health providers' clinical decision-making. This broader population was considered sufficiently direct by the expert panel (as per GRADE methods, directness is judged based on the target population, intervention, and outcomes of interest (19)). For more information about the guideline development process, including the use of GRADE methods, refer to **Appendix C**.

There was one systematic review of RCTs, one non-randomized single arm study, and two systematic reviews of non-randomized studies that examined benefits and harms of the intervention. The types of predictive analytics discussed in the studies varied; however, all of them focused on AI-driven CDSS or early warning systems, which is why the recommendation is specific to AI-driven predictive analytics. The studies included a machine learning algorithm to manage treatment of patients with gestational diabetes through telemedicine (116); a computer-based triage algorithm (116); a personalized warfarin dosing algorithm based on CDSS data (116); a CDSS used to predict sepsis or pressure injuries (117); a CDSS that identified persons who required pain assessment (118); a CDSS that generated recommendations based on evidence-based guidelines and EHR data (118); and ML-based prediction models to predict ventilator associated pneumonia (173). One study focused on nurses (117), one systematic review focused on physicians (118), and one systematic review focused on health providers generally (the types of health providers were not specified) (116, 173). Most studies took place in acute care settings (117,118,173), and one systematic review included studies that took place in home care settings and an acute care setting (116). All studies focused on adult persons receiving care. One review focused specifically on adults undergoing internal mechanical ventilation in intensive care unit settings (173). For further details on the intervention details, please refer to the "Implementation tips" below.

From a systematic review, two RCTs found that the use of an AI-driven CDSS may improve proactive/anticipatory care, and one RCT found there was little to no difference, compared to standard care or no AI-driven CDSS (116). Another systematic review found that ML models outperformed the manual diagnosis and clinical scoring tools for ventilator associated pneumonia at all prediction times (173). The certainty of the evidence was low due to risk of bias concerns and few participants.

From another systematic review, five non-randomized studies demonstrated use of a CDSS may improve application of evidence-based practice (measured as guideline adherence), compared to no CDSS or standard care (mean difference of 11.45 per cent). One study in the review found that use of a CDSS may decrease deviation from guidelines, compared to no CDSS or standard care at the time of hospital discharge (difference of 60 per cent) (118). The certainty of evidence was low due to risk of bias in the individual studies.

Two non-randomized studies within a systematic review examined nurse sensitive outcomes (i.e., pain) and found there was little to no difference in mean pain scores or pain intensity scores in the intervention group when a CDSS was used compared to no CDSS or standard care (118). The certainty of evidence was very low due to risk of bias concerns and very few participants.

One non-randomized single arm study found that failure to rescue (measured as sepsis mortality) decreased by 53 per cent after a CDSS was implemented. Patients screened using the sepsis CDSS had a 2.1 times lower risk of death (CI 0.228-0.988), compared to patients in the pre-implementation period group (117). The certainty of evidence was very low.

Critical incidents are defined as any unintended event that occurs when a person receives treatment in a health service organization that a) results in death, or serious disability, injury or harm to the person, and; b) does not result primarily from the persons' underlying medical condition or from a known risk inherent in providing the treatment (119). The expert panel noted this as a critical outcome that the systematic reviews should focus on; however, no studies measured this outcome.

There were no harms reported in the evidence.

For more information on the benefits and harms of predictive analytics (specifically CDSS), refer to **Appendix I**.

For more detailed information on the impact of leveraging AI-driven predictive analytics on the prioritized outcomes, refer to the evidence profiles.

Values and preferences

From the systematic review evidence:

One qualitative study aimed to explore the factors influencing the integration of a machine learning sepsis early warning system into clinical workflows based on interviews with physicians and nurses (120). Participants described unfamiliarity with ML models, which negatively influenced their trust in the system (120). Participants also expressed knowledge gaps regarding the ML model and early warning system, which was seen as a barrier to flow of information between health providers (120).

Health equity

From the systematic review evidence:

Physicians in a qualitative study noted that attending physicians at large academic health centres usually had more expertise in identifying and treating sepsis, and perceived the sepsis early warning system to be most useful in low-resource community settings where staff may not have the same level of clinical skills related to identifying and treating sepsis (120).

From the expert panel:

The panel noted that this recommendation would be difficult to implement in less affluent health-care systems, due to the high cost of predictive analytics systems.

Expert panel justification of recommendation

There may be benefits when implementing CDSS or early warning systems that use AI-driven predictive analytics to inform nurses' clinical decision-making, such as improved proactive/anticipatory care, decreased failure to rescue, consistent application of evidence-based practice, and improved nurse sensitive outcomes (i.e., pain), but the certainty in the evidence was very low. No harms were reported in the literature. The panel noted some health equity considerations such as the high cost of AI-driven predictive analytics systems, and feasibility of implementing these systems. Therefore, the expert panel determined the strength of the recommendation to be conditional.

Implementation tips

From the expert panel: For health providers and organizations

- Clinical decision support systems and early warning systems that use artificial intelligence-driven predictive analytics are not intended to replace health providers' critical thinking or clinical judgment. Health providers should not become dependent on these systems, as they are only meant to support decision-making. Nurses and health providers are still expected to practice within their scope, following regulatory requirements and standards of practice when using AI-driven predictive analytics systems.
- When implementing CDSS, early warning systems, or other predictive analytics technologies, organizations are to use validated predictive analytics software and tools.
  - For increased effectiveness, validated tools that are embedded into EHR systems are to be clearly visible and legible for nurses during their documentation.
- Understand and recognize unintended consequences when implementing CDSS, early warning systems, or other predictive analytics. Unintended consequences could include increased patient ratios, and mitigation strategies should be developed to ensure patient ratios do not increase as a result of implementation of these systems.
  - Be cognizant of alarm fatigue and "pop-up" fatigue. Nurses may be caring for many patients with the same reminder or notification, such as a high falls risk score, and before dismissing/accepting the notification they may not be thinking critically about what this means for practice. Monitor these unintended impacts regularly in addition to evaluating clinical outcomes.
- Provide education for nurses and other health providers when implementing CDSS or early warning systems that use predictive analytics. Include education on:
  - how the CDSS or early warning system was developed, including how it gathers data to make decisions.
  - how to appropriately use the tools, and interpret and evaluate the information in the tools.

- When implementing CDSS or early warning systems that use predictive analytics, monitor and evaluate staff adherence to using the system and relevant clinical outcomes following implementation.
- Ensure data within the CDSS is evaluated and results are shared with relevant individuals within the organization (e.g., what was the warning in the system, was it addressed or ignored, why was it ignored, what were the actions or interventions taken, and what were the outcomes).
- Academic organizations are to consider involving nursing and health professional students in the design of CDSS that utilize predictive analytics software, and educate students on how to appropriately use these systems.
- Deploy AI-powered predictive analytics in collaboration and consultation with nurses and health providers. This will ensure that these systems are designed and implemented in a manner that aligns with clinician workflows and meets end-user needs effectively (see **Good Practice Statement 3.0**).
- Organizations may also consider using traditional CDSS or early warning systems that do not use AI-driven predictive analytics; however, these were not examined in the evidence.
- Consider early warning systems or CDSS for certain specific populations, depending on the person and families receiving care (e.g., pediatrics vs. adults vs. older adults may require different early warning system or CDSS software).
- Be aware of and critique potential algorithmic biases present in CDSS and early warning systems as these biases may perpetuate health inequities (e.g., if the CDSS was developed using data from only one specific population).

Table 10: Implementation context and details from the evidence

COMPONENTS OF THE STUDIES	DETAILS FROM EVIDENCE
Predictive analytics technology	**Cresswell et al., 2020** ■ Learning algorithm to manage treatment of patients with gestational diabetes through telemedicine by health providers. ■ Computer-based triage algorithm for nurses (automated triaging). ■ Personalized support for warfarin dosing based on the AI algorithm by health providers in home care settings (116). **Manaktala & Claypool, 2017** ■ CDSS conducted real-time surveillance of EHR data and delivered alerts to nursing staff's mobile devices at the point of care (117). **Klarenbeek et al., 2020** ■ CDSS to identify persons who require pain assessment, displayed person-specific information and the most recent and maximum pain score. ■ CDSS generated person-specific recommendations (e.g., evidence-based interventions based on the person's most recent or maximum pain score). ■ One study in a systematic review used a CDSS that enabled a structured decision tree flowchart (118). **Frondelius et al., 2023** ■ ML-based prediction models to predict ventilator associated pneumonia and inform clinical decision making in adults undergoing invasive mechanical ventilation in intensive care settings (173).
Implementation and change management	■ One study discussed a training and implementation period that was utilized for change management, in order to create protocols and order sets, establish unit teams, and educate unit staff about sepsis and the use of the CDSS (117). ■ During the CDSS implementation period, the nursing documentation within the hospital's EMR was evaluated and adjusted to ensure that appropriate clinical elements would be documented for use by the CDSS system's rules engine (117). ■ CDSS algorithms were reviewed by subject matter experts with clinical experience in sepsis and clinical informatics (117). ■ Implementation of a machine learning early warning system was facilitated by an easy-to-use tablet application, and the embedded communication strategies that were developed by nurses to share results with physicians (120).

Supporting resources

RESOURCE	DESCRIPTION
Buchanan C, Howitt ML, Wilson R, et al. Predicted influences of artificial intelligence on the domains of nursing: scoping review. JMIR Nurs [Internet]. 2020; 3(1). Available from: https://nursing.jmir.org/2020/1/e23939/	■ Scoping review that summarizes the extent of the literature on emerging trends in health technologies powered by AI and their implications on the domains of nursing. ■ Emerging AI technologies discussed in the review included predictive analytics, smart homes, virtual health care assistants, and robots.
Collins BE. Use of high-reliability principles in the evolution of a hospital command centre. Healthc Q [Internet]. 2021; 23(4). Available from: https://doi.org/10.12927/hcq.2020.26393	■ Descriptive article presenting the conceptual development of Humber River Health's command centre.
Humber River Health. The command centre [Internet]. n.d. Available from: https://www.humbercommandcentre.ca/	■ Website containing a virtual tour of Humber River Health's command centre in Toronto, Ontario, and information for health providers and persons receiving care related to the command centre.
Drysdale E, Dolatabadi E, Chivers C, et al. Implementing AI in healthcare [Internet]. 2020. Available from: https://vectorinstitute.ai/wp-content/uploads/2020/03/implementing-ai-in-healthcare.pdf	■ Report that provides an overview of the Health AI Deployment Symposium which took place in Toronto, Ontario in 2019 as a joint collaboration between the Hospital for Sick Children and the Vector Institute. ■ Report outlines successes and challenges related to implementation of AI in health service organizations.
Gold D, Hicks J, Macheska J, et al. Clinical Decision Support for Emergency Department Nursing Discharge Pain Reassessment. Online J Nurs Inform [Internet]. 2018; 22(3). Available from: https://www.himss.org/resources/clinical-decision-support-emergency-department-nursing-discharge-pain-reassessment	■ "This article presents a literature review to explore CDS implementation best practices, details the development of CDS functionality to improve emergency department pain reassessment documentation, and presents quantifiable evidence to show documentation compliance improvement after implementation" (121).
World Health Organization (WHO). WHO guideline: recommendations on digital interventions for health system strengthening [Internet]. Geneva: WHO; 2019. Available from: https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf?ua=1	■ Guideline that presents recommendations based on emerging digital health interventions that are contributing to health system improvements, based on an assessment of the benefits, harms, acceptability, feasibility, resource use and equity considerations. ■ Includes recommendation on use of mobile decision support tools.

RECOMMENDATION QUESTION #5:

Should a distributive model (versus no distributive model or any other type of change management model) be recommended to integrate digital health competencies into the professional practice roles and responsibilities of nurses at all levels within an organization?

Outcomes: Nurse competence (with using technology) nurse engagement (with using, developing, acquiring, and participating in education about the technology), nurse confidence (with using technology) person/caregiver/family experience or satisfaction, and nurses are able to define what their role is.

No recommendation was made. The expert panel determined that current evidence was insufficient to assess the certainty of effects of a distributive model or other types of change management models to integrate digital health competencies into the professional practice roles and responsibilities of nurses and health providers within an organization.

Discussion of evidence:

Benefits and harms

For the purposes of this BPG, a **distributive model**[G] refers to a framework that articulates the structures, processes, protocols, and policies that generate a culture of shared responsibility for digital health practice. It includes tactics such as education, evaluation, and monitoring for all nurses and health providers. Furthermore, a distributive model involves leadership of nurses and health providers at all levels, and a shared responsibility for the success of person- and family-centred care and the health services (122). Other terms used in the literature to describe this type of model include collective leadership, shared leadership or shared governance. This type of model differs from traditional leadership models, which are typically hierarchical in nature or use a "top-down" approach. These traditional change management models are focused on individual capabilities and individual leadership, rather than a collective approach. The expert panel noted that some health service organizations are currently using a distributive model, while others are using a traditional leadership model, yet at this time there is no current guidance on which model is most effective. This is an emerging area of research.

A systematic search was conducted for evidence on the impact of a distributive model to integrate digital health competencies or other competencies into professional practice roles and responsibilities of nurses and health providers at all levels within an organization, compared to no distributive model or any other type of change management model. This broader intervention and population was considered sufficiently direct by the expert panel (as per GRADE methods, directness is judged based on the target population, intervention, and outcomes of interest (19)). After conducting a systematic review, it was noted that there was no published evidence on the impact of this intervention on the prioritized outcomes; thus, no recommendation was made. For more information about the guideline development process, including the use of GRADE methods, refer to **Appendix C**.

One systematic review of RCTs examined the effect of collective leadership interventions on professional practice outcomes, compared to usual centralized leadership approaches (122). Two studies included within this review examined professional management by leadership training called supportive leadership and team leadership (122).

One study within the review used a decentralized and participatory style of problem-solving management meetings (participative decision-making) with hospital unit staff members and their nurse managers (122). One study within the review examined a professional management intervention for trauma centre personnel using team leadership **simulation-based training**[G] (122). All studies in the included systematic review took place in acute care settings (i.e., hospitals), two studies focused on nurses (i.e., head nurses, registered nurses, and nursing aides), and one study focused on health providers with advanced trauma life support certifications (122).

The review examined the effect of collective leadership interventions on individual leadership, and the review authors combined data from the three RCTs in a meta-analysis and found a moderate improvement in individual leadership (122). One study within the systematic review examined participative decision-making and found an improvement in team performance (122). Another study within the systematic review reported on a clinical performance outcome as patient care overall score, but found little to no difference in clinical performance (122). The expert panel determined that the interventions and outcomes from the review were very different from the original prioritized outcomes.

The expert panel noted that nurse competence (with using technology), nurse engagement (with using, developing, acquiring, and participating in education about technology), and nurse confidence (with using technology) were critical outcomes that the systematic reviews should focus on; however, no studies measured these outcomes. The expert panel also noted that the systematic reviews should focus on two important outcomes: person/caregiver/family experience or satisfaction, and nurses' ability to define their role. However, no studies measured these outcomes.

Expert panel justification

The expert panel determined that current evidence was insufficient to assess the certainty of effects of a distributive model compared to other types of change management models to integrate digital health competencies into the professional practice roles and responsibilities of nurses within an organization. This is an emerging topic, and the expert panel determined there is not enough evidence at this time to make a recommendation.

