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Nursing contributions to virtual models of care in primary care: A scoping review protocol

Crystal Vaughan¹, Julia Lukewich¹, Maria Mathews², Lindsay Hedden^{3,4}, Marie-Eve Poitras⁵, Shabnam Asghari⁶, Michelle Swab⁷, Dana Ryan¹

¹Faculty of Nursing, Memorial University, St. John's, Newfoundland and Labrador, Canada

²Department of Family Medicine, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada

³Faculty of Health Sciences, Simon Fraser University, Burnaby, British Columbia, Canada

⁴British Columbia Academic Health Science Network, Vancouver, British Columbia, Canada

⁵School of Nursing, Sherbrooke University, Sherbrooke, Quebec, Canada

⁶Department of Family Medicine, Memorial University, St. John's, Newfoundland and Labrador, Canada

⁷Health Sciences Library, Faculty of Medicine, Memorial University, St. John's, Newfoundland and Labrador, Canada

Corresponding author:

Julia Lukewich

Rm H2953, Faculty of Nursing, Memorial University

Health Sciences Centre

300 Prince Philip Dr, St. John's, NL A1B 3V6

Tel: (709) 864-8211; Email: jlukewich@mun.ca

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ABSTRACT

Introduction: Since the onset of the COVID19 pandemic, virtual care has gained increased attention, particularly in primary care for the ongoing delivery of routine services. Nurses have had an increased presence in virtual care and have contributed meaningfully to the delivery of team-based care in primary care; however, their exact contributions in virtual models of primary care remain unclear. The Nursing Role Effectiveness Model, applied in a virtual care and primary care context, outlines the association between structural variables, nursing roles, and patient outcomes. The aim of this scoping review is to identify and synthesize the international literature surrounding nurse contributions to virtual models of primary care.

Methods and analysis: The Joanna Briggs Institute scoping review methodology will guide this review. We performed preliminary searches in April 2022 and will use CINAHL, MEDLINE, Embase, and APA PsycInfo for the collection of sources for this review. We will also consider grey literature, such as dissertations/theses and organizational reports, for inclusion. Studies will include nurses across all designations (i.e., nurse practitioners, registered nurses, practical nurses). To ensure studies capture roles, nurses should be actively involved in healthcare delivery. Sources require a virtual care and primary care context; studies involving the use of digital technology without patient-provider interaction will be excluded. Following a pilot test, trained reviewers will independently screen titles/abstracts for inclusion and extract relevant data. Data will be organized using the Nursing Role Effectiveness Model, outlining the virtual care and primary care context (structure component) and the nursing role concept (process component).

Ethics and dissemination: This review will involve the collection and analysis of secondary sources that have been published and/or are publicly available. Therefore, ethics approval is not required. Scoping review findings will be published in a peer-reviewed journal and presented at relevant conferences, targeting international primary care stakeholders.

Keywords: Primary Care, Nursing, Nurse Role, Virtual Care

Strengths and limitations of this study

- This protocol is in accordance with the Joanna Briggs Institute methodology for scoping reviews, providing rigorous direction for the development of this timely review.
- International literature will be compiled to generate an understanding of nursing presence in virtual healthcare delivery throughout various models of primary care.
- Only English and French sources will be included, which may limit the generalizability of findings across all primary care contexts.
- This review will provide evidence related to nursing across all designations.

INTRODUCTION

Since the beginning of the COVID19 pandemic, virtual care (also known as telehealth) in Canada has gained significant attention in healthcare delivery and its use has increased considerably across healthcare systems. Virtual care is defined as “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”. [1] Virtual care goes beyond the use of telephone and video to include the use of other digital technologies in healthcare, such as text messaging. [2] Virtual models of care aim to improve access to care, provide timely and convenient care, enhance continuity of care, and reduce healthcare costs. [2-4]

Primary care practices have relied heavily on virtual care during the pandemic to maintain the delivery of routine healthcare services while minimizing risks of infection to clinicians and patients. For instance, in the province of Ontario, Canada, between 2019 and 2020, virtual visits in primary care increased from 1.2% to 71.1% across a 7-month period (based on physician billing data). [5] Similarly, survey data from a Quebec study indicated a significant increase in the use of telephone consultations in primary care during the pandemic compared to pre-pandemic use. [6] Nurses practicing in primary care, including nurse practitioners (NPs), registered nurses (RNs), and licensed practical nurses (LPNs) (referred to as registered practical nurses [RPNs] in Ontario), have the ability within their scopes of practice to contribute to primary care using virtual modalities. Also, in community health nursing, which encompasses primary care, public health, and home care nursing, nurses deliver primary care services as part of their community health practice responsibilities, often in rural/remote areas. Some of these nurses practice in community health centres and are referred to using a more specific title, such as community health nurse (in addition to their designation-specific title). [7] Collectively, nurse contributions to virtual models of primary care are poorly defined, and it is unclear how the organizational attributes of primary care practices support the optimization of nurses in virtual care delivery and indirectly influence patient outcomes. [8, 9]

Primary care, also referred to as general practice or family practice in some jurisdictions, is the initial point of contact patients have with the healthcare system to address their healthcare needs and is delivered in a variety of settings such as clinics, general practitioner offices, and health centres. [10] In Canada, practitioners in primary care initiate referrals to specialty care, a model implemented to manage specialist shortages and healthcare costs. [11] There is an ongoing focus on primary care reform to shift care delivery from hospitals to community and promote the development of interdisciplinary, collaborative teams. [12] Nurses contribute to the delivery of services in primary care, either as independent practitioners or collaborative team members alongside other healthcare workers (e.g., family physicians, social workers). Strides have been made in Canada to strengthen the integration of nurses in primary care and clarify their roles and functions in team-based care by developing national competencies for RNs in primary care [13] and expanding their scope of practice (e.g., increased prescribing authority for NPs). [14] To date, nurses have contributed considerable knowledge and skills to the effectiveness of team-based care in primary care settings. [15] Similarly, their skills and knowledge can be leveraged in the virtual delivery of services.

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Nursing involvement in virtual care across healthcare sectors in Canada has expanded with up to a 9-fold increase from 2017-2020 (i.e., email communication, video consultation, facilitation of video consultation with another practitioner).[16] The international literature has identified that nurses contribute meaningfully to virtual care delivery in primary care settings.[17, 18] In Canada, select provinces have provided guidance for virtual nursing practice.[19-22] For instance, the College of Registered Nurses of Newfoundland and Labrador outlined virtual practice expectations for RNs/NPs;[23] and the College of Nurses of Ontario provided an overview of practice standards and guidelines specific to virtual care (or telepractice) for RNs/NPs/RPNs.[20] Nonetheless, nurse contributions to virtual modalities require further clarification, in particular their roles in virtual models of primary care. Within a primary care context, defining these roles may be challenging considering the variability that exists in nursing roles across primary care settings, influenced by individual knowledge, scopes of practice, and primary care funding models.[8] In Canada, healthcare systems and nurses are both regulated by province/territory,[24] which will directly lead to variation in nurse roles across virtual care models and in primary care, more broadly. Notably, the roles of nurses in these models may mimic their existing in-person roles in primary care and the shift in practice contributions may not be in their specific roles but rather in the modality (i.e., virtual) through which these roles are carried out.

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The Nursing Role Effectiveness Model (NREM) (Figure 1) will be used as a conceptual framework to guide this study. Although this model was developed for acute care, it has been proposed for use in primary care.[26] This model aims to recognize the influence of structure (i.e., patient, nurse, organization) and process (i.e., roles) variables on patient and system outcomes.[25] Roles are described as independent, dependent (e.g., requires physician order), or interdependent (i.e., collaborative delivery with other practitioners). For the purpose of this study, roles will be defined as the responsibilities, activities, and tasks carried out by nurses in their involvement with virtual care interventions, programs, and/or initiatives in primary care.[27, 28] Within the context of primary care, nursing roles may include chronic disease management, care coordination, and pharmaceutical management;[29] however, it remains unclear whether these same roles are carried out virtually by nurses in primary care. The NREM is appropriate for use in this review because it allows nursing roles (or processes) to be considered in relation to both structures and outcomes.[25] This review will not analyze patient outcomes specifically, rather the focus will be on the structure and process components of this model to extract data related to roles in the context of virtual primary care nursing. The contributions of structures and roles need to be clarified to understand how these elements influence patient outcomes to allow virtual nursing practice in primary care to be supported, integrated, and sustained.

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National nursing associations, such as the Canadian Nurses Association and the Canadian Nursing Informatics Association, are committed to expanding virtual care access and strengthening the contribution of nurses to virtual care.[30] Nurse leaders have recognized that the use of digital technology in nursing is imperative to the post-pandemic future of the profession as healthcare providers who are integral to the delivery of quality healthcare.[31, 32] With ongoing attention on primary care reforms, and an increased focus on virtual care optimization,[3, 4] there is incredible need to generate a clear understanding of nurse contributions to virtual care delivery in primary care practice. To facilitate advancements in nursing informatics, we require a foundation of knowledge that identifies the current state of virtual nursing practice in primary care, and the potential for future integration of nurses in virtual care roles throughout primary care settings.

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The aim of this scoping review is to identify and synthesize the international literature surrounding nurse contributions to virtual models of care within primary care settings.

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3 Specifically, the research objectives of this review are to: (a) describe the attributes of virtual
4 models of care within primary care settings that involve nurses (structure); (b) outline the
5 nursing roles that are carried out through virtual delivery (in comparison to in-person) within
6 primary care settings (process); and (c) identify barriers/facilitators to the implementation of
7 virtual models of care (that involve nurses) within primary care settings. For each objective,
8 we will compare urban and rural/remote settings. There is limited published literature on
9 virtual care use in primary care within a nursing context; therefore, a scoping review is the
10 most appropriate methodology to gather both scholarly and grey literature to accomplish the
11 objectives of this study. A scoping review is the chosen methodology when addressing a gap
12 in knowledge and providing a scope of the literature in an emerging area of research.[23] We
13 conducted a preliminary search of CINAHL, JBI Evidence Synthesis, Cochrane Database of
14 Systematic Reviews, Google Scholar, and Embase to screen for existing systematic or
15 scoping reviews on this topic that have been completed or are underway (search performed
16 April 5, 2022) and found no published protocols or reviews on this topic.
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20 21 **METHODS AND ANALYSIS**