Table 11: Implementation context and details from the evidence

COMPONENTS OF THE STUDIES	DETAILS FROM THE EVIDENCE
Details of key interventions to support and promote a distributive model	**Silva et al., 2022** ■ Simulation-based team leadership training that involved: □ establishing the leadership role (assumes leadership); □ sharing information and interpreting data; □ planning and prioritizing tasks; □ assigning roles and assessing team members' skill; and □ seeking input and identifying task barriers. ■ Interactive group workshops that used a participatory style of problem-solving management (i.e., participative decision-making strategies) with all health providers and managers. ■ Collective leadership interventions involved multiple professionals sharing viewpoints and knowledge. ■ Shared decision-making in an interactive, interdependent process. ■ Clarifying roles and responsibilities of team members. ■ Implementation of care-team huddles into daily practice. ■ Having a facilitator to help generate a common understanding and agreement around team goals (122).
Details of competencies examined	**Silva et al., 2022** ■ Professional practice competencies ■ Supportive leadership behaviours ■ Participatory problem-solving strategies ■ Sharing information effectively ■ Interpreting data ■ Planning and prioritizing tasks (122)

Supporting resources

RESOURCE	DESCRIPTION
Chatterjee R, Suy R, Yat Y, et al. Literature Review on Leadership in Healthcare Management. J Soc Sci [Internet]. 2018; 5(38). Available from: https://www.vumc.org/faculty/sites/default/files/Healthcare%20Leadership%20Review.pdf	■ Literature review describing the influences of the leadership in health-care management. ■ Discusses theories of leadership, collaborative leadership, distributive leadership and leadership models in the management of health care.
De Brún A, O'Donovan R, McAuliffe E. Interventions to develop collectivistic leadership in healthcare settings: a systematic review. BMC Health Serv Res [Internet]. 2019; 19(72). Available from: https://doi.org/10.1186/s12913-019-3883-x	■ Systematic review describing interventions to introduce collectivistic leadership in health-care settings.
Registered Nurses' Association of Ontario (RNAO), Healthcare Excellence Canada (HEC). Leading change toolkit [Internet]. Toronto (ON): RNAO, HEC; 2021. Available from: rnao.ca/leading-change-toolkit	■ Online, open-access evidence-informed implementation resource that focuses on the uptake and sustainability of knowledge — or evidence — and uses two complementary frameworks. ■ Section on "core leadership structures" that includes information on shared or distributed leadership structures.
Quek SJ, Thomson L, Houghton R, et al. Distributed leadership as a predictor of employee engagement, job satisfaction and turnover intention in UK nursing staff. J Nurs Manag [Internet]. 2021; 29. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/jonm.13321	■ Mixed-methods study that explores how distributed leadership through a shared governance program has influenced employee engagement, job satisfaction and turnover intention among staff in the UK health-care system.

Research gaps and future implications

The RNAO best practice guideline development and research team and the expert panel identified priority areas for future research (outlined in **Table 12**). The left-hand column of the table outlines the recommendation questions and outcomes, and the right-hand column outlines priority research areas identified by the expert panel based on the systematic reviews that were conducted for each question.

Clinical practice in a digital health environment is an emerging area of research, and studies conducted in these specific areas outlined below would provide further evidence to support high-quality and equitable support for nurses and other health providers practising in a digital health environment. The expert panel noted that although rigorous RCTs are needed, more exploration including qualitative research is also needed in the area of digital health. National and international digital health research institutes are also needed in order to conduct research. The list below is not exhaustive; other areas of research may be required.

Table 12: Priority research areas per recommendation question

RECOMMENDATION QUESTION	PRIORITY RESEARCH AREA
RECOMMENDATION QUESTION #1: **Should practical (e.g., hands-on) professional development education focused on the use of digital health technologies within an organization be recommended or not for all nurses?** **Outcomes:** Nurse competence (with using technology), nurse acceptance of technology, nurse sensitive outcomes (e.g., falls, pressure injuries, pain), nurse involvement in the technology lifecycle, nurse confidence (with using technology), nurse-person therapeutic relationship	■ Studies that identify the essential components of practical (e.g., hands-on) professional development education (e.g., timing, setting and content of education), specific to the integration of digital health technologies within an organization. ■ The impact of practical (e.g., hands-on) professional development education on the outcomes of nurse acceptance of technology, nurse sensitive outcomes (e.g., falls, pressure injuries, pain), and nurse involvement in the technology lifecycle. ■ Studies that identify and describe barriers and facilitators to the provision of practical (e.g., hands-on) professional development education. ■ The impact of practical (e.g., hands-on) professional development education on organizational and patient outcomes.

RECOMMENDATION QUESTION	PRIORITY RESEARCH AREA
RECOMMENDATION QUESTION #2: **Should education about relational care and interpersonal communication skills be recommended or not for nurses practising in virtual care settings and in-person digital health environments?** **Outcomes:** Person, caregiver or family's experience or satisfaction with care received, nurse competence (with using technology), nurse confidence (with using technology), nurse-person therapeutic relationship, person, caregiver or family involvement and engagement in care	■ Studies that identify the essential components of education about relational care and interpersonal communication skills (e.g., timing, setting and content of education), specific to virtual care settings and in-person digital health environments. ■ The impact of education about relational care and interpersonal communication skills in digital health environments on the outcomes of person, caregiver or family involvement and engagement in care. ■ Studies focused on education about relational care and interpersonal communication skills in digital health environments, specific to nurses or nursing students. ■ The impact of education about relational care and interpersonal communication skills in digital health environments on organizational and patient outcomes. ■ Studies examining the types of communication skills needed for nurses and health providers in virtual care settings compared to traditional in-person settings. ■ Qualitative studies exploring how nurses and health providers adapt their communication skills in digital health environments.
RECOMMENDATION QUESTION #3: **Should the implementation of interdisciplinary peer champion models in health service organizations be recommended or not to facilitate education for health providers on the use of digital health technologies?** **Outcomes:** Health provider competence (with using technology), health provider adoption of technology, health provider confidence (with using technology), health provider sensitive outcomes (e.g., falls, pressure injuries, pain), sustainability of education (i.e., knowledge and skills retention)	■ RCTs examining the essential components of interdisciplinary peer champion models in health service organizations to facilitate education for health providers on the use of digital health technologies. ■ The impact of interdisciplinary peer champion models on sustainability of education (i.e., knowledge and skills retention). ■ Studies exploring the implementation of interdisciplinary peer champion models in primary care and community care settings. ■ The impact of interdisciplinary peer champion models on technology adoption, person and family outcomes, and cost-effectiveness (compared to other models).

RECOMMENDATION QUESTION	PRIORITY RESEARCH AREA
RECOMMENDATION QUESTION #4: **Should the use of artificial intelligence-driven predictive analytics software or systems (e.g., command centres and risk assessment software tools) for nurses providing care in all practice settings be recommended or not to inform clinical decision-making and improve clinical outcomes?** **Outcomes:** Proactive/anticipatory care, critical incidents, failure to rescue, consistent application of evidence-based practice, nurse sensitive outcomes (e.g., falls, pressure injuries, pain)	■ Studies that explore the use of AI-driven predictive analytics in settings outside of acute care (e.g., primary care, community care, and long-term care). ■ The impact of AI-driven predictive analytics on critical incidents, health provider critical thinking, mortality, readmission rates, length of stay, resource allocation, and complication rates. ■ The impact in pediatric populations of AI-driven predictive analytics on persons and families receiving care (i.e., person and family health outcomes). ■ Studies that examine the efficacy, accuracy, and generalizability of AI-driven predictive analytics. ■ Qualitative studies examining the usability and user experience of AI-driven predictive analytics systems and design factors that enhance or hinder adoption and effectiveness. ■ Studies that examine integration of AI-driven predictive analytics into clinical workflows. ■ Studies that examine the ethical considerations of AI-driven predictive analytics (e.g., bias in algorithms, decision transparency). ■ Studies that examine the optimal methods of training and educating nurses and health providers to use AI-driven predictive analytics systems.
RECOMMENDATION QUESTION #5: **Should a distributive model (versus no distributive model or any other type of change management model) be recommended to integrate digital health competencies into the professional practice roles and responsibilities of nurses at all levels within an organization?** **Outcomes:** Nurse competence (with using technology), nurse engagement (with using, developing, acquiring, and participating in education about the technology), nurse confidence (with using technology), person, caregiver or family's experience or satisfaction with care received, nurses being able to define what their role is within the distributive model	■ Studies that identify the essential components of a distributive model, or other change management models, that can be used to integrate digital health competencies into the roles and responsibilities of nurses at all levels within an organization. ■ Studies focused on a distributive model, or other change management models, to integrate digital health competencies into the professional practice roles and responsibilities of nurses in settings outside of acute care (e.g., primary care, community care, and long-term care). ■ The impact of a distributive model, or other change management models, on the outcomes of nurse competence, nurse engagement, nurse confidence, person, caregiver, or family's experience or satisfaction with care received, and nurses' ability to define their role within the distributive model. ■ The impact of a distributive model, or other change management models, on persons and families receiving care (i.e., person and family health outcomes).

Table 13: Additional priority research areas identified by the expert panel

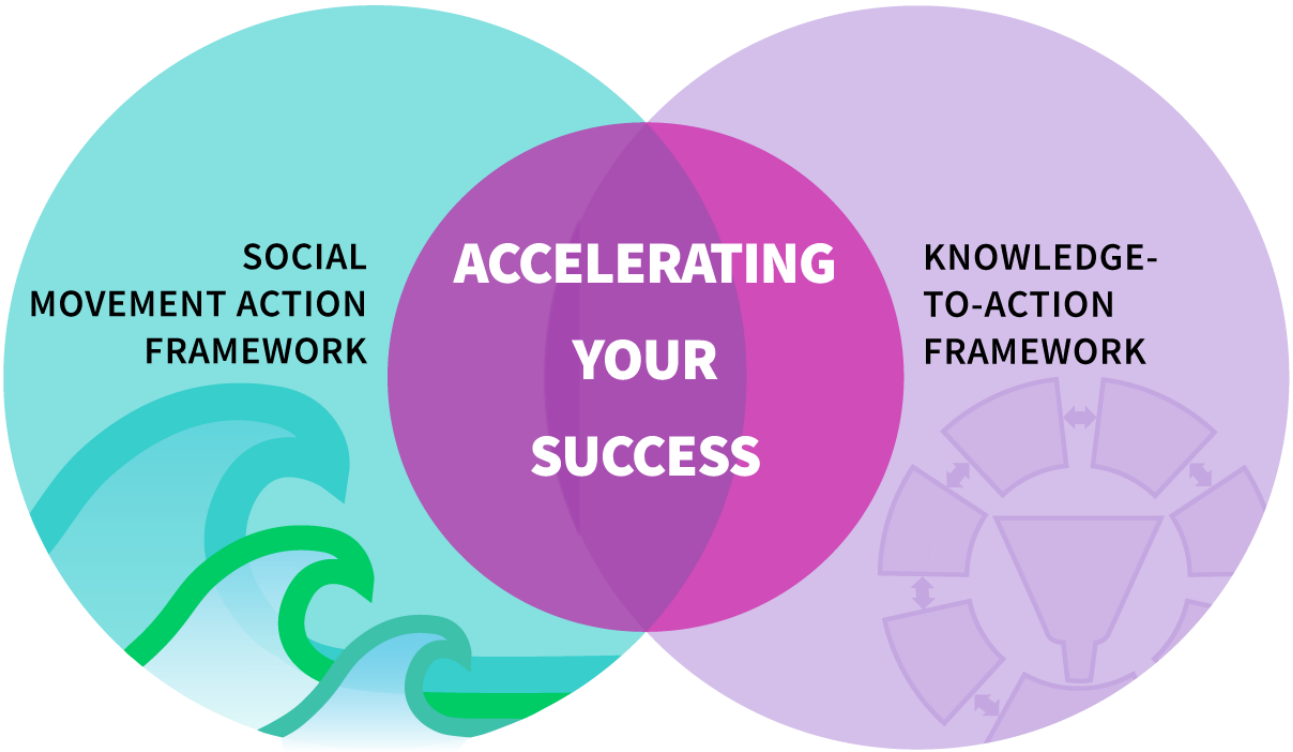
CATEGORY	PRIORITY RESEARCH AREA
Settings and sectors	■ Studies that focus on rural settings and sectors with less access or resources related to digital health technologies.
Populations	■ Studies that focus on persons with auditory or visual disabilities, who may have unique challenges related to digital health technologies (including but not limited to: older adults, persons with cognitive impairments, or persons with developmental delays). ■ Studies that focus on pediatric populations.
Health equity	■ Studies that focus on digital health technologies and their impact on diversity, equity and inclusion.
Digital health technologies	■ Studies that focus on the impact of nurse involvement in the technology lifecycle on technology acceptability. ■ Studies that examine the types of interventions needed to build trust and rapport with persons and families when digital health technologies are being used. ■ Studies that examine the impact of technology proficiency on communication effectiveness and person and family engagement.

Implementation strategies

Implementing guidelines at the point of care is multi-faceted and challenging. It takes more than awareness and access to BPGs for practice to change: BPGs must be adapted for each practice setting in a systematic and participatory way to ensure that recommendations fit the local context (123). The Leading Change Toolkit (developed by RNAO, in partnership with Healthcare Excellence Canada), provides evidence-informed processes for this (see **Appendix J**) (4).

The Leading Change Toolkit uses two complementary frameworks to guide evidence uptake and sustainability (see **Figure 3**). They can be used together to maximize and accelerate change.

Figure 3: The leading change toolkit: Two complementary frameworks to accelerate your success



Reprinted with permission from: Registered Nurses' Association of Ontario (RNAO), Healthcare Excellence Canada (HEC). Leading change toolkit [Internet]. 3rd ed. Toronto (ON): RNAO, HEC; 2021. Available from: RNAO.ca/leading-change-toolkit

The Social Movement Action Framework (1,2) is descriptive and identifies the defining elements of a **social movement for knowledge uptake and sustainability**[G]. It integrates a bottom-up, people-led approach to change for a shared concern (or common cause) in which change agents and change teams mobilize individual and collective action to achieve goals. The framework's elements — categorized as preconditions, key characteristics and outcomes — are dynamic, inter-related and develop spontaneously as the social movement evolves.

The Knowledge-to-Action Framework uses a process model of action cycle phases to systematically guide the adaptation of the new knowledge (e.g., a BPG) to the local context and implementation. This framework suggests identifying and using knowledge tools/products (such as guidelines) to determine gaps and begin the process of tailoring the new knowledge to local settings.

The Leading Change Toolkit is based on emerging evidence in health and social sciences that successful uptake and sustainability of best practice in health care is more likely when the following occurs:

- BPGs are selected for implementation through a participatory process led by change agents and change teams.
- The selected BPGs reflect priority areas for a shared concern that are credible, valued and meaningful, or an urgency for action.
- Others impacted by the change are identified and engaged throughout implementation to engage in individual and collective action.
- Receptivity for implementing BPGs, including environmental readiness, is assessed.
- Implementation strategies are tailored to the local context and designed to address barriers.
- Use of the BPG is monitored and sustained.
- Evaluation of the BPG's impact is embedded in the process to determine if the goals and outcomes have been met.
- There are adequate resources to complete all aspects of the uptake and sustainability of the BPG.
- The BPG is scaled up, out or deep, where possible, in order to widen its influence and create lasting health improvements.

RNAO is committed to widespread dissemination, implementation and sustainability of our BPGs. We use a systematic approach deploying various strategies, including:

1. The RNAO Best Practice Champion Network®, which powers the capacity of change agents to foster awareness, engagement, adoption and sustainability of BPGs. RNAO best practice champions are persons who are passionate about implementing evidence-based practices and mobilize others so together they improve care and health. Champions include nurses and other health professionals from all roles and health sectors, students, advocates, persons with lived experience, and caregivers.
2. RNAO BPG Order Sets™ provide clear, concise and actionable intervention statements derived from practice recommendations. BPG Order Sets can be readily embedded within electronic records, and they can also be used in paper-based or hybrid environments. In the LTC sector, BPG Order Sets have evolved into RNAO Clinical Pathways™ with the support of nurses that have extensive expertise in this setting. The RNAO Clinical Pathways have been embedded within a commonly used electronic health record system and are available to all Canadian and international LTC homes.
3. The Best Practice Spotlight Organization® (BPSO®) designation supports implementation at the organization and system levels. BPSOs focus on developing evidence-based cultures with the specific mandate to implement, evaluate and sustain multiple RNAO BPGs.