22 We will conduct the proposed scoping review between July 2022 and June 2023 in
23 accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews.[34] We
24 will use Covidence software to manage literature throughout each step of the review process
25 and facilitate a team approach to screening, as described below. We will use the
26 methodological framework proposed by Arksey and O'Malley [34] to guide the development
27 of this review; and will reference the four stages of the framework to build the protocol: (1)
28 identifying the research question; (2) identifying relevant studies; (3) study selection; and (4)
29 charting the data. We will use the Preferred Reporting Items for Systematic Reviews and
30 Meta-analyses extension for Scoping Reviews (PRISMA-ScR) checklist to guide the
31 reporting of this review to improve methodological rigour and use appropriate language
32 throughout.[35]
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35 **Patient and public involvement**

36 We will involve patient partners throughout each stage of the review process.[36] We
37 recruited patient partners (TL, JC) and involved them in the initial conceptualization of this
38 project. Both provided insight on the research question and its relevance, and reviewed the
39 methodological process outlined in this protocol, such as the inclusion criteria, search
40 strategy, and data extraction approach. They will participate in the analysis process to
41 interpret the findings from a patient perspective. To aid in this process, they will be provided
42 lay summaries to review the results. Additionally, patient partners will provide feedback on
43 each draft of the review prepared for publication and on all knowledge translation materials
44 prior to their dissemination. Contributions from patient partners may evolve throughout the
45 research process.
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49 **Stage 1: Identifying the research question**

50 This scoping review will answer the following research questions: What roles and
51 activities do nurses perform to contribute to the delivery of virtual models of care within
52 primary care settings? What are the key characteristics of virtual models of care within
53 primary care settings that involve nurses? What barriers or facilitators influence the
54 implementation of virtual models of care in primary care and the involvement of nurses in
55 these models of care? How do virtual models of care and nurse contributions to these models
56 of care differ across urban and rural/remote primary care settings?
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Stage 2: Identifying relevant studies

Inclusion criteria

Participants

In this review, we will consider studies that involve nurses practicing in primary care. We will include studies if they involve nurses from any professional designation (i.e., in Canada these include: NP, RN, LPN/RPN), including community health nurses in rural/remote settings. Notably, nurses practicing in primary care may carry an additional title specific to this practice area (e.g., general practice nurse); these job titles and professional designations (or protected titles) may differ across countries.[37] We will consider studies that do not specify nurse designation to capture a full understanding of primary care nursing in virtual care. The search strategy will use various terms to capture all generic and primary care-specific nursing titles. Nurses must be licensed/practicing; we will exclude any studies focused on student nurses.

Concept

We will include data related to nursing roles in the provision or coordination of services in primary care settings using virtual care (with nurse-patient interaction). This concept will be captured by including studies that involve nursing action and interdisciplinary collaboration. Action may involve interventions that are independent, dependent, or interdependent (as per the NREM); this labelling of roles may vary across nurse designations, whereby independent roles for NPs may be dependent roles for RNs. Studies must explicitly identify roles that are delivered by nurses in primary care and not by specialist nurses (e.g., foot care nurse). We will exclude studies that provide unclear description of nurse contributions to virtual care delivery (e.g., refer to roles of healthcare providers collectively). Nurse roles should be explicitly stated or interpreted based on the virtual care services being delivered. For example, an NP following up with a diabetic patient after initiating a medication change may be classified as an independent role delivering chronic disease management services. Studies will not be required to discuss virtual care effectiveness or patient outcomes to be included.

Context

We will include studies performed within the context of virtual care and primary care in this review. Virtual care, as defined in this review, requires provider-patient interaction. We recognize that virtual care may be referred using other terms (e.g., telehealth, remote healthcare, digital health), and each of these terms will be captured in the search strategy. Studies should involve nurse-patient interaction in the virtual care context to be included. For example, we will exclude studies that involve the use of digital healthcare without provider-patient interaction (e.g., using electronic medical records, using simulation for clinical-based training/education). Nurses should be actively involved in the virtual service being delivered, where the virtual care modality is situated in the primary care setting. Similarly, various terms will be used in the search strategy to capture primary care as it is referred in other jurisdictions (i.e., family practice, general practice, primary healthcare). The search will not be limited by country; rather all studies situated in primary care (that meet the other inclusion criteria for this review) will be included. We will exclude studies that are situated in another area of community health nursing, such as home care or public health (e.g., communicable disease management); however, we will include studies if a primary care context can be inferred despite the study setting labelled broadly as community health (e.g., rural/remote settings with community health nurses).[7]

Types of sources

In this review, we will consider qualitative studies including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research and feminist research. We will also consider both experimental and quasi-experimental quantitative studies, (e.g., randomized controlled trials, non-randomized controlled trials, before and after studies, interrupted time-series studies). In addition, we will consider analytical observational studies, including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies; and descriptive observational studies including case series, individual case reports and descriptive cross-sectional studies for inclusion. Lastly, we will exclude text/opinion pieces and conference abstracts. Systematic reviews with research questions that align with the aim of this scoping review will not be included; rather, we will hand search their reference lists to identify relevant primary studies to consider for inclusion.

#	Query	Results
S1	MH "Nurses+" OR TI nurs* OR AB nurs*	698,556
S2	MH "Primary Health Care" OR MH "Family Practice" OR MH "Office Nursing" OR MH "Family Nursing" OR "primary care" OR "primary health care" OR "primary healthcare" OR "general practice" OR "family practice" OR "family nursing"	157,253
S3	MH "Telehealth+" OR telehealth OR "tele health" OR telenursing OR "tele nursing" OR "telepractice" OR "digital health care" OR "digital healthcare" OR "virtual care" OR "virtual health care" OR "virtual healthcare" OR "virtual consult*" OR "virtual appointment*" OR "virtual visit*" OR "remote care" OR "remote health care" OR "remote healthcare" OR "remote consult*" OR "remote appointment*" OR "remote visit*" OR "online care" OR "online health care" OR "online healthcare" OR "online consult*" OR "online appointment*" OR "online visit*" OR MH "Text Messaging" OR "text messag*" OR "instant messag*" OR "short message service" OR "SMS"	41,257
S4	S1 AND S2 AND S3	541

Table 1. Search strategy for CINAHL database.

Search strategy

The search strategy will aim to locate both published and unpublished sources using a three-step process.[33] We undertook an initial limited search of CINAHL and MEDLINE to identify relevant articles and review text words contained in the titles and abstracts, and index terms used to describe the articles. These text words and index terms were used to develop a full search strategy for CINAHL (Table 1), MEDLINE, Embase, and APA PsycInfo in consultation with a librarian (MS). The search strategy, including all identified keywords and index terms, will be adapted for each included database and/or information source. We will screen relevant systematic reviews to assess the validity of the search and key words and identify primary studies that were not located from other information sources. Additionally, we will screen the reference list of all included sources for other appropriate studies; and will use the descendancy approach to identify relevant articles that referenced an earlier, key study included in this review. If titles indicate relevance to the topic, abstracts will be searched and reviewed to improve the relevancy of studies included using these approaches.

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3 Studies published in English and French will be included. Due to the recency of digital
4 healthcare advancements and primary care reforms, there will be no date limitation placed on
5 the search.
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7 Information sources

8 The databases to be searched include CINAHL, MEDLINE, Embase, and APA
9 PsycInfo. Sources of unpublished grey literature to be searched include, but are not limited
10 to, dissertations/theses, organizational/government reports, and nursing-specific policies.
11 Databases to be searched for grey literature include ProQuest Dissertations and Theses
12 Global and Google Scholar, in addition to website searches of national nursing organizations
13 (e.g., Canadian Nurses Association, Australian Primary Health Care Nurses Association),
14 digital health-focused organizations (e.g., Digital Health Canada), and primary care
15 networks/centres. This is not an exhaustive list as website searches for unpublished sources
16 may evolve throughout the duration of the data collection process.
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20 **Stage 3: Study selection**

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22 Following the search, we will collate and upload all identified citations into
23 Covidence and remove duplicates. Trained reviewers will perform a pilot test following a
24 framework for pilot testing, proposed by JBI.[33] First, a random sample of 5-10% of
25 identified articles will be selected and reviewers will screen the titles/abstracts against the
26 inclusion criteria for this review. Any discrepancies will be discussed between reviewers and
27 the inclusion/exclusion criteria will be modified accordingly. Reviewers will require 75%
28 agreement in the pilot test to initiate the source selection process for the review.
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30 Once the pilot test is complete, Covidence software will facilitate a collaborative team
31 approach for screening among trained reviewers. We will screen titles/abstracts for
32 assessment against the inclusion criteria for this review. Potentially relevant sources will be
33 retrieved in full and assessed in detail against the inclusion criteria by two independent
34 reviewers. We will record and report reasons for exclusion of sources when screening full
35 texts if they go beyond the pre-determined inclusion/exclusion criteria. Any disagreements
36 that arise between the reviewers at each stage of the selection process will be resolved
37 through discussion, or with an additional reviewer. The results of the search and the study
38 inclusion process will be reported in full in the final scoping review and presented in a
39 PRISMA-ScR flow diagram.[35]
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43 **Stage 4: Charting the data**

44 Data extraction

45 Two independent reviewers will extract data from papers included in the scoping
46 review using a data extraction tool developed by the reviewers. The data extracted will
47 include specific details about the participants, concept, context, study design, methods and
48 key findings relevant to the review objectives. Each reviewer will use a data extraction table
49 to collect data from studies that meet inclusion criteria. In addition to study details (e.g.,
50 design, methods, results), primary care practice context will be described (e.g.,
51 urban/rural/unspecified, practice model). As well, we will describe the attributes of virtual
52 models of care, including type of intervention (e.g., consultation, prescription renewal), target
53 patient population (e.g., demographics, disease group), delivery source (e.g., telephone,
54 video), and any barriers or facilitators that contributed to virtual care delivery. We will
55 extract findings related to virtual care effectiveness or patient outcomes if available (to guide
56 future related work). Nursing data will include demographic details (e.g., level of
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education/specialty training), professional designation, and activity/task (or role) performed. Role type will be extracted in adherence with the NREM which identifies roles (or processes) as independent, dependent (e.g., requires physician order), or interdependent (i.e., collaborative delivery with other practitioners).[25] Each reviewer will independently pilot test the extraction of descriptive data on three sources to ensure all relevant data is being extracted consistently across studies.