In addition, we offer annual capacity-building learning institutes on the implementation of practice change. Information about our implementation strategies can be found at:

- RNAO Best Practice Champions Network®: RNAO.ca/bpg/get-involved/champions
- RNAO Clinical Pathways™: RNAO.ca/bpg/implementation/clinicalpathways
- RNAO BPG Order Sets™: RNAO.ca/ehealth/bpgordersets
- RNAO BPSO®: RNAO.ca/bpg/bpso

RNAO capacity-building learning institutes and other professional development opportunities: RNAO.ca/events

Appendix A: Glossary of terms

Artificial Intelligence (AI): "An area of computer science that emphasizes the simulation of human intelligence processes by machines that work and react like human beings" (8).

See machine learning

Best practice guidelines (BPG): "Best practice guidelines are systematically developed, evidence-based documents that include recommendations for nurses and the interprofessional team, educators, leaders and policy-makers, persons and their families on specific clinical and healthy work environment topics. BPGs promote consistency and excellence in clinical care, health policies, and health education, ultimately leading to optimal health outcomes for people and communities and the health system" (124).

Best Practice Spotlight Organization® Ontario Health Team (BPSO OHT): Ontario Health Teams (OHTs) are groups of providers and organizations that are accountable for delivering a full and coordinated continuum of care to an attributed population in Ontario, Canada (125). The Best Practice Spotlight Organization® (BPSO®) model for OHTs offers a tailored program to scale up and spread RNAO BPGs within integrated systems of care. The BPSO OHT model helps OHTs advance all four elements of the Quadruple Aim and the United Nations Sustainable Development Goals (SDG) by addressing population health, supporting underserviced populations and promoting health equity. BPSO OHTs are actively supported by RNAO to systematically implement evidence-based BPGs that mobilize teams towards their collective goals. The BPSO OHT program is nested within the OHTs, and program deliverables are designed to advance OHT goals.

Big data: Rapidly collected, complex data in very large quantities, necessitating large storage requirements (126). The unique properties of big data are defined by volume, velocity, variety, and veracity (126).

Caregiver: "A family member, friend or person of choice who gives unpaid care to someone who has care needs due to a disability, a physical, neurological or mental condition, a chronic illness, frailty or age" (127). Caregivers are often key members of a person's support network.

Chatbot: A computer system that uses AI to simulate interactive human conversation via text or speech (128). For example, chatbots can be used in smartphone apps to mimic human conversations and interactions (auditory or text) (128) and provide assistance to persons regarding where to access care, or to connect them directly with health providers.

Clinical decision support system (CDSS): Computer-based programs that analyze data within EHRs to provide prompts and reminders to assist health providers in implementing evidence-based clinical guidelines at the point of care (114).

Command centre: A centralized operating system that brings together data that is already being collected across a health service organization so that more informed decisions can be made on how to improve overall efficiency and deliver better care (113). Physically, it is a large room that sits in the geographical centre of an organization (e.g., hospital) with a wall full of screens which monitor many operational and clinical functions of the hospital (113). It is a powerful processor with AI capability that takes in inputs provided by staff and equipment, analyzes the data and provides real-time actionable information to staff and leadership to improve each function it is asked to focus on (113).

Culturally safe care: People providing culturally safe care are attempting to provide respectful engagement that recognizes and aims to address power imbalances inherent across the health system (129). Culturally safe care aims to create and sustain an environment that is free of racism and discrimination, where people feel safe when receiving health care. For example, Indigenous people, families and communities should be able to share their perspectives, ask questions and have their beliefs, behaviours and values be respected by health and social service providers (129).

Digital determinants of health: This term refers to literacy in information and communication technologies, access to equipment, and access to the internet (8).

See digital health literacy and social determinants of health

Digital divide: This term refers to the gap between demographics and regions that have access to modern information and communications technology and those that do not or have restricted access. This technology may include smartphones, tablets, televisions, computers, and other devices that use the internet (8).

Digital health: A broad term that refers to the field of knowledge and practice associated with the development and use of digital technologies to improve health (8). Digital health encompasses other uses of digital technologies for health such as AI, machine learning, big data and robotics. It encompasses eHealth, mHealth, health informatics, as well as emerging areas such as advanced computing sciences (8). Digital technologies refer to tools, systems or devices that can generate, create, store or process data, enabled through microprocesses that are programmed to perform specific functions (9).

See eHealth, health informatics, mHealth, nursing informatics, and robotics

Digital health environment: Any setting where health providers, informatics professionals, administrators, managers and persons/families receiving care work in supportive teams to leverage digital tools, technologies and services in order to optimize care delivery and empower and activate people to manage their health and wellness.

Digital health literacy: Refers to having the personal competencies to use digital health technologies and services efficiently, competently and safely (10,11). It includes eHealth literacy, which refers to having the skills and abilities necessary to seek, find, understand and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem (12).

See health literacy

Distributive model: A framework that articulates the structures, processes, protocols, and policies that generate a culture of shared responsibility for digital health practice. It includes tactics such as education, evaluation, and monitoring.

Downgrade: In GRADE, when limitations in the individual studies potentially bias the results, the certainty of evidence will decrease (130). For example, a body of quantitative evidence for one priority outcome may begin with high certainty, but due to serious limitations in one or more of the five GRADE criteria, it will be downgraded (rated down) by one or two levels (130).

Early warning system: Risk assessment tool that uses EHR data such as alterations in vital signs to rapidly identify clinically deteriorating patients and escalate care accordingly (i.e., alert health providers) (adapted from (115)). For the purposes of this BPG, early warning systems refer to artificial intelligence-driven predictive analytics technology (e.g., machine learning software using real-time data).

Education recommendation: Directed at those who are responsible for the education of nurses and other health providers (e.g., educators, quality improvement teams, managers, administrators, and academic and professional institutions). These recommendations outline content and training strategies for entry-level health programs, ongoing education and professional development.

eHealth: The secure use of information and communications technologies in support of health and health-related fields, including health care services, health surveillance, health literature, and health education, knowledge and research (8).

Electronic health record (EHR): An electronic health record is a secure, private, lifetime digital record of a person's health and care history that gives authorized health and social service providers real-time access to relevant medical information (131). Access to shared electronic health records refers to authorized health and social service providers in different organizations and sectors having joint access to a person's electronic health record in order to streamline communication and coordinate care.

Evidence-based practice: The integration of research evidence with clinical expertise and patient values; unifies research evidence with clinical expertise and encourages the inclusion of patient preferences (132).

Evidence-to-Decision (EtD) frameworks: A table that facilitates guideline panels to make decisions when moving from evidence to recommendations. The purpose of the EtD framework is to summarize the research evidence, outline important factors that can determine the recommendation, inform panel members about the benefits and harms of each intervention considered, and increase transparency about the decision-making process in the development of recommendations (19).

External reviewer: Individuals or groups who commit to reviewing and providing feedback on the draft RNAO best practice guideline prior to publication. External reviewers often include individuals or groups that are directly impacted by the guideline topic and recommendations (e.g., people accessing health services, people working in health service organizations, or people with subject-matter expertise).

Family: "A term used to refer to individuals who are related (biologically, emotionally, or legally) and/or have close bonds (friendships, commitments, shared households and child rearing responsibilities, and romantic attachments) with the person receiving health care. A person's family includes all those whom the person identifies as significant in his or her life (e.g., parents, caregivers, friends, substitute decision-makers, groups, communities, and populations). The person receiving care determines the importance and level of involvement of any of these individuals in their care based on his or her capacity" (64).

Good Practice Statement: Good practice statements are directed primarily to nurses and the interprofessional teams who provide care to persons and their families across the continuum of care, including (but not limited to): primary care; home and community care; acute care; and LTC.

Good practice statements are actionable statements that should be done in practice (16). These statements are believed to be so beneficial that summarizing the evidence would be a poor use of the expert panel's time and resources (16). Moreover, researchers may no longer be conducting studies on the topic, or the alternative to the action may be unethical or studying them may go against human rights (16,17). Given the high level of certainty that the benefits derived from good practice statement outweigh the harms, they are not based on a systematic review of the evidence. They also do not receive a rating of the certainty in their evidence or a strength (i.e., a rating of conditional or strong, which is further discussed below) (18). This does not diminish certainty in the evidence; while they are often supported by indirect evidence, there is a well-documented clear and explicit rationale connecting the indirect evidence to the statement (16). As such, good practice statements should be interpreted as strong recommendations, as there is an underlying assumption that there is high certainty in the benefits of implementing the action (16).

Grading of Recommendations Assessment, Development and Evaluation (GRADE): The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) is a methodological approach to assess the certainty of a body of evidence in a consistent and transparent way, and to develop recommendations in a systematic way. The body of evidence across identified important and/or critical outcomes is evaluated based on risk of bias, consistency of results, relevance of the studies, precision of the estimates, publication bias, large effect, dose response, and opposing confounding (19).

When using GRADE, five components contribute to the assessment of confidence in the evidence for each outcome. These components are as follows:

1. Risk of bias, which focuses on the flaws in the design of a study or problems in its execution.
2. Inconsistency, which looks at a body of evidence and assesses whether the results point in the same direction or are different.
3. Imprecision, which refers to the accuracy of results based on the number of participants and/or events included, and the width of the confidence intervals across a body of evidence.
4. Indirectness, whereby each primary study that supports an outcome is assessed and a decision is made regarding the applicability of the findings to the population, intervention, and outcome outlined in the research question.
5. Publication bias, where a decision is made about whether the body of published literature for an outcome potentially includes only positive or statistically significant results (19).

Health provider: Refers to both regulated (e.g., nurses, physicians, dieticians and social workers) and unregulated (e.g., personal support workers) workers who are part of the interprofessional team. With regards to unregulated health providers, the individual and the organization they work for must ascertain that they have the knowledge, skill and judgment to carry out an intervention.

Regulated health providers: In Ontario, the Regulated Health Professional Act, 1991 (RHPA) provides a framework for regulating 23 health professions, outlining the scope of practice and the profession-specific controlled or authorized acts that each regulated professional is authorized to perform when providing health care and services (13).

Unregulated health providers: Unregulated health providers fulfill a variety of roles in areas that are not subject to the RHPA. They are accountable to their employers but not to an external regulating professional body (e.g., College of Nurses of Ontario). Unregulated health providers fulfill a variety of roles and perform tasks that are determined by their employer and employment setting. Unregulated health providers only have the authority to perform a controlled act as set out in the RHPA if the procedure falls under one of the exemptions set out in the Act (14).

Health informatics: Includes the core principles of: health sciences and services; computer, data, and information science; social and behavioural sciences; and, management sciences (133). Also refers to the intersection and integration of information sciences; data sciences; computer sciences; engineering sciences; basic sciences; health sciences; socio-behavioural sciences; and ethico-legal and policy fields (133) to assist in the management of health information.

See nursing informatics

Health literacy: The ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the lifespan (134). Health literacy covers three broad elements: (1) knowledge of health, health care and health systems (2) processing and using information in various formats in relation to health and health care and (3) ability to maintain health through self-management and working in partnership with health providers (135).

See digital literacy

Health service organizations: Organizations that deliver health-care services to defined communities or populations. These include, but are not limited to, family health teams, home care organizations and hospitals.

Implementation science: Defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services and care" (136).

Indigenous: Introduced and used in a global context following the international efforts of Aboriginal peoples to achieve a greater presence in the United Nations (UN). The UN broadly defines Indigenous persons as peoples of long settlement and connection to specific lands who practice unique traditions and retain social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they reside (137). Under the UN definition, Indigenous is generally understood to include: self-identification at the individual level and acceptance by an Indigenous community as a member; historical continuity with pre-colonial or pre-settler societies; strong links to territories and surrounding natural resources; distinct social, economic or political systems; and distinct language, culture and beliefs. Indigenous peoples form non-dominant groups within society and resolve to maintain and reproduce their ancestral environments and systems as distinctive peoples and communities (137).

The Canadian Constitution recognizes three groups of Indigenous peoples: First Nations, Inuit and Métis. These are three distinct peoples with unique histories, languages, cultural practices and spiritual beliefs (138).

Indirect evidence: As per GRADE methods, directness is judged based on the target population, intervention, and outcomes of interest (19). Evidence can be indirect if the populations differ from those of interest, the intervention tested differs from the intervention of interest, or the outcomes differ from those of primary interest (19).

See surrogate outcome

Interprofessional team: A team comprised of multiple health providers (regulated and unregulated) who work collaboratively to deliver comprehensive and quality health services to persons within, between and across health-care settings (15). Examples of key interprofessional team members supporting persons receiving care in digital health environments include, but are not limited to, nurses, physicians, dietitians, pharmacists, peer workers and personal support workers. It is important to emphasize that persons and their families are active participants in their care, and collaborate in partnership with nurses and the interprofessional team.

Machine learning (ML): A type of AI that uses algorithms to derive knowledge from data by interpreting the data independently and without being explicitly programmed. As more data are presented to the ML application, the computer learns from the data and corrects the output (139). Broadly, ML is a set of processes or approaches used to generate AI tools.

See artificial intelligence and predictive analytics

Meta-analysis: A systematic review that uses statistical methods to analyze and summarize the results of the included studies (140).

See systematic review

mHealth: "The use of mobile and wireless technologies to support health objectives" (24).

Non-randomized study: A quantitative study estimating the effectiveness of an intervention, where people are allocated to different interventions using methods that are not random (141).

Nurse: Refers to registered nurses, licensed practical nurses (referred to as registered practical nurses in Ontario), registered psychiatric nurses and nurses in advanced practice roles such as nurse practitioners and clinical nurse specialists (13).

Nursing informatics: The integration of "nursing, its information and knowledge and their management with information and communication technologies to promote the health of people, families and communities worldwide" (142).

See health informatics

Organization and policy recommendation: These recommendations apply to managers, administrators and policymakers who are responsible for developing policy or securing supports required within health service organizations to enable the implementation of best practices.

Outcomes: A dependent variable, or the clinical and/or functional status of a patient or population, that is used to assess if an intervention is successful. In GRADE, outcomes are prioritized based on if they are critical for decision-making, important but not critical for decision-making, or not important. In so doing, the literature search and systematic reviews are more focused (19).

Peer champion model: For the purposes of this BPG, refers to super-users, champions, coaches, change agents, formal or informal leaders, or any individual with additional knowledge and expertise in digital health technology. The peer champion delivering the education could be a nurse or other health provider. A peer champion advocates for change, motivates others, and uses their position to facilitate adoption (93).

Person: An individual with whom a health or social service provider has established a therapeutic relationship for the purpose of partnering for health. Replaces the terms "patient," "client," and "resident" that are used across health and social service organizations (64).

Person centred: An approach to care in which the person is viewed as whole. The process of coming to know the whole person is nurtured through the formation of a therapeutic relationship between the person, those who are significant to them, and health and social service providers. This approach to care involves advocacy, empowerment, mutual respect and an understanding of the person's right to be autonomous, to self-determine and to participate actively in decisions about their health (both illness and wellness) (64).

Person with lived experience: Members of the community who have first-hand experience and knowledge of the topic of interest either as a person, unpaid caregiver, or advocate. Persons with lived experience are a diverse group with an array of backgrounds and experiences (143).