Source details	Citation
	Country
	Document type
	Design
	Purpose/aim
	Methods
Primary care context	Results
	Setting
	Model of care
	Geographical region/community type
Virtual care context	Team composition
	Type of intervention (if applicable)
	Patient population/needs being addressed
	Delivery source
	Key outcome(s) (if applicable)
Nurse contributions	Barriers/facilitators
	Demographic information
	Professional designation
	Role(s)
	Role type

Table 2. Data extraction table template

We will revise the draft data extraction tool (Table 2) based on the pilot tests and acknowledge any modifications in the scoping review. Any disagreements that arise between the reviewers will be resolved through discussion, or with an additional reviewer. If appropriate, authors of papers will be contacted to request missing or additional data.

Data analysis and presentation

We will use the NREM to descriptively map review findings in tabular format. That is, data describing the virtual care/primary care context and nurse demographics will create the structure component and the nursing roles concept will describe the process component. In a figure/table, we will visually present virtual models of care as they relate to both primary care and nursing. Roles may be further reduced/analyzed by designation (i.e., RN, NP, LPN/RPN) and/or role type (i.e., independent, dependent, interdependent). Quantitatively, we will analyze certain characteristics of both the structure (i.e., virtual care/primary care context) and process (i.e., nurse roles) components (e.g., virtual care interventions, patient population, roles) by providing frequency counts. In addition to figures/tables of qualitative/quantitative analyses, we will provide a narrative summary of the findings, as they relate to the research questions/objectives.

Nursing practice, policy, research implications

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3 Digital technology is becoming a relied upon resource across healthcare systems,
4 including primary care. Nurses are key providers in the delivery of primary care services,
5 requiring nursing-specific evidence and guidance to support the optimization of their roles in
6 new, virtual modalities of healthcare delivery. This scoping review has the potential to
7 portray the current state of virtual primary care nursing and promote growth in this area of
8 nursing practice. As well, findings from this review may guide the development of policy to
9 create a more structured, evidence-informed, patient-centred practice. This is an introductory
10 study in the area of virtual primary care nursing; therefore, next steps for future related
11 research will be identified.
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14 **ETHICS AND DISSEMINATION**

15 This review will involve the collection of published and/or publicly available sources
16 for secondary analysis; therefore, ethics approval is not required. To optimize the reach and
17 visibility of this scoping review, results will be published in an international peer-reviewed
18 journal and presented at national and international conferences in the presence of global
19 primary care stakeholders.
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22 **Acknowledgements:** We would like to acknowledge our two patient partners, Toni Leamon
23 and Joan Cranston, for their insight during the conceptualization and critical review of this
24 scoping review protocol. We look forward to collaborating on this review.
25
26

27 **Authors' contributions:** CV – Conceptualization; Methodology; Writing – original draft;
28 Writing – review & editing; Funding acquisition. JL – Conceptualization; Methodology;
29 Writing – review & editing; Funding acquisition; Supervision. MM – Methodology; Writing
30 – review & editing. LH – Methodology; Writing – review & editing. MP – Methodology;
31 Writing – review & editing. SA – Methodology, Writing – review & editing. MS –
32 Methodology, Writing – review & editing. DR – Methodology; Writing – review & editing.
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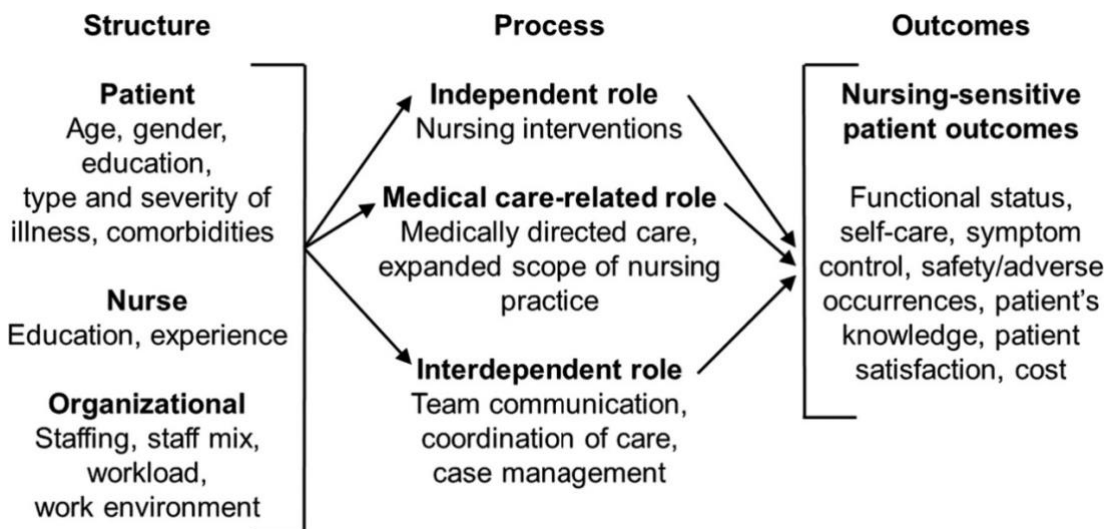
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LEGEND

Figure 1. Adapted from the Nursing Role Effectiveness Model.[25, 26]