PICO research question: A framework to outline a focused question. It specifies four components:

1. The patient or population that is being studied.
2. The intervention to be investigated.
3. The alternative or comparison intervention.
4. The outcome that is of interest (19).

Practical or hands-on education: For the purposes of this guideline, practical education refers to deliberate practice, hands-on training, or simulation training; it does not include training using e-learning modules alone. Some examples of practical or hands-on professional development education for the use of digital health technologies include nurses practising in a computer lab using EHRs and hands-on training for using virtual care platforms. Practical or skills lab training follows a structured teaching concept, takes place under supervision and in consideration of foundational concepts, and ideally creates an atmosphere that allows the repeated, risk-free practice of targeted clinical skills (76).

Practice recommendation: Recommendations directed primarily at nurses and the interprofessional team who provide direct care to persons and support for their family across the spectrum of care. This includes (but is not limited to) primary care, acute care, home-care and long-term care.

Predictive analytics: A branch of data analytics that uses various techniques, including machine learning, to analyze patterns in data and predict future outcomes (144). For the purposes of this BPG, predictive analytics include command centres, risk assessment software tools, early warning systems and other clinical decision support systems (CDSS) that use machine learning algorithms to interpret data independently (e.g., tool that uses EHR data such as alterations in vital signs to rapidly identify clinically deteriorating patients and escalate care accordingly).

See CDSS, command centre, and machine learning

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram: A diagram that depicts the flow of information through the different phases of a systematic review. It maps out the number of articles identified, included and excluded (145).

Quadruple aim: An internationally-recognized framework for the delivery of health care that is centred around four overarching goals: (1) enhanced experiences for persons receiving care (2) enhanced experiences for health and social service providers delivering care (3) improved health outcomes for persons receiving care and (4) reduced health care costs (45).

Qualitative research: An approach to research that seeks to convey how human behaviour and experiences can be explained within the contexts of social structures, using an interactive and subjective approach to investigate and describe phenomena (146).

Quantitative research: An approach to research that investigates phenomena with tools that produce statistical measurements/numerical data (147).

Randomized controlled trial (RCT): An experiment in which the investigator assigns one or more interventions to participants who are randomly allocated to either the experimental group (receives intervention) and the comparison (conventional treatment) or control group (placebo or no intervention) (140).

Recommendation: A course of action(s) that directly answers a recommendation question (also known as a "PICO research question"). A recommendation is based on a systematic review of the literature and is made in consideration of its (a) benefits and harms; (b) values and preferences; and (c) health equity. All recommendations are given a strength — either strong or conditional — through panel consensus.

It is important to note that recommendations should not be viewed as dictates, because recommendations cannot take into account all of the unique features of individual, organizational and clinical circumstances (19).

Recommendation question: A priority research area of practice, policy or education, identified by expert panel members, that requires evidence to answer. The recommendation question may also aim to answer a topic area around which there is ambiguity or controversy. The recommendation question informs the research questions, which guides the systematic review.

Relational care: Care provided with an understanding of persons' health needs focusing on how personal, interpersonal and social structural factors shape persons' lived experience (81,82). From the perspective of relational practice, nurses examine how personal capacities and socioeconomic limitations impact the lived experience of persons, decision-making, and management of their health-care (82). Relational care practices are a respectful and reflexive approach to inquire into persons' lived experiences and health-care needs; they are the skilled action of respectful, compassionate, and authentically interested inquiry (81).

See webside manner

RNAO Clinical Pathways™: RNAO Clinical Pathways are a digitized version of RNAO's Best Practice Guidelines that can be embedded in an electronic health record system to promote evidence-based, person- and family-centred care.

Robotics: The design, construction and use of machines (robots) to perform tasks (148). Many aspects of robotics involve AI, and robots may be equipped with human senses such as vision, touch, and ability to sense temperature, or with simple decision-making (148).

Simulation-based training: Practising realistic scenarios using a specialized manikin (i.e., a doll-like model of the human body that mimics human anatomy and physiology), computer software (including virtual or augmented reality), or humans playing the role of patient (78). The setting can be high-fidelity, where manikins and equipment are advanced, also called technology-enhanced simulation, or low-fidelity where the equipment is less advanced (78). The most specialized high-fidelity manikins can simulate the physiology of humans with pulse, blood pressure, and secretion of sweat and tears (78). The facilitator has the ability to regulate the parameters according to the actions initiated by the health providers using specialized computer software (78).

Social determinants of health: The social determinants of health are "non-medical factors that influence health outcomes. They are the conditions in which people are born, grow, work, live and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems" (149).

See digital determinants of health

Social media: "A form of mass media communications on the Internet (such as websites for social networking and microblogging) through which users share information, ideas, personal messages, and other content (such as videos) (150)." It includes using social networking sites and related platforms to build an audience (150).

Social movement for knowledge uptake and sustainability: Individuals, groups and/or organizations who, as voluntary and intrinsically motivated change agents, mobilize to transform health outcomes (2).

Surrogate outcome: A surrogate outcome is a substitute measure to the one originally selected. Surrogate outcomes are considered when evidence about the desired outcomes is lacking or unexplored (19).

See indirect evidence

Systematic review: A comprehensive review of the literature that uses clearly formulated questions and systematic and explicit methods to identify, select and critically appraise relevant research. A systematic review collects and analyzes data from the included studies and presents them, sometimes using statistical methods (140).

See meta-analysis

Telepractice: Broadly defined as the use of communications technologies to provide health care at a distance (152). "The delivery, management and coordination of care and services provided via information and telecommunication technologies. This may include the use of telephone and cell phone communication; email; video and audio conferencing; instant messaging (e.g., texting, multimedia, online chat); teleradiology; and telerobotics" (153).

May also be called telehealth, teleconsultation or telemedicine.

Underserved and underserviced populations: Underserved populations can include Indigenous people, people who do not speak either of Canada's official languages, people with alternate sexual orientation, immigrants, refugees, ethnically or racially diverse populations, people with disabilities, those experiencing homelessness, sex workers and people with low incomes. Underserviced means there is an increased likelihood that individuals who belong to a certain population (and people can belong to more than one) may experience difficulties in obtaining needed care, receive less care or a lower standard of care, experience different treatment by health providers or receive treatment that does not adequately meet their needs, or that they will be less satisfied with health services than the general population (154).

Verified virtual platforms: These are virtual care platforms that are appropriate for clinical use and that meet a standard for privacy, security, technology and functionality.

Virtual care: "Any interaction between patients and/or members of their circle of care, occurring remotely, using any forms of communication or information technologies, with the aim of facilitating or maximizing the quality and effectiveness of patient care" (41).

Wearables: Electronic technology or devices incorporated into items that can be comfortably worn on a body and are used for tracking real-time information (155). They often have motion sensors that sync information with mobile devices or computers (155). Examples include activity trackers and smart watches (155).

Webside manner: Term used to convey a health provider's ability to transfer relational skills via technology (e.g., offering comfort, listening attentively, showing respect, and providing empathic responses to persons receiving care via technology) (156).

See relational care

Appendix B: RNAO guidelines and other resources that align with this guideline

The following are some topics and suggested Registered Nurses' Association of Ontario (RNAO) guidelines and resources from other organizations that align with this best practice guideline (BPG).

TOPIC	RESOURCE(S)
Implementation science, implementation frameworks and resources	■ Registered Nurses' Association of Ontario (RNAO), Healthcare Excellence Canada (HEC). Leading change toolkit [Internet] (3rd ed.). Toronto (ON): RNAO, HEC; 2021 Available from: RNAO.ca/leading-change-toolkit ■ The National Implementation Research Network's Active Implementation Hub. Get Started [Internet]. [place unknown]: AI Hub; c2013–2018. Available from: http://implementation.fpg.unc.edu/ ■ Canadian Patient Safety Institute. Improvement frameworks: getting started kit [Internet]. [place unknown]: safer healthcare now!; 2015 Aug. Available from: http://www.patientsafetyinstitute.ca/en/toolsResources/ImprovementFramework/Documents/Improvement%20Frameworks%20GSK%20EN.PDF ■ Helping navigate dissemination and implementation models. In: The Dissemination and Implementation Models in Health Research and Practice Webtool [Internet]. Denver (CO): University of Colorado Denver; c2014-2023. Available from: https://dissemination-implementation.org/ ■ Registered Nurses' Association of Ontario (RNAO). Adopting eHealth solutions: implementation strategies [Internet]. Toronto (ON): RNAO; 2017. Available from: RNAO.ca/bpg/guidelines/ehealth-solutions
Person- and family-centred care	■ Registered Nurses' Association of Ontario (RNAO). Person-and family-centred care [Internet]. Toronto (ON): RNAO; 2015. Available from: RNAO.ca/bpg/guidelines/person-and-family-centred-care **Note:** this BPG is currently under revision.

TOPIC	RESOURCE(S)
Digital health	■ Canada Health Infoway. Toolkit for implementers of artificial intelligence in health care [Internet]. Dec 2021. Available from: https://www.infoway-inforoute.ca/en/digital-health-initiatives/innovative-technologies/artificial-intelligence/toolkit-for-ai-implementers ■ Healthcare Excellence Canada (HEC). Implementing artificial intelligence in Canadian healthcare: a kit for getting started [Internet]. Ottawa (ON): HEC; 2021. Available from: https://www.healthcareexcellence.ca/media/qdmn0p3b/20211208_aireport_en.pdf ■ National Institute for Health and Care Excellence (NICE). Behaviour change: digital and mobile health interventions [Internet]. London (UK): NICE; 7 Oct 2020. Available from: https://www.nice.org.uk/guidance/ng183 ■ Rouleau G, Gagnon MP, Côté J, Payne-Gagnon J, Hudson E, & Dubois CA. Impact of information and communication technologies on nursing care: results of an overview of systematic reviews [Internet]. J Med Internet Res; 2017; 19(4), e122. Available from: https://doi.org/10.2196/jmir.6686 ■ World Health Organization (WHO). WHO guideline: recommendations on digital interventions for health system strengthening [Internet]. Geneva: WHO; 2019. Available from: https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf?ua=1
Transitions in care and services	■ Registered Nurses' Association of Ontario (RNAO). Transitions in care and services, second edition [Internet]. Toronto (ON): RNAO; 2023. Available from: RNAO.ca/bpg/guidelines/transitions-in-care

Appendix C: Best practice guideline development methods

This appendix presents an overview of the RNAO guideline development process and methods. RNAO is unwavering in its commitment that every BPG be based on the best available evidence. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) methods have been implemented to provide a rigorous framework and meet international standards for guideline development.

Scoping the best practice guideline

The scope sets out what an RNAO BPG will and will not cover (see **Purpose and scope**). To determine the scope of this particular BPG, the RNAO best practice guideline development and research team conducted the following steps:

1. **A review of previous BPG.** The RNAO BPG *Adopting eHealth Solutions: Implementation Strategies* was reviewed to help inform the purpose and scope of this BPG.
2. **An environmental scan of guidelines.** Two guideline development methodologists searched an established list of websites for guidelines and other relevant content published between January 2016 and March 2021. The purpose of the environmental scan of guidelines was to gain an understanding of existing guidelines on digital health technologies in order to identify opportunities to develop the purpose and scope of this BPG. The resulting list was compiled based on knowledge of evidence-based practice websites and recommendations from the literature. RNAO expert panel members were asked to suggest additional guidelines (see the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)**[G] diagram online). For more detailed information, please see the search strategy for existing guidelines, including the list of websites searched and the inclusion criteria used.

   The guidelines were reviewed for content, applicability to nursing scope of practice, accessibility and quality. The two guideline development methodologists appraised four international guidelines using the AGREE II tool (157). Guidelines with an overall score of 6 or 7 (on a 7-point Likert scale) were considered to be of high quality and therefore considered for GRADE-ADOLOPMENT (158). GRADE-ADOLOPMENT provides a framework for adopting or adapting trustworthy recommendations from existing guidelines (158). However, the expert panel did not identify any priority recommendations from the existing guidelines to be adopted or adapted for this BPG.

   The following guidelines were appraised as indicated:

   - World Health Organization (WHO). WHO guideline: recommendations on digital interventions for health system strengthening [Internet]. Geneva: WHO; 2019. Available from: https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf?ua=1
     - Score: 7 out of 7.
     - This guideline was used as a supporting resource.
   - Blacquiere D, Lindsay MP, Foley N, et al.; Heart and Stroke Foundation Canadian Stroke Best Practice Committees. Available from: https://pubmed.ncbi.nlm.nih.gov/28441928/
     - Score: 4 out of 7.
     - This guideline was not used in this BPG, as it was specific to stroke best practices and scored below 6 on the AGREE II tool. More detail could have been provided regarding the search strategy used to retrieve evidence, the methods used to appraise the studies, and the steps taken to develop the recommendations.
   - National Institute for Health and Care Excellence (NICE). Behaviour change: digital and mobile health interventions [Internet]. London (UK): NICE; 7 Oct 2020. Available from: https://www.nice.org.uk/guidance/ng183

- Score: 6 out of 7.
- This guideline was used as a supporting resource.

3. **An environmental scan of standards.** Two guideline development methodologists also searched for standards published within Canada between January 2016 and March 2021 to gain an understanding of existing standards on digital health technologies and to identify their scope. The standards were reviewed for content, applicability to nursing scope of practice and accessibility. The standards were not quality appraised.

   The following standards were reviewed as indicated:

   - Health Standards Organization (HSO). Virtual health [Internet]. Ottawa (ON): HSO; Dec 2018. Available from: https://healthstandards.org/standard/virtual-health/
     - This standard was used as a supporting resource.
   - Oncology Nursing Program. Oncology nursing telepractice standards [Internet]. ON: Cancer Care Ontario; Aug 2019. Available from: https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer/60456
     - This standard was not used in this BPG, as it was specific to oncology nursing.
   - Australian Commission on Safety and Quality in Health Care. National Safety and Quality Digital Mental Health Standards [Internet]. Sydney (NSW): Australian Commission on Safety and Quality in Health Care; 2020. Available from: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/national-safety-and-quality-digital-mental-health-standards
     - This standard was not used in this BPG, as it was specific to populations living with mental health issues.
   - National Institute for Health and Care Excellence (NICE). Evidence standards framework (ESF) for digital health technologies [Internet]. London (UK): NICE; 10 Dec 2018. Available from: https://www.nice.org.uk/corporate/ecd7
     - This standard was not used in this BPG, as it was not focused on health providers using digital health technologies in practice.
   - College of Nurses of Ontario (CNO). Telepractice [Internet]. Toronto (Canada): CNO; 2020. Available from: https://www.cno.org/globalassets/docs/prac/41041_telephone.pdf
     - This standard was not used in this BPG, as the guideline development methodologists were unable to find a detailed explanation to describe how the standard was developed.

4. **A review of the literature.** A literature review was undertaken to determine interventions and outcomes related to digital health that have been studied in the literature. Two guideline development methodologists searched for literature published between January 2016 and May 2021. Common findings across studies were summarized and shared with the expert panel during the initial planning meetings.
5. **Key informant interviews.** Twenty-four interviews were conducted with experts in the field — including persons with lived experience, direct care health and social service providers, and researchers — to understand the needs of members of the interprofessional team and persons with lived experience related to digital health technologies.
6. **Discussion group sessions.** Three sessions were convened with a total of 18 nursing students, clinical informatics nurses and frontline nurses to understand the needs of nurses within digital health environments.

The expert panel determined that the BPG's purpose is to primarily focus on nurses, however the recommendations and good practice statements are applicable to interprofessional teams of all domains of clinical care, administration, education, research, and policy to support the intersection between nursing clinical practice and technology.

Assembly of the expert panel

RNAO aims for diversity in membership of an expert panel; this is in alignment with its Organizational Statement on Diversity and Inclusivity, which is part of the RNAO Mission and Values (159). RNAO also aims for persons impacted by BPG recommendations, especially persons with lived experience, to be included as expert panel members.

There are numerous ways in which RNAO finds and selects members of an expert panel. These include:

- searching the literature for researchers in the topic area;
- soliciting recommendations from key informant interviews;
- drawing from established professional networks, such as RNAO Interest Groups, the Best Practice Champions Network® and BPSOs®; and
- contacting other nursing and health and social service provider associations, topic-relevant technical associations or organizations, and advocacy bodies.

For this BPG, the RNAO best practice guideline development and research team assembled a panel of experts from nursing practice, research, education and policy, as well as other members of the interprofessional team, and persons with lived experience representing a range of sectors and practice areas. The expert panel also included representatives from different geographical areas, including rural, suburban and urban (see the **RNAO best practice guideline expert panel**).

The expert panel engaged in the following activities:

- developed and approved the purpose and scope of this BPG
- determined the recommendation questions and outcomes to be addressed in this BPG
- participated in a development process to finalize recommendation statements
- provided feedback on the drafting of this BPG
- participated in the development of evaluation indicators
- identified appropriate experts to review the draft guideline prior to publication

In addition to the above, the expert panel co-chairs also:

- participated in meetings with the guideline development methodologists and guideline development project coordinator
- facilitated expert panel meetings
- provided in-depth guidance on clinical and/or research issues
- moderated voting processes

Declaration of conflict of interest

In the context of RNAO best practice guideline development, the term "conflict of interest" (COI) refers to situations in which an RNAO staff member or expert panel member's financial, professional, intellectual, personal, organizational or other relationships may compromise their ability to conduct panel work independently. Declarations of COI that might be construed as constituting a perceived and/or actual conflict were made by all members of the RNAO expert panel prior to their participation in guideline development work using a standard

form. Expert panel members also updated their COI at the beginning of each expert panel meeting and prior to guideline publication. Any COI declared by an expert panel member was reviewed by the RNAO best practice guideline development and research team and expert panel co-chairs. No limiting conflicts were identified by members of the expert panel. See the Declarations of Conflicts of Interest Summary online.

Identifying priority recommendation questions and outcomes

RNAO systematic review questions are developed in accordance with the PICO format (population, intervention, comparison and outcomes). For an overview of the recommendation questions, good practice statements, indirect searches conducted, and final decisions based on GRADE and the expert panel, please refer to the supplementary document online.

From July to December 2021, the RNAO best practice guideline development and research team and the expert panel convened four times, virtually, to determine the priority recommendation questions and outcomes for this BPG. The four meetings included an orientation meeting and three planning meetings. A comprehensive list of recommendation questions that the BPG could potentially address was developed at these meetings. This was informed by:

- the environmental scan of guidelines
- the review of the literature
- key informant interviews and a discussion group
- an expert panel survey completed prior to the first planning meeting
- expert panel discussion during the planning meetings

This list of potential recommendation questions was sent to the expert panel in a confidential online survey after the expert panel had an opportunity to discuss the recommendation areas during the first and second planning meetings. Expert panel members were asked to rank order the recommendation questions from highest to lowest priority. The results were presented to the expert panel during the third planning meeting. The top six recommendation questions were deemed to be the final recommendation questions. A seventh recommendation question was added, following further discussion (see "Updates to the Recommendation Questions and Outcomes" for details).

In alignment with GRADE standards for assessing and presenting the evidence, potential outcomes were brainstormed by the expert panel for each recommendation question that would be the focus of a systematic review. The list of outcomes was informed by a review of the literature, the key informant interviews and discussion group, and expert panel discussion.

It was deemed feasible to have three to five outcomes per recommendation question. During the brainstorming session at the third planning meeting, the expert panel identified between two and nine potential outcomes per recommendation question. As a next step, the RNAO guideline development and research team consulted with RNAO's evaluation and monitoring team to have a closer look at all of the outcomes. During the consultation, the following factors were considered when refining the outcomes: which outcomes are measurable; if there are any overlap between outcomes; consistency in outcomes across recommendation areas; and outcomes that could be captured through other means (e.g., implementation tips or values and preferences associated with each recommendation area). After this internal review process, the team narrowed down the initial list and modified some outcomes.

Following the internal review process, the expert panel was sent a confidential online survey to rate the relative importance of each outcome (per recommendation question). The RNAO guideline development and research team then reviewed the results and calculated the top three to five most critical and important outcomes per recommendation question. The expert panel was provided an update via email regarding the final list of outcomes prioritized for each recommendation question.

The seven recommendation questions and their respective PICO research questions are presented below.

Recommendation Question #1: Should practical (e.g., hands-on) professional development education focused on the use of digital health technologies within an organization be recommended or not for all nurses?

PICO Research Question #1

Population: All nurses and other health providers, and persons receiving care.
Intervention: Practical or hands-on professional development education (in general, or specific to digital health technologies).
Comparison: Standard education (i.e., no practical component).
Outcomes: Nurse competence (with using technology) (critical), nurse confidence (with using technology) (critical), nurse-person therapeutic relationship (critical), nurse acceptance of technology (critical), nurse sensitive outcomes (e.g., falls, pressure injuries, pain) (critical), nurse involvement in the technology lifecycle (critical).

*The outcomes "nurse acceptance of technology," "nurse sensitive outcomes," and "nurse involvement in the technology lifecycle" were not measured. See "Updates to the Recommendation Questions and Outcomes" for details.

Recommendation Question #2: Should education about relational care and interpersonal communication skills be recommended or not for nurses practising in virtual care settings and in-person digital health environments?

PICO Research Question #2

Population: All nurses and other health providers, and persons receiving care.
Intervention: Comprehensive education about relational care and interpersonal communication skills (in general, or specific to digital health technologies).
Comparison: Standard education (or no education) about relational care and interpersonal communication skills.
Outcomes: Person, caregiver or family's experience or satisfaction with care received (critical), nurse competence (with using technology) (critical), nurse confidence (with using technology) (critical), nurse-person therapeutic relationship (critical), person, caregiver or family involvement and engagement in care (critical).

*The outcome "person, caregiver or family involvement and engagement in care" was not measured. See "Updates to the Recommendation Questions and Outcomes" for details.

Recommendation Question #3: Should the implementation of interdisciplinary peer champion models in health service organizations be recommended or not to facilitate education for health providers on the use of digital health technologies?

PICO Research Question #3

Population: Health providers at all levels of an organization, and persons receiving care.
Intervention: Interdisciplinary peer champion model (in general, or specific to digital health technologies).
Comparison: No interdisciplinary peer champion model.
Outcomes: Health provider competence (with using technology) (critical), health provider adoption of technology (critical), health provider confidence (with using technology) (critical), health provider sensitive outcomes (e.g., falls, pressure injuries, pain) (critical), sustainability of education (i.e., knowledge and skills retention) (critical).

*This question was originally proposed as a good practice area, but upon further discussion with the expert panel it was determined to be better suited as a systematic review question. The outcome "sustainability of education" was not measured. See "Updates to the Recommendation Questions and Outcomes" for details.

Recommendation Question #4: Should the use of artificial intelligence-driven predictive analytics software or systems (e.g., command centres and risk assessment software tools) for nurses providing care in all practice settings be recommended or not to inform clinical decision-making and improve clinical outcomes?

PICO Research Question #4

Population: All nurses and other health providers, and persons receiving care.
Intervention: Use of AI-driven predictive analytics.
Comparison: No use of AI-driven predictive analytics.
Outcomes: Proactive/anticipatory care (critical), critical incidents (critical), failure to rescue (critical), consistent application of evidence-based practice (critical), nurse sensitive outcomes (e.g., falls, pressure injuries, pain) (critical).

*The outcome "critical incidents" was not measured. See "Updates to the Recommendation Questions and Outcomes" for details.

Recommendation Question #5: Should a distributive model (versus no distributive model or any other type of change management model) be recommended to integrate digital health competencies into the professional practice roles and responsibilities of nurses at all levels within an organization?

PICO Research Question #5

Population: All nurses (at all levels of an organization), other health providers and persons receiving care.
Intervention: A distributive model to integrate competencies into the professional practice roles and responsibilities of nurses at all levels within an organization (in general, or specific to digital health technologies).
Comparison: No distributive model, or other types of change management models (e.g., 'top-down' approach, hierarchical organizational structure, vertical leadership, or others on a spectrum).
Outcomes: Nurse competence (with using technology) (critical), nurse engagement (with using, developing, acquiring, and participating in education about the technology) (critical), nurse confidence (with using technology) (critical), person, caregiver or family's experience or satisfaction with care received (important), nurses are able to define what their role is (within the distributive model) (important).

*The expert panel determined that current evidence was insufficient to assess the certainty of effects of a distributive model compared to other types of change management models to integrate digital health competencies into the professional practice roles and responsibilities of nurses within an organization. No recommendation was made. See "Updates to the Recommendation Questions and Outcomes" for details.

Recommendation Question #6: Should the active involvement of nurses (in all roles) in all stages in the technology lifecycle (i.e., design, development, implementation, adoption, evaluation, and ongoing monitoring and optimization) be recommended?

The expert panel initially brainstormed outcomes for this question in order to conduct a systematic review. However, upon further discussion, the expert panel determined this to be a good practice area.

Recommendation Question #7: Should embedding digital health competencies into nursing entry-to-practice exams be recommended?

The expert panel initially brainstormed outcomes for this question in order to conduct a systematic review. However, upon further discussion, the expert panel determined this to be a good practice area.

During planning meeting three, the expert panel also reviewed and discussed five potential good practice areas. Following planning meeting three, the list of potential good practice statements was sent to the expert panel in a confidential online survey to vote on the good practice statements. For further details, see "Developing Good Practice Statements."

Updates to the recommendation questions and outcomes

Systematic reviews were conducted for **Recommendation Questions 1**, **2**, **3**, **4**, **5**, **6**, and **7**. After further consultation with the expert panel, **Recommendation Questions 6** and **7** were determined to be better suited as good practice areas.

Indirect evidence searches

For **Recommendation Questions 1**, **2**, **3**, **4**, **5**, and **6**, after conducting the initial systematic review searches it was decided to look for further indirect evidence to support each question. Although direct evidence allows for more confidence in the results, in the absence of direct evidence GRADE suggests that indirect evidence can be used and downgraded accordingly (19). Directness is judged by the users of evidence tables, depending on the target population, intervention, and outcomes of interest (19). Indirect evidence searches were conducted, with the help of a health sciences librarian, by broadening the population and/or intervention for each recommendation question. For further details, see the discussions of evidence for each recommendation, and see "Systematic Retrieval of the Evidence."

While a systematic review and indirect evidence search was originally conducted for **Recommendation Questions 6** and **7**, the panel later agreed that "involvement of nurses (in all roles) in stages in the technology lifecycle" and "embedding digital health competencies into nursing entry-to-practice exams" were better suited to be a good practice statement according to GRADE methods. Therefore, good practice statements were drafted and consensus was reached that these were good practice areas. For further details, see "Developing Good Practice Statements." After conducting an indirect evidence search for **Recommendation Question 5**, it was determined that current evidence was insufficient to assess the certainty of effects of a distributive model compared to other types of change management models to integrate digital health competencies into the professional practice roles and responsibilities of nurses within an organization. No recommendation was made.

Developing good practice statements

The process for determining good practice statements evolved throughout the BPG development process as new GRADE guidance became available. Good practice statements are actionable statements that should be done in practice and the benefits of the action clearly outweigh the harms (16).

During the initial three planning meetings, the RNAO best practice guideline development and research team reviewed the list of six prioritized recommendations areas and presented five additional potential good practice areas for the expert panel to consider voting on. These included:

- conducting an initial assessment with persons and families, related to the digital health technology being used;
- providing education to persons and families related to the digital health technologies being used with them;
- organizations providing protected time for education for nurses;
- organizations utilizing peer champions to facilitate education; and,
- organizations implementing policies related to digital health technologies.

The expert panel discussed each of these areas, and following the planning meetings the expert panel was sent a confidential online survey to confirm if they were good practice areas. In the survey, the expert panel was asked to respond to five questions:

1. Is the message necessary to communicate? (Yes/No)
2. a) Is the evidence difficult to collect and summarize? (Yes/No)

   b) Would not performing the action be unethical or against human rights? (Yes/No)
3. Would implementing the action result in large benefits and very small harms? (Yes/No)
4. Is there a clear rationale for the action? (Yes/No)
5. Are there any other reasons why this statement should not be made (e.g., large costs, unacceptable, infeasible)? (Yes/No)

A 70 per cent expert panel consensus was required for each question to pass as a good practice area. For the good practice areas on *conducting an initial assessment* and *utilizing peer champions*, a 70 per cent consensus was not reached for one of the questions. There was further discussion and clarification with the expert panel on the good practice area of *conducting an initial assessment*, to clarify the criteria for a good practice statement and what is involved in conducting an assessment. After this discussion, and as per GRADE, the expert panel agreed that conducting an assessment met the criteria for a good practice statement. The area on *utilizing peer champions* was moved to a recommendation area and a systematic review was conducted, since the expert panel noted that utilizing peer champion models to facilitate education with nurses and other health providers on the use of digital health technologies specifically was a current debatable intervention.

Midway through the BPG development process, after attempting to conduct a systematic review on the topic of *embedding digital health competencies into nursing entry-to-practice exams* the RNAO best practice guideline development and research team consulted with the co-chairs and a GRADE consultant. It was determined that this recommendation area was better suited as a good practice area, as the expert panel noted that there was a lot of linked evidence (e.g., seminal studies, reports, or grey literature that is difficult to collect and summarize) to reflect this practice (i.e., embedding competencies is a known standard of practice for many health professions). As such, a good practice statement on this topic was drafted and presented to the expert panel. To reflect new GRADE learnings, a formal poll was not conducted and consensus was reached through discussion on each of the five questions:

1. Is collecting and summarizing the evidence a poor use of time and energy? (Yes/No)
2. Is the message necessary to communicate? (Yes/No)
3. Would implementing the action result in large benefits and very small harms? (Yes/No)
4. Is there a clear rationale for the action? (Yes/No)
5. Is the statement clear and actionable? (Yes/No)

Near the end of the BPG development process, after conducting a systematic review and indirect evidence search on *active involvement of nurses in the stages of the technology lifecycle*, the RNAO best practice guideline development and research team consulted again with the co-chairs and a GRADE consultant. It was determined that this recommendation area was better suited as a good practice area, and the expert panel noted there was linked evidence (e.g., seminal studies, reports, or grey literature that is difficult to collect and summarize) to reflect this practice. As such, a good practice statement on this topic was drafted and presented to the expert panel. To reflect new GRADE learnings, a formal poll was not conducted and consensus was reached through discussion on each of the aforementioned five questions.

Systematic retrieval of the evidence

Strong and conditional recommendations are based on a comprehensive and systematic review of the literature.

For this BPG, a search strategy was developed by RNAO's best practice guideline development and research team and a health sciences librarian for each of the aforementioned PICO research questions. A search for relevant research studies published in English between January 2017 and July 2022 was applied to the following databases: Cumulative Index to Nursing and Allied Health (CINAHL), Medline, Medline in Process, Cochrane Central, Cochrane Database of Systematic Reviews, Embase, Emcare, PsycInfo and IEEE Xplore.

Expert panel members were asked to review their personal libraries for key studies not found through the above search strategies (see PRISMA diagrams). Detailed information on the search strategy for the systematic reviews, including the inclusion and exclusion criteria and search terms, is available online.

Systematic review search dates were limited to the last five years from the year of the initial planning meetings in order to capture the most up-to-date evidence (January 2017). All study designs were included in the search.