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Nursing contributions to virtual models of care in primary care: A scoping review protocol

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Nursing contributions to virtual models of care in primary care: A scoping review protocol

Crystal Vaughan¹, Julia Lukewich¹, Maria Mathews², Lindsay Hedden^{3,4}, Marie-Eve Poitras⁵, Shabnam Asghari⁶, Michelle Swab⁷, Dana Ryan¹

¹Faculty of Nursing, Memorial University, St. John's, Newfoundland and Labrador, Canada

²Department of Family Medicine, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada

³Faculty of Health Sciences, Simon Fraser University, Burnaby, British Columbia, Canada

⁴British Columbia Academic Health Science Network, Vancouver, British Columbia, Canada

⁵School of Nursing, Sherbrooke University, Sherbrooke, Quebec, Canada

⁶Department of Family Medicine, Memorial University, St. John's, Newfoundland and Labrador, Canada

⁷Health Sciences Library, Faculty of Medicine, Memorial University, St. John's, Newfoundland and Labrador, Canada

Corresponding author:

Julia Lukewich

Rm H2953, Faculty of Nursing, Memorial University

Health Sciences Centre

300 Prince Philip Dr, St. John's, NL A1B 3V6

Tel: (709) 864-8211; Email: jlukewich@mun.ca

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ABSTRACT

Introduction: Since the onset of the COVID19 pandemic, virtual care has gained increased attention, particularly in primary care for the ongoing delivery of routine services. Nurses have had an increased presence in virtual care and have contributed meaningfully to the delivery of team-based care in primary care; however, their exact contributions in virtual models of primary care remain unclear. The Nursing Role Effectiveness Model, applied in a virtual care and primary care context, outlines the association between structural variables, nursing roles, and patient outcomes. The aim of this scoping review is to identify and synthesize the international literature surrounding nurse contributions to virtual models of primary care.

Methods and analysis: The Joanna Briggs Institute scoping review methodology will guide this review. We performed preliminary searches in April 2022 and will use CINAHL, MEDLINE, Embase, and APA PsycInfo for the collection of sources for this review. We will also consider grey literature, such as dissertations/theses and organizational reports, for inclusion. Studies will include nurses across all designations (i.e., nurse practitioners, registered nurses, practical nurses). To ensure studies capture roles, nurses should be actively involved in healthcare delivery. Sources require a virtual care and primary care context; studies involving the use of digital technology without patient-provider interaction will be excluded. Following a pilot test, trained reviewers will independently screen titles/abstracts for inclusion and extract relevant data. Data will be organized using the Nursing Role Effectiveness Model, outlining the virtual care and primary care context (structure component) and the nursing role concept (process component).

Ethics and dissemination: This review will involve the collection and analysis of secondary sources that have been published and/or are publicly available. Therefore, ethics approval is not required. Scoping review findings will be published in a peer-reviewed journal and presented at relevant conferences, targeting international primary care stakeholders.

Keywords: Primary Care, Nursing, Nurse Role, Virtual Care

Strengths and limitations of this study

- This protocol is in accordance with the Joanna Briggs Institute methodology for scoping reviews, providing rigorous direction for the development of this timely review.
- International literature will be compiled to generate an understanding of nursing presence in virtual healthcare delivery throughout various models of primary care.
- Only English and French sources will be included, which may limit the generalizability of findings across all primary care contexts.
- This review will provide evidence related to nursing across all designations.

INTRODUCTION

Since the beginning of the COVID19 pandemic, virtual care (also known as telehealth) has gained significant attention in healthcare delivery and its use has increased considerably across healthcare systems. Virtual care is defined as “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”. [1] Virtual care goes beyond the use of telephone and video to include the use of other digital technologies in healthcare, such as text messaging. [2] Virtual models of care aim to improve access to care, provide timely and convenient care, enhance continuity of care, and reduce healthcare costs. [2-4] There are also challenges to consider when using virtual care, such as limited access to technology (e.g., telephone, internet), lack of virtual care training among providers, and low-levels of technical literacy among patients. [5]

Primary care practices have relied heavily on virtual care during the pandemic to maintain the delivery of routine healthcare services (e.g., chronic disease management, sexual healthcare, screening, patient education) while minimizing risks of infection to clinicians and patients. [6, 7] There were, however, routine services that may have required an in-person physical assessment (e.g., high-risk prenatal care, cervical screening interventions) and were encouraged to be assessed for appropriateness prior to using virtual care. [8] In the province of Ontario, Canada, between 2019 and 2020, virtual visits in primary care increased from 1.2% to 71.1% across a 7-month period (based on physician billing data). [9] Similarly, survey data from a Quebec study indicated a significant increase in the use of telephone consultations in primary care during the pandemic compared to pre-pandemic use. [10] Nurses practicing in primary care, including nurse practitioners (NPs), registered nurses (RNs), and licensed practical nurses (LPNs) (referred to as registered practical nurses [RPNs] in Ontario), have the ability within their scopes of practice to contribute to primary care using virtual modalities. Also, in community health nursing, which encompasses primary care, public health, and home care nursing, nurses deliver primary care services as part of their community health practice responsibilities, often in rural/remote areas. Some of these nurses practice in community health centres and are referred to using a more specific title, such as community health nurse (in addition to their designation-specific title, e.g., RN). [11] Collectively, nurse contributions to virtual models of primary care are poorly defined, and it is unclear how the organizational attributes of primary care practices support the optimization of nurses in virtual care delivery and indirectly influence patient outcomes. [12, 13]

Primary care, also referred to as general practice or family practice in some jurisdictions, is the initial point of contact patients have with the healthcare system to address their healthcare needs and is delivered in a variety of settings such as clinics, general practitioner offices, and health centres. [14] In Canada, practitioners in primary care initiate referrals to specialty care, a model implemented to manage specialist shortages and healthcare costs. [15] There is an ongoing focus on primary care reform to shift care delivery from hospitals to community and promote the development of interdisciplinary, collaborative teams. [16] Nurses contribute to the delivery of services in primary care, either as independent practitioners or collaborative team members alongside other healthcare workers (e.g., family physicians, social workers). Strides have been made in Canada to strengthen the integration of nurses in primary care and clarify their roles and functions in team-based care by developing national competencies for RNs in primary care [17] and expanding their scope of practice (e.g., increased prescribing authority for NPs). [18] To date, nurses have contributed considerable knowledge and skills to the effectiveness of team-based care in primary care settings. [19] Similarly, their skills and knowledge can be leveraged in the virtual delivery of services.

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Nursing involvement in virtual care across healthcare sectors in Canada has expanded with up to a 9-fold increase from 2017-2020 (i.e., email communication, video consultation, facilitation of video consultation with another practitioner).[20] The international literature from Australia and the United States has identified that nurses contribute meaningfully to virtual care delivery in primary care settings, particularly since the onset of the COVID-19 pandemic.[21, 22] In Canada, select provinces have provided guidance for virtual nursing practice.[23-26] For instance, the College of Registered Nurses of Newfoundland and Labrador outlined virtual practice expectations for RNs/NPs,[27] and the College of Nurses of Ontario provided an overview of practice standards and guidelines specific to virtual care (or telepractice) for RNs/NPs/RPNs.[24] Nonetheless, nurse contributions to virtual modalities require further clarification, in particular their roles in virtual models of primary care. Within a primary care context, defining these roles may be challenging considering the variability that exists in nursing roles across primary care settings, influenced by individual knowledge, scopes of practice, and primary care funding models.[12] In Canada, healthcare systems and nurses are both regulated by province/territory,[28] which will directly lead to variation in nurse roles across virtual care models and in primary care, more broadly. Notably, the roles of nurses in these models may mimic their existing in-person roles in primary care and the shift in practice contributions may not be in their specific roles but rather in the modality (i.e., virtual) through which these roles are carried out.

The Nursing Role Effectiveness Model (NREM) (Figure 1) will be used as a conceptual framework to guide this study. Although this model was developed for acute care, it has been proposed for use in primary care.[29] This model aims to recognize the influence of structure (i.e., patient, nurse, organization) and process (i.e., roles) variables on patient and system outcomes.[30] Nursing-sensitive outcomes, which are highlighted in this model, refer to outcomes that result (based on evidence) from nursing interventions or action within their scope of practice. [31] Roles are described as independent, dependent (e.g., requires physician order), or interdependent (i.e., collaborative delivery with other practitioners). Dependent roles can also be referred to as medical care-related roles; the term “dependent” will be used to describe these roles throughout. For the purpose of this study, roles will be defined as the responsibilities, activities, and tasks carried out by nurses in their involvement with virtual care interventions, programs, and/or initiatives in primary care.[32, 33] Within the context of primary care, nursing roles may include chronic disease management, care coordination, and pharmaceutical management;[34] however, it remains unclear whether these same roles are carried out virtually by nurses in primary care. The NREM is appropriate for use in this review because it allows nursing roles (or processes) to be considered in relation to both structures and outcomes.[30] This review will not analyze patient outcomes specifically, rather the focus will be on the structure and process components of this model to extract data related to roles in the context of virtual primary care nursing. The contributions of structures and roles need to be clarified to understand how these elements influence patient outcomes to allow virtual nursing practice in primary care to be supported, integrated, and sustained.

National nursing associations, such as the Canadian Nurses Association and the Canadian Nursing Informatics Association, are committed to expanding virtual care access and strengthening the contribution of nurses to virtual care.[35] Nurse leaders have recognized that the use of digital technology in nursing is imperative to the post-pandemic future of the profession as healthcare providers who are integral to the delivery of quality healthcare.[36, 37] With ongoing attention on primary care reforms, and an increased focus on virtual care optimization,[3, 4] there is incredible need to generate a clear understanding of nurse contributions to virtual care delivery in primary care practice. To facilitate

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3 advancements in nursing informatics, we require a foundation of knowledge that identifies
4 the current state of virtual nursing practice in primary care, and the potential for future
5 integration of nurses in virtual care roles throughout primary care settings.