All studies were independently assessed for relevance and eligibility by two guideline development methodologists based on the inclusion and exclusion criteria. Any disagreements were resolved through consensus.

All included studies were independently assessed for risk of bias by study design using validated and reliable tools. Systematic reviews were assessed using the ROBIS tool (160), RCTs were assessed using the Risk of Bias 2.0 tool (140), non-randomized studies were assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool (161), and **qualitative studies**[G] were assessed using the Critical Appraisal Skills Programme (CASP) tool (162). The two guideline development methodologists reached consensus on all scores through discussion. For data extraction, the included studies were divided equally between the guideline development methodologists. Each guideline development methodologist extracted information from their assigned studies and this was reviewed by the other guideline development methodologist for accuracy.

From January to March 2023, the health science librarian conducted indirect searches for relevant systematic reviews published in English between January 2017 and March 2023 that answered recommendation questions 1, 2, 3, 4, 5, and 6. Given that digital health technologies are an emerging area of research, the search strategy was limited to literature from the last five years, and this timeframe was deemed appropriate by the expert panel. The search was applied to the following databases: CINAHL, Medline, and Embase. Results from eight systematic reviews were incorporated into the discussions of evidence for **Recommendation 1.0**, **Recommendation 2.0**, **Recommendation 3.0**, and **Recommendation 4.0**. See the PRISMA diagrams online for studies included in the indirect evidence search.

In January 2024, the health science librarian conducted an update search for relevant systematic reviews published in English between January 2023 – January 2024 that answered recommendations questions 1, 2, 3 and 4. The search for question 5 was not updated because a recommendation was not drafted in that area. The search was applied to the following databases: CINAHL and Medline. Results from two reviews were incorporated into the discussions of evidence for **Recommendation 1.0** and **Recommendation 4.0**. See PRISMA diagrams online for studies included in the update search.

Determining certainty of evidence

Certainty of evidence

The certainty of quantitative evidence (i.e., the extent to which one can be confident that an estimate of an effect is true) is determined using GRADE methods (19). First, the certainty of the evidence is rated for each prioritized outcome across studies (i.e., for a body of evidence) per recommendation (19). This process begins with the study design and then requires an examination of five domains — risks of bias, inconsistency, imprecision, indirectness and publication bias — to potentially **downgrade**[G] the certainty of evidence for each outcome. See **Table 14** for a definition of each of these certainty criteria.

Table 14: GRADE certainty criteria

CERTAINTY CRITERIA	DEFINITION
Risk of bias	Limitations in the study design and execution that may bias study results. Valid and reliable quality appraisal tools are used to assess the risk of bias. First, risk of bias is examined for each individual study and then examined across all studies per defined outcome.
Inconsistency	Unexplained differences (heterogeneity) of results across studies. Inconsistency is assessed by exploring the magnitude of difference, and possible explanations in the direction and size of effects reported across studies for a defined outcome.
Indirectness	Variability between the research and review question and context within which the recommendations would be applied (applicability). There are four sources of indirectness which are assessed: ■ differences in population ■ differences in interventions ■ differences in outcomes measured ■ differences in comparators
Imprecision	The degree of uncertainty around the estimate of effect. This is usually related to sample size and number of events. Studies are examined for sample size, number of events and confidence intervals.
Publication bias	Selective publication of studies based on study results. If publication bias is strongly suspected, downgrading is considered.

Source: Adapted with permission from: Schunemann H, Brozek J, Guyatt G, et al., editors. Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach [Internet]. [place unknown: publisher unknown]; 2013. Available from: https://gdt.gradepro.org/app/handbook/handbook.html#h.svwngs6pm0f2.

Following the initial consideration for rating down the certainty of quantitative evidence, three factors are assessed that can potentially enable rating up the certainty of evidence for non-randomized studies.

1. **Large magnitude of effect:** If the body of evidence has not been rated down for any criteria other than risk of bias and a large estimate of the magnitude of intervention effect is present, there is consideration for rating up.
2. **Dose–response gradient:** If the body of evidence has not been rated down for any criteria other than risk of bias and a dose–response gradient is present, there is consideration for rating up.
3. **Effect of plausible confounding:** If the body of evidence has not been rated down for any criteria other than risk of bias and all residual confounders would result in an underestimation of treatment effect, there is consideration for rating up (19).

GRADE categorizes the overall certainty of evidence as high, moderate, low or very low. See **Table 15** for the definitions of these categories.

For this BPG, the five GRADE quality criteria for potentially downgrading quantitative evidence — and the three GRADE quality criteria for potentially rating up evidence — were independently assessed by the two guideline development methodologists. Any disagreements were resolved through consensus. An overall certainty of evidence per recommendation was assigned based on these assessments. The certainty of evidence assigned to each recommendation was based on the certainty of prioritized outcomes in the studies that informed the recommendation.

Table 15: Certainty of evidence

OVERALL CERTAINTY OF EVIDENCE	DEFINITION
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low	We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Source: Reprinted with permission from: The GRADE Working Group. Quality of evidence. In: Schunemann H, Brozek J, Guyatt G, et al., editors. Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach [Internet]. [place unknown: publisher unknown]; 2013 [cited 2018 Aug 31]. Table 5.1, Quality of evidence grades. Available from: https://gdt.gradepro.org/app/handbook/handbook.html#h.wsfivfhuxv4r. Reprinted with permission.

Formulating recommendations

Summarizing the evidence

The guideline development methodologists analyzed all studies pertaining to each recommendation question and drafted recommendations that answer the questions accordingly. For each draft recommendation, GRADE evidence profiles were constructed by the two guideline development methodologists. GRADE evidence profiles are used to present decisions on determining the certainty of evidence, and to present general information about the body of research evidence, including key statistical or narrative results (19).

The evidence profiles for the body of quantitative studies presented the decisions made by the two guideline development methodologists on the five key GRADE certainty criteria for rating down the evidence, the population included in the studies, the countries where the studies were conducted, the key results and the transparent judgments about the certainty underlying the evidence for each outcome (19). For this BPG, **meta-analyses**[G] were not performed.

For more detail, please see the GRADE evidence profiles for each recommendation, organized per outcome.

Evidence-to-Decision rrameworks

Evidence-to-Decision (EtD) frameworks[G] outline proposed recommendations and summarize all necessary factors and considerations based on available evidence and expert panel judgements for formulating the recommendation statements. EtD frameworks are used to help ensure that all important factors (i.e., certainty of the evidence, benefits/harms, values and preferences, and health equity) required to formulate recommendation statements are considered by the expert panel (19). Both quantitative and qualitative evidence are incorporated into the frameworks. The guideline development methodologists draft the EtD frameworks with available evidence from the systematic reviews.

For this BPG, the EtD frameworks included the following areas of consideration for each drafted recommendation statement (see **Table 16**):

- Background information on the magnitude of the problem.
- Includes the PICO question and general context related to the research question.
- The balance of benefits and harms of an intervention.
- Certainty of the evidence.
- Values and preferences.
- Health equity.

Decision making: Determining the direction and strength of recommendations

Expert panel members were provided with the EtD frameworks to review prior to three (virtual) half-day meetings to determine the direction (i.e., a recommendation for or against an intervention) and the strength (i.e., strong or conditional) of the BPG's recommendations. Expert panel members were also given access to the complete evidence profiles and full-text articles.

The expert panel co-chairs and the two guideline development methodologists facilitated the meetings to allow for adequate discussion for each proposed recommendation.

The decision on the direction and strength of each recommendation statement was determined by discussion of the judgements made for each of the factors in the EtD frameworks and a consensus vote of at least 70 per cent of voting panel members. The voting process was anonymous and was moderated by the expert panel co-chairs and guideline development methodologists. The co-chairs were also voting members. In determining the strength of a recommendation statement, the expert panel was asked to consider the following (see **Table 16**):

- the balance of benefits and harms of an intervention
- certainty of the evidence
- values and preferences
- health equity

If the expert panel deemed there was insufficient evidence to develop a recommendation (i.e., limited number of studies, and/or very low certainty evidence) they also had the option to not proceed with a recommendation.

Table 16: Key considerations for determining the strength of recommendations

FACTOR	DEFINITION	SOURCES
Benefits and harms	Potential desirable and undesirable outcomes reported in the literature when the recommended practice or intervention is used. "The larger the difference between the desirable and undesirable effects, the higher the likelihood that a strong recommendation is warranted. The narrower the gradient, the higher the likelihood that a conditional recommendation is warranted" (163).	Includes research exclusively from the systematic review.
Certainty of evidence	The extent of confidence that the estimates of an effect are adequate to support a recommendation. The extent of confidence that a review finding is a reasonable representation of the phenomenon of interest (164). Recommendations are made with different levels of certainty; the higher the certainty, the higher the likelihood that a strong recommendation is warranted (163).	Includes research exclusively from the systematic review.
Values and preferences	The relative importance or worth of the health outcomes of following a particular clinical action from a person-centred perspective. "The more values and preferences vary or the greater the uncertainty in values and preferences, the higher the likelihood that a conditional recommendation is warranted" (163).	Includes evidence from the systematic review (when available) and other sources, such as insights from the expert panel. During the systematic review screening process, if studies did not directly answer the research question (i.e., they did not discuss the outcomes of interest) but were relevant to preferences for the intervention from a person-centred perspective, those studies were also included in this section.

FACTOR	DEFINITION	SOURCES
Health equity	Represents the potential impact of the recommended practice or intervention on health outcomes or health quality across different populations. The greater the potential for increasing health inequity, the higher the likelihood that a conditional recommendation is warranted (165).	Includes evidence from the systematic review (when available) and other sources, such as insights from the expert panel.

Source: Adapted with permission from: Schunemann H, Brozek J, Guyatt G, et al., editors. Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach [Internet]. [place unknown: publisher unknown]; 2013. Available from: https://gdt.gradepro.org/app/handbook/handbook.html#h.svwngs6pm0f2

Supporting resources and appendices

Content for the supporting resources and appendices was submitted throughout the guideline development process by expert panel members and **external reviewers**[G]. The two guideline development methodologists reviewed the content based on the following five criteria:

1. **Relevance:** Supporting resources and appendices should be related to the subject of the BPG or recommendation. In other words, the resource or appendix should be suitable and appropriate in relation to the purpose and scope of the BPG or the specific recommendation(s).
2. **Timeliness:** Resources should be timely and current. Resources should be published within the last 10 years or in line with current evidence.
3. **Credibility:** When assessing credibility, the trustworthiness and expertise of the source material's author or authoring organization is considered. Potential biases are also assessed, such as the presence of advertising or the affiliation of the authors with a private company selling health-care products.
4. **Quality:** This criterion assesses the accuracy of the information and the degree to which the source is evidence-informed. The assessment of quality is in relation to the subject of the resource. For example, if a tool is being suggested, is that tool reliable and/or valid?
5. **Accessibility:** This criterion considers whether the resource is freely available and accessible online.

Drafting the guideline

The guideline development methodologists wrote the draft of this BPG. The expert panel reviewed the draft and provided written feedback. The BPG then proceeded to external review.

External review

As part of the guideline development process, RNAO is committed to obtaining feedback from: (a) nurses and other health and social service providers from a wide range of practice settings and roles; b) persons with lived experience; and (c) knowledgeable educators and administrators, throughout Canada and around the world.

External reviewers for RNAO BPGs are identified in two ways. First, reviewers are recruited through a public call issued on the RNAO website. Second, individuals and organizations with expertise in the guideline topic area are identified by the RNAO best practice guideline development and research team and the expert panel, and they are directly invited to participate in the review.

As part of the external review process, the guideline development methodologists shared the draft guideline with representatives from BPSOs and BPSO OHTs who will be implementing this BPG in their practice settings.

External reviewers are individuals with subject matter expertise in the guideline topic or those who may be affected by its implementation. Reviewers may be nurses, members of the interprofessional team, administrators, research experts, educators, nursing students, or persons with lived experience and their support network.

Reviewers are asked to read a full draft of the BPG and participate in its review prior to its publication. External reviewer feedback is submitted online by completing a survey questionnaire.

The external reviewers are asked the following questions about each recommendation and good practice statement:

- Is this recommendation/good practice statement clear?
- Do you agree with this recommendation/good practice statement?
- Is there a clear and explicit rationale to support this recommendation/good practice statement?

In addition, the external reviewers are asked the following:

About the appendices:

- Are the appendices included in this guideline appropriate?
- Are there any gaps in the content provided?

About the guideline title:

- Do you think this title is appropriate?
- Do you think this title is clear?

About the guideline as a whole:

- Do you have any additional comments/suggestions about the background section of this guideline?
- Do you agree with the wording of the key concepts and accompanying definitions?

With respect to the evaluation indicators, the external reviewers are asked:

- Are these indicators relevant to your practice setting?
- Do you have suggestions for other indicators and/or measures?

In addition, external reviewers are given the option to enter additional comments or suggestions. Survey submissions are compiled and feedback is summarized by the RNAO best practice guideline development and research team. Together with the expert panel, they review and consider the survey results, modifying BPG content and recommendations prior to publication to reflect the feedback received as required.

For this BPG, the written external review process was completed between September 14, 2023 and October 23, 2023. External reviewers with diverse perspectives provided feedback (see **External reviewer acknowledgement**).

Together with the expert panel, the RNAO best practice guideline research and development team reviewed the feedback received and modified the BPG content, where necessary.

Procedure for updating the guideline

The RNAO commits to updating all BPGs, as follows:

1. Each BPG will be reviewed by the RNAO every five years following publication of the previous edition.
2. Whether it is a new BPG topic or time to update an existing BPG, careful considerations need to be made regarding selection of the BPG for development. For next edition BPGs, an assessment of the uptake of the existing BPG is conducted, such as asking:
   - Is this a mandatory guideline that BPSOs need to implement?
   - How many BPSOs are actively implementing this BPG?
   - How many times has the BPG been downloaded online?
3. Further, an assessment of existing, recent and/or in-production high quality guidelines of the same topic by other guideline development organizations is completed. If the uptake of a BPG is high and there are no existing high quality BPGs of the same topic, this may indicate a higher priority for the next edition BPG to be completed. However, if the uptake is low and/or there is another high-quality guideline of the same topic, the BPG topic may be retired.
4. New BPG topics are determined by a process that includes a set of criteria to guide the systematic assessment of a selected list of suggested topics and feedback from a range of external reviewers, partners or others impacted by the topic area. Any group or individual may propose a BPG topic to RNAO through a variety of methods such as:
   - "Submit an Idea" on the RNAO website;
   - Writing to RNAO's CEO or director/associate directors of the International Affairs and Best Practice Guidelines (IABPG) Centre;
   - A rapid review or environmental scan (i.e., scoping search for trends, hot topics, practice concerns);
   - A survey requesting individuals to rank identified topics on a five-point Likert scale; and
   - Report sources (e.g., coroner's inquest, government or related agency).
5. RNAO selects topics for BPG development annually. All topics submitted are identified, and priority topics are chosen based on the following systematic assessment criteria:
   - Key priority areas identified by the Government of Ontario, request from major public health agency, Coroner's inquest;
   - Within the scope of nursing practice (RN, NP, RPN/LPN), and applicable in a range of practice settings;
   - Based on a multidisciplinary approach;
   - Builds on previously developed BPGs or general topic area;
   - Potential for partnerships in BPG development with other agencies;
   - Perceived need for the guideline, as identified by those submitting a topic for consideration;

- Evidence to support the guideline recommendations is available; and
- No other high quality guideline exists on the topic area.

6. Upon reviewing all submissions based on the above criteria, the results are shared with the BPG guideline development and research team, the Director of the IABPG Centre, and the CEO of RNAO, who reports the selected topics to Government of Ontario.

Appendix D: Indicator development process

The following is a summary of the RNAO indicator development process (see Indicator Development Flow Diagram online).

1. **Guideline selection:** Indicators are developed for guidelines focused on health system priorities, with an emphasis on filling gaps in measurement while reducing reporting burden.
2. **Extraction of recommendations:** Practice recommendations, overall guideline outcomes and BPG Order Sets™ (if applicable) are reviewed to extract potential measures for indicator development.
3. **Indicator selection and development:** Indicators are selected and developed through established methodology, including alignment with external data repositories and health information data libraries.
4. **Practice test and validation:** Proposed indicators are internally validated through face and content validity, and externally validated by national and international organization representatives.
5. **Implementation:** Indicators are published in the Monitoring and Evaluation chart in the BPG, and data dictionaries are published on the NQuIRE® website for use by BPSOs.
6. **Data quality assessment and evaluation:** Data quality assessment and evaluation, as well as ongoing feedback from BPSOs®, ensure purposeful evolution of BPG indicators collected in NQuIRE.

Appendix E: Framework for digital health equity

The framework for digital health equity is an expansion of the American National Institute on Minority Health and Health Disparities (NIMHD) Research Framework, and it is organized into several domains, including biological, behavioral, physical/built environment, sociocultural environment, and the health-care system (see **Figure 4**) (166). It categorizes domains as determinants of influence according to levels of the socioecological model (166). The social determinants of health are included primarily in the physical/built environment, sociocultural environment, and the health-care system domains (166). The framework builds on the leading health disparities framework, incorporating a digital environment domain (166). The framework can help support the work of digital health technology developers, as it is important for developers to think about and incorporate principles of digital health equity from the very beginning of the technology development process. The framework is also key for end-users, researchers, and health systems leaders, as digital health transformation requires health leaders at all levels to understand how the digital determinants impact health equity (166).

Figure 4: Framework for digital health equity

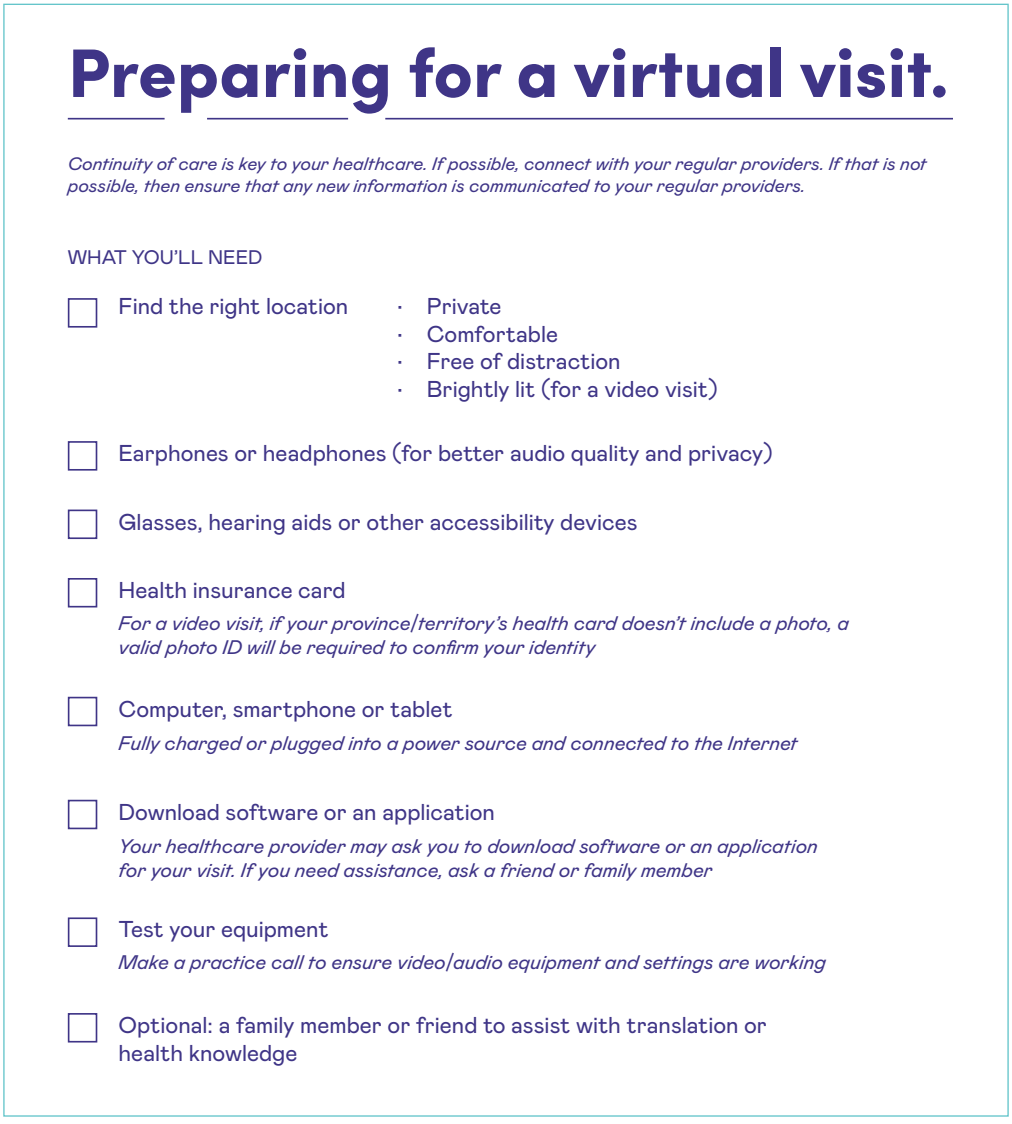
		Levels of Influence*			
		Individual	**Interpersonal**	**Community**	**Societal**
Domains of Influence *(Over the Lifecourse)*	**Biological**	Biological Vulnerability and Mechanisms	Caregiver–Child Interaction Family Microbiome	Community Illness Exposure Herd Immunity	Sanitation Immunization Pathogen Exposure
	Behavioral	Health Behaviors Coping Strategies	Family Functioning School/Work Functioning	Community Functioning	Policies and Laws
	Physical/Built Environment	Personal Environment	Household Environment School/Work Environment	Community Environment Community Resources	Societal Structure
	Digital Environment	Digital Literacy, Digital Self-Efficacy, Technology Access, Attitudes Towards Use	Implicit Tech Bias, Interdependence (e.g. shared devices), Patient-Tech-Clinician Relationship	Community Infrastructure, Healthcare Infrastructure, Community Tech Norms, Community Partners	Tech Policy, Data Standards, Design Standards, Social Norms & Ideologies, Algorithmic Bias
	Sociocultural Environment	Sociodemographics Limited English Cultural Identity Response to Discrimination	Social Networks Family/Peer Norms Interpersonal Discrimination	Community Norms Local Structural Discrimination	Social Norms Societal Structural Discrimination
	Health Care System	Insurance Coverage Health Literacy Treatment Preferences	Patient–Clinician Relationship Medical Decision-Making	Availability of Services Safety Net Services	Quality of Care Health Care Policies
Health Outcomes		**Individual Health**	**Family/ Organizational Health**	**Community Health**	**Population Health**

Source: Reprinted from: Richardson S, Lawrence K, Schoenthaler AM, et al. A framework for digital health equity. NPJ digital medicine [Internet]. 2022; 5(1), 119. Available from: https://www.nature.com/articles/s41746-022-00663-0

Appendix F: Preparing for a virtual visit checklist

This checklist was developed by Healthcare Excellence Canada and the Canadian Medical Association to help persons and families prepare for virtual visits and appointments with their health providers.

Figure 5: Preparing for a virtual visit checklist



Preparing for a virtual visit.

Continuity of care is key to your healthcare. If possible, connect with your regular providers. If that is not possible, then ensure that any new information is communicated to your regular providers.

WHAT YOU'LL NEED

- ☐ Find the right location
  - Private
  - Comfortable
  - Free of distraction
  - Brightly lit (for a video visit)
- ☐ Earphones or headphones (for better audio quality and privacy)
- ☐ Glasses, hearing aids or other accessibility devices
- ☐ Health insurance card
  For a video visit, if your province/territory's health card doesn't include a photo, a valid photo ID will be required to confirm your identity
- ☐ Computer, smartphone or tablet
  Fully charged or plugged into a power source and connected to the Internet
- ☐ Download software or an application
  Your healthcare provider may ask you to download software or an application for your visit. If you need assistance, ask a friend or family member
- ☐ Test your equipment
  Make a practice call to ensure video/audio equipment and settings are working
- ☐ Optional: a family member or friend to assist with translation or health knowledge

FOR ALL VISITS PREPARE A LIST OF THE FOLLOWING ITEMS

For in person and virtual

- ☐ Symptoms
  What are your symptoms? When did they start? How severe are they and how are you managing them?
- ☐ Key health data
  Weight, temperature, home blood pressure and any other health data you monitor.
- ☐ Current medications, vitamins and allergies
- ☐ Current health prevention/treatment activities
- ☐ Relevant health history
  Functional issues, assistive devices, past traumas, past surgeries or hospitalizations, and immunizations.
- ☐ Immediate family history (parents and siblings)
- ☐ Your care team members

QUESTIONS FOR YOUR HEALTHCARE PROVIDER

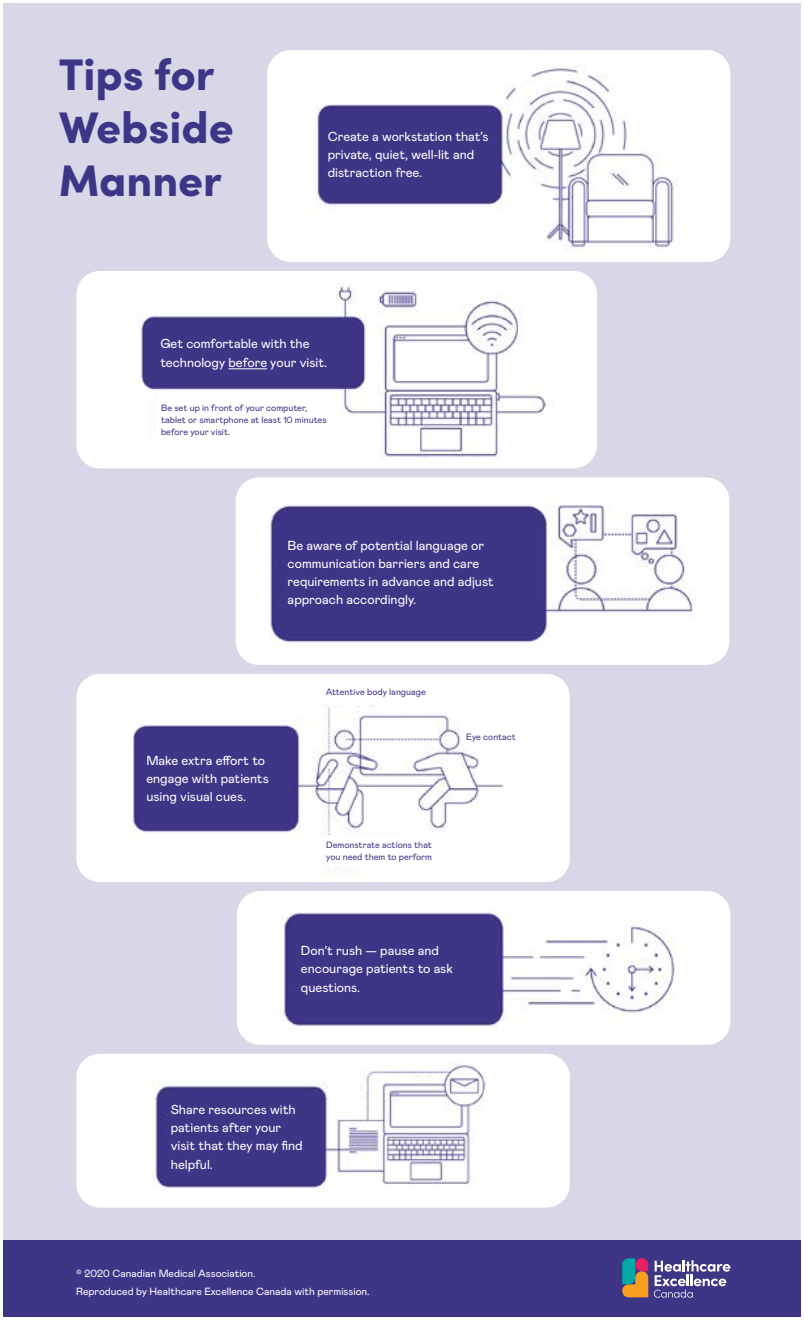
Healthcare Excellence Canada

Source: Reprinted with permission from: Healthcare Excellence Canada. Preparing for a virtual visit [Internet]. 2020. Copyright Canadian Medical Association. Available from: https://www.healthcareexcellence.ca/media/myghwzq2/hec_preparingforyourvisit_checklis.pdf

Appendix G: Tips for webside manner

These tips were developed by Healthcare Excellence Canada and the Canadian Medical Association to help prepare health providers for the use of virtual care platforms. Webside manner refers to a health provider's ability to transfer relational skills via technology (e.g., offering comfort, listening attentively, showing respect, and providing empathic responses to persons receiving care via technology) (156).

Figure 6: Tips for webside manner

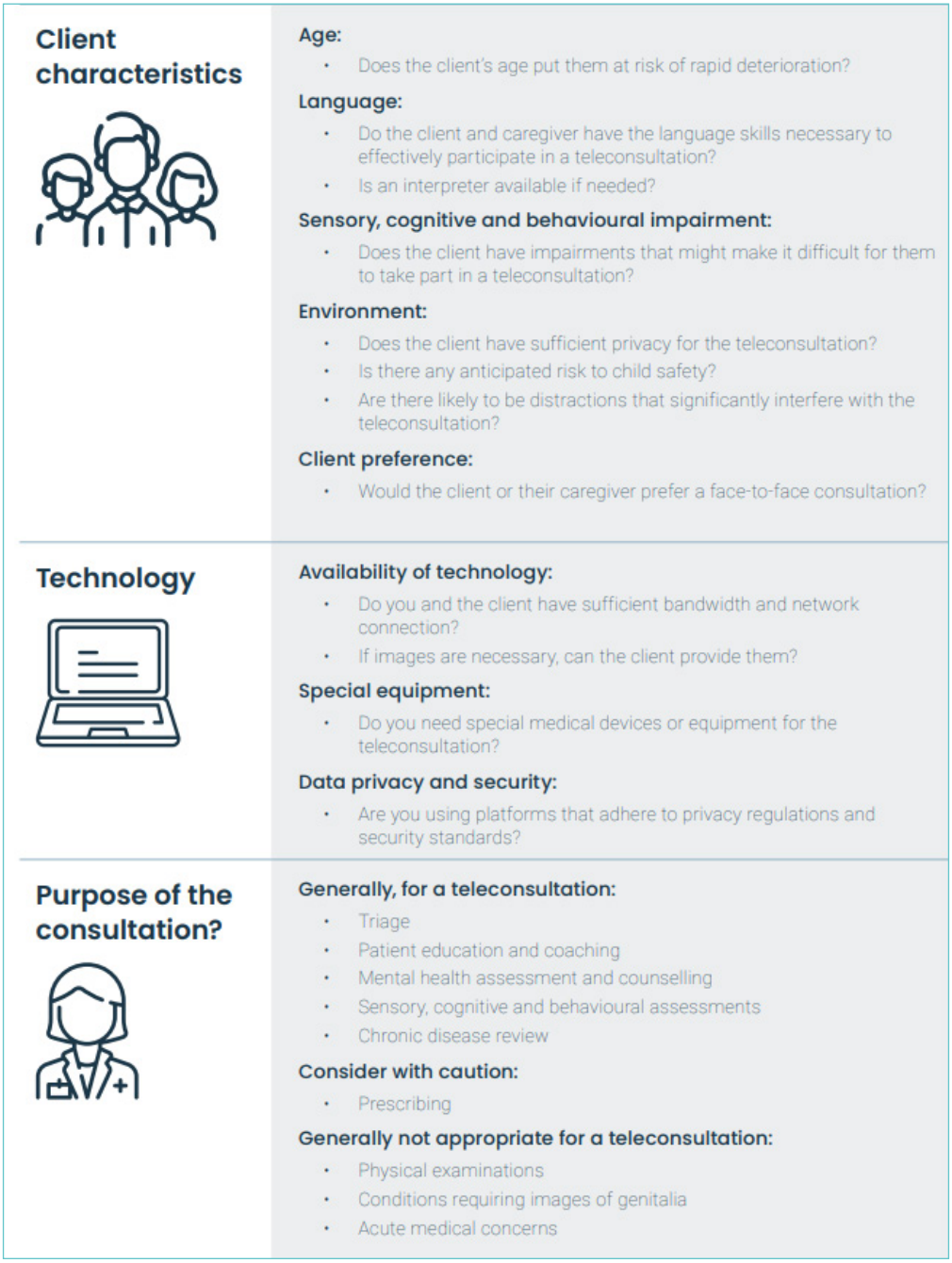


Source: Reprinted from: Healthcare Excellence Canada. Tips for webside manner [Internet]. 2020. Copyright Canadian Medical Association. Available from: https://www.healthcareexcellence.ca/media/yv2peclz/webside-manners-infographic.pdf

Appendix H: WHO teleconsultation considerations

The World Health Organization outlines how to plan and conduct telehealth consultations with children and adolescents and their families (167). Teleconsultation is not suitable for all persons receiving care, and the risks and benefits of teleconsultation should be considered for each situation and decided on a case-by-case basis. The figure below outlines some considerations when determining whether a teleconsultation is appropriate.

Figure 7: Consider whether a teleconsultation is appropriate



Source: Reprinted with permission from: World Health Organization (WHO). How to plan and conduct telehealth consultations with children and adolescents and their families [Internet]. Geneva: WHO; 2021. Available from: https://www.who.int/publications/i/item/9789240038073

Appendix I: Benefits of clinical decision support systems, possible harms, and evidence-based mitigation strategies

The table below outlines functions and benefits of clinical decision support systems (CDSS), potential harms, and solutions to mitigate harm. This information can help health service organizations who are considering implementation of CDSS.

Figure 8: Benefits of clinical decision support systems, possible harms, and evidence-based mitigation strategies

1. FUNCTIONS AND ADVANTAGES OF CDSS	2A. POTENTIAL HARM OF CDSS	2B. SOLUTION(S) TO MITIGATE HARM
Patient Safety Reducing incidence of medication/prescribing errors and adverse events.	**Alert fatigue** A phenomenon where too many insignificant alerts or CDSS recommendations are presented, and providers start to dismiss them regardless of importance.	Prioritize critical alerts, minimize use of disruptive alerts for non-critical indications.
Clinical management Adherence to clinical guidelines, follow-up and treatment reminders, etc.	**Negative impact on user skills** One example is reliance on, or excessive trust in, the accuracy of a system.	Avoid prescriptiveness in system design. Evaluate system impact on an ongoing basis.
Cost containment Reducing test and order duplication, suggesting cheaper medication or treatment options, automating tedious steps to reduce provider workload, etc.	**Financial challenges** Setup can be expensive (capital or human resource), and long-term cost-effectiveness is not guaranteed.	Design and plan for longitudinal cost analysis at the outset. Specify measurements for non-financial benefits where possible.
Administrative function/ automation Diagnostic code selection, automated documentation and note auto-fill.	**System and content maintenance challenges** As practice changes, there can be difficulty keeping the content and knowledge rules that power CDSS up to date.	1. Knowledge Management (KM) Service in place, with a focus on translation to CDSS systems. 2. System for measurement and analysis of CDSS performance.

1. FUNCTIONS AND ADVANTAGES OF CDSS	2A. POTENTIAL HARM OF CDSS	2B. SOLUTION(S) TO MITIGATE HARM
Diagnostics support Providing diagnostic suggestions based on patient data, automating output from test results.	**User distrust of CDSS** Users may not agree with the guideline provided by the CDSS.	Reference expert knowledge - include scientific references in messages where appropriate.
Diagnostics Support: Imaging, Laboratory, and Pathology Augmenting the extraction, visualization, and interpretation of medical images and laboratory test results.	**Transportability/ interoperability** CDSS faces challenges regarding integration with other hospitals or systems, making it inefficient for otherwise high-quality systems to be disseminated and scaled.	1. Adoption of industry standards. 2. Secure cloud services and blockchain.
Patient decision support Decision support administered directly to patients through personal health records (PHR) and other systems.	**Dependency on computer literacy** CDSS may require a very high technological proficiency to use.	1. Conform to existing functionality. 2. Adequate training made available at launch.
Better Documentation	**Inaccurate and poor-quality data/documentation** CDSS may aggregate data from multiple sources that are not synced properly. Users may develop manual workarounds that compromise data.	1. Expert Knowledge of interlinked systems. 2. IT testing/debugging during development and implementation stage.
Workflow improvement CDSS can improve and expedite an existing clinical workflow in an EHR with better retrieval and presentation of data.	**Disrupted/fragmented workflow** CDSS can also disrupt existing workflows if they require interaction external to the EHR, or don't match the providers' real world information processing sequences.	1. Usability evaluation. 2. Workflow modeling.

Source: Reprinted and adapted from: Sutton RT, Pincock D, Baumgart DC, et al. An overview of clinical decision support systems: benefits, risks, and strategies for success. Digit Med [Internet]. 2020; 3,17.

Note: Column 2C was removed from the original image.

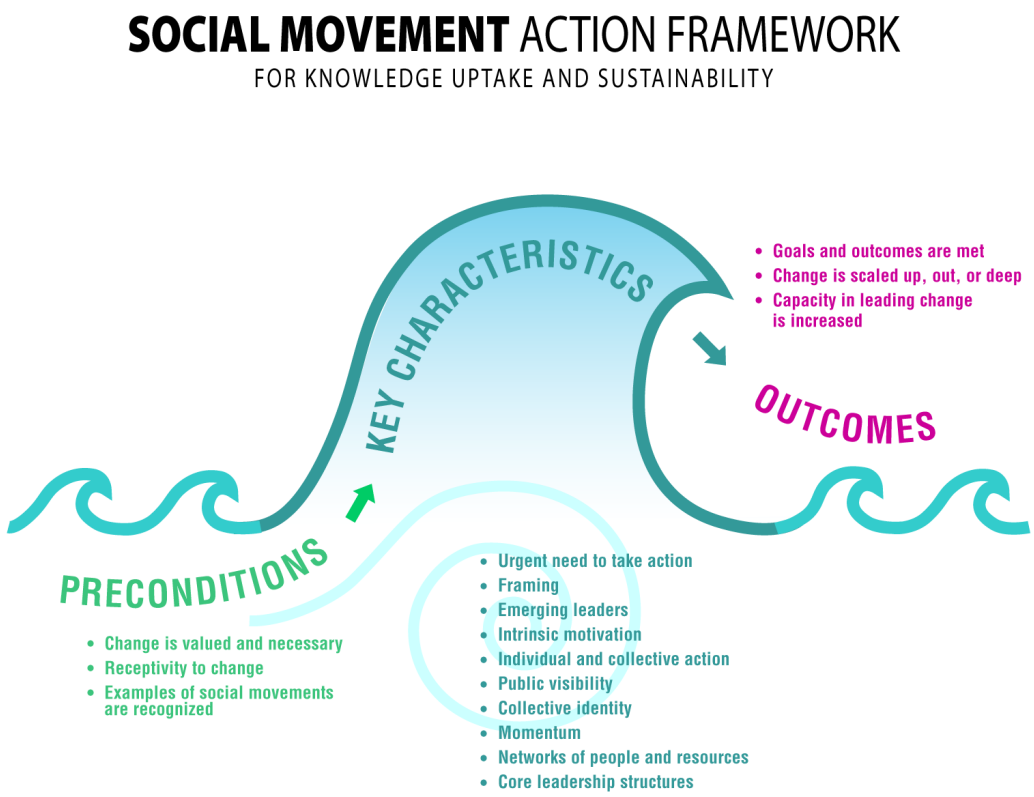
Appendix J: Description of the Leading Change Toolkit

BPGs can only be successfully implemented and sustained if planning, resources, organizational and administrative supports are adequate and if there is appropriate facilitation. Active engagement and involvement of formal and informal leaders (e.g., change agents and peer champions) are also essential. To encourage successful implementation and sustainability, an international expert panel of nurses, researchers, patient/person advocates, social movement activists and administrators has developed the Leading Change Toolkit (4). The toolkit is based on available evidence, theoretical perspectives and consensus. We recommend the Leading Change Toolkit for guiding the implementation of any BPG in health-care or social service organizations, including academic centres.

The Leading Change Toolkit includes two frameworks — the Social Movement Action (SMA) Framework (1,2) and the Knowledge-to-Action (KTA) Framework (3) — for change agents and change teams leading the implementation and sustainability of BPGs. Both frameworks outline the concept of implementation and its inter-related components. As such, either framework — the SMA or the KTA —can be used to guide change initiatives, including the implementation of BPGs. Using both frameworks serves to enhance and accelerate change (1).

The SMA Framework includes elements of **social movements for knowledge uptake and sustainability**[G] that have demonstrated powerful impact and long-term effects. Based upon the results of a concept analysis, the framework includes 16 elements categorized as preconditions (i.e., what must be in place prior to the occurrence of the social movement), key characteristics (i.e., what must be present for the social movement to occur) and outcomes (i.e., what will likely happen as a result of the social movement) (1,168). The three categories and elements of the SMA Framework are shown in **Figure 9**.

Figure 9: Social Movement Action Framework

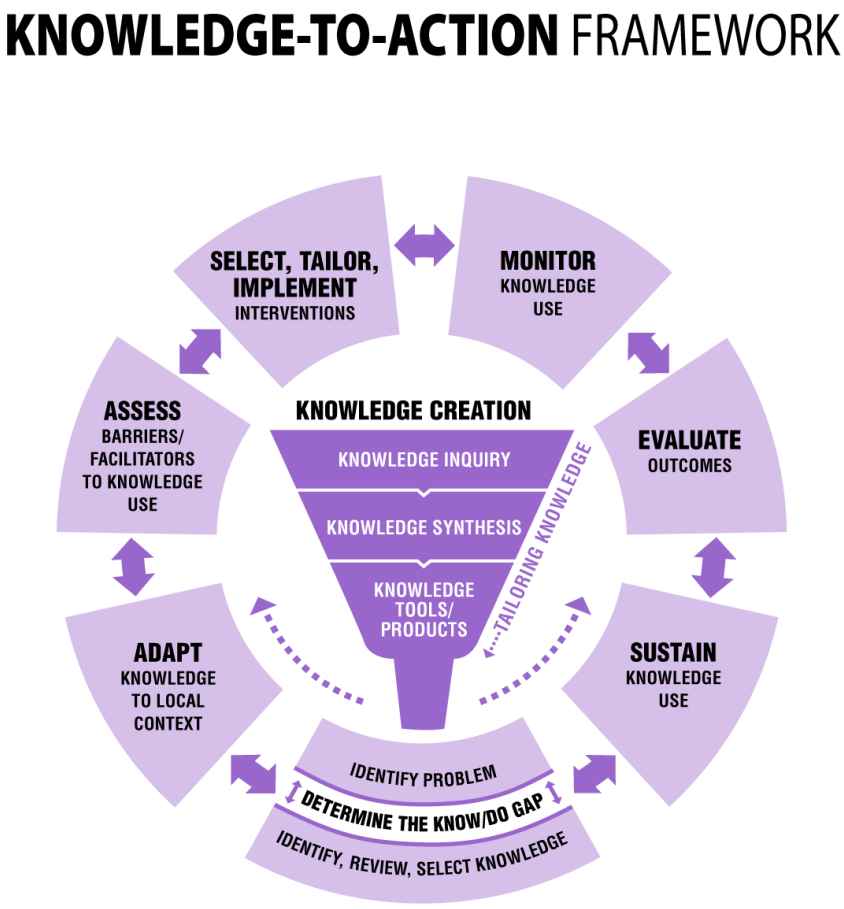


Source: Reprinted with permission from: Grinspun D, Wallace K, Li SA, et al. Exploring social movement concepts and actions in a knowledge uptake and sustainability context: a concept analysis. Int J Nurs Sci. 2022 Oct;9(4):411-21.

Grinspun D, Wallace K, Li SA, et al. Leading change through social movement. Registered Nurse Journal. 2020.

The KTA Framework is a planned cyclical approach to change that integrates two related components: the knowledge creation and the action cycle. The knowledge creation process is what researchers and guideline developers use to identify critical evidence results to create a knowledge product, like an RNAO BPG. The action cycle is comprised of seven phases in which the knowledge created is implemented, evaluated and sustained (3). Many of the action cycle phases may occur or need to be considered simultaneously. The KTA Framework is depicted in **Figure 10** (3,4).

Figure 10: Knowledge-to-Action Framework



Source: Adapted with permission from: Graham ID, Logan J, Harrison MB, et al. Lost in translation: time for a map? J Contin Educ Health Prof [Internet]. 2006;26(1):13-24. Available from: https://journals.lww.com/jcehp/Abstract/2006/26010/Lost_in_knowledge_translation__Time_for_a_map_.3.aspx

It is a complex undertaking to implement and sustain BPGs in order to effect successful practice changes and positive health outcomes for patients/persons and their families, providers, organizations and systems. The Leading Change Toolkit is a foundational implementation resource for leading this process.

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Canada Health Infoway
Inforoute Santé du Canada

October 28, 2024,

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Dear Dr.Grinspun,

On behalf of Canada Health Infoway, it is my privilege to extend our endorsement of the RNAO Best Practice Guideline (BPG) titled "Clinical Practice in a Digital Health Environment." We commend the RNAO for its commitment to advancing nursing practice through comprehensive, evidence-based guidelines that address the evolving landscape of digital health.

The "Clinical Practice in a Digital Health Environment" BPG is a testament to the RNAO's dedication to supporting healthcare providers in navigating the complexities of digital health integration. The guideline's thorough research, practical recommendations, and emphasis on continuous education and training are exemplary. It aligns seamlessly with Canada Health Infoway's mission to improve the quality and accessibility of healthcare for Canadians through innovative digital solutions.

Nurses play an indispensable role in the healthcare system, and their contributions are critical to the success of Connected Care initiatives. The emphasis on interprofessional collaboration and the creation of a cohesive digital health ecosystem supports Infoway's vision of a connected and efficient healthcare system where information flows effortlessly between providers and patients, leading to improved health outcomes.

Canada Health Infoway is committed to supporting initiatives that enhance the capacity of healthcare providers to deliver high-quality care. The RNAO's BPG serves as a vital resource that will aid in the development and implementation of policies and practices that foster the effective use of digital health technologies. It underscores the importance of equipping healthcare professionals, particularly nurses, with the tools and knowledge necessary to thrive in a digital health environment.

In conclusion, we are pleased to provide our endorsement of the RNAO's "Clinical Practice in a Digital Health Environment" BPG and are confident that this guideline will play a significant role in advancing digital health initiatives and improving healthcare delivery across Canada. We look forward to continuing our collaboration with the RNAO to support and empower nurses in their pivotal role within the healthcare system.

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Notes

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