6 The aim of this scoping review is to identify and synthesize the international literature
7 surrounding nurse contributions to virtual models of care within primary care settings.
8 Specifically, the research objectives of this review are to: (a) describe the attributes of virtual
9 models of care within primary care settings that involve nurses (structure); (b) outline the
10 nursing roles that are carried out through virtual delivery (in comparison to in-person) within
11 primary care settings (process); and (c) identify barriers/facilitators to the implementation of
12 virtual models of care (that involve nurses) within primary care settings. For each objective,
13 we will compare urban and rural/remote settings. There is limited published literature on
14 virtual care use in primary care within a nursing context; therefore, a scoping review is the
15 most appropriate methodology to gather both scholarly and grey literature to accomplish the
16 objectives of this study. A scoping review is the chosen methodology when addressing a gap
17 in knowledge and providing a scope of the literature in an emerging area of research.[38] We
18 conducted a preliminary search of CINAHL, JBI Evidence Synthesis, Cochrane Database of
19 Systematic Reviews, Google Scholar, and Embase to screen for existing systematic or
20 scoping reviews on this topic that have been completed or are underway (search performed
21 April 5, 2022) and found no published protocols or reviews on this topic.

22 **METHODS AND ANALYSIS**

23 We will conduct the proposed scoping review between July 2022 and June 2023 in
24 accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews.[38] We
25 will use Covidence software to manage literature throughout each step of the review process
26 and facilitate a team approach to screening, as described below. We will use the
27 methodological framework proposed by Arksey and O'Malley [39] to guide the development
28 of this review; and will reference the four stages of the framework to build the protocol: (1)
29 identifying the research question; (2) identifying relevant studies; (3) study selection; and (4)
30 charting the data. We will use the Preferred Reporting Items for Systematic Reviews and
31 Meta-analyses extension for Scoping Reviews (PRISMA-ScR) checklist to guide the
32 reporting of this review to improve methodological rigour and use appropriate language
33 throughout.[40]

34 **Patient and public involvement**

35 We will involve patient partners throughout each stage of the review process. We
36 recruited patient partners (TL, JC) and involved them in the initial conceptualization of this
37 project. Both provided insight on the research question and its relevance, and reviewed the
38 methodological process outlined in this protocol, such as the inclusion criteria, search
39 strategy, and data extraction approach. They will participate in the analysis process to
40 interpret the findings from a patient perspective. To aid in this process, they will be provided
41 lay summaries to review the results. Additionally, patient partners will provide feedback on
42 each draft of the review prepared for publication and on all knowledge translation materials
43 prior to their dissemination. Contributions from patient partners may evolve throughout the
44 research process.

45 **Stage 1: Identifying the research question**

46 This scoping review will answer the following research questions: What roles and
47 activities do nurses perform to contribute to the delivery of virtual models of care within
48 primary care settings? What are the key characteristics of virtual models of care within
49 primary care settings that involve nurses? What barriers or facilitators influence the
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3 implementation of virtual models of care in primary care and the involvement of nurses in
4 these models of care? How do virtual models of care and nurse contributions to these models
5 of care differ across urban and rural/remote primary care settings?
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8 **Stage 2: Identifying relevant studies**

9 Inclusion criteria

10 *Participants*

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13 We will consider studies that involve nurses practicing in primary care.
14 We will include studies if they involve nurses from any professional designation (i.e., in
15 Canada these include: NP, RN, LPN/RPN), including community health nurses in
16 rural/remote settings. Notably, nurses practicing in primary care may carry an additional title
17 specific to this practice area (e.g., general practice nurse); these job titles and professional
18 designations (or protected titles) may differ across countries.[41] We will consider studies
19 that do not specify nurse designation to capture a full understanding of primary care nursing
20 in virtual care. The search strategy will use various terms to capture all generic and primary
21 care-specific nursing titles. Nurses must be licensed/practicing; we will exclude any studies
22 focused on student nurses.
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26 *Concept*

27 We will include data related to nursing roles in the provision or coordination of
28 services in primary care settings using virtual care (with nurse-patient interaction). This
29 concept will be captured by including studies that involve nursing action and interdisciplinary
30 collaboration. Action may involve interventions that are independent, dependent, or
31 interdependent (as per the NREM); this labelling of roles may vary across nurse designations,
32 whereby independent roles for NPs may be dependent roles for RNs or LPNs. Roles will vary
33 in complexity as scopes of practice differ widely across nurse designations. NP roles (as
34 primary providers) may be more advanced than RN or LPN roles; for example, NPs may
35 diagnose and treat patients independently while LPNs may be tasked with coordinating care
36 or performing patient follow-up under the direction of a primary provider. Studies must
37 explicitly identify roles that are delivered by nurses in primary care and not by specialist
38 nurses (e.g., foot care nurse). We will exclude studies that provide unclear description of
39 nurse contributions to virtual care delivery (e.g., refer to roles of healthcare providers
40 collectively). Nurse roles should be explicitly stated or interpreted based on the virtual care
41 services being delivered. For example, an NP following up with a diabetic patient after
42 initiating a medication change may be classified as an independent role delivering chronic
43 disease management services. Studies will not be required to discuss virtual care
44 effectiveness or patient outcomes to be included.
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49 *Context*

50 We will include studies performed within the context of virtual care and primary care
51 in this review. Virtual care, as defined in this review, requires provider-patient interaction.
52 We recognize that virtual care may be referred using other terms (e.g., telehealth, remote
53 healthcare, digital health), and each of these terms will be captured in the search strategy.
54 Studies should involve nurse-patient interaction in the virtual care context to be included. For
55 example, we will exclude studies that involve the use of digital healthcare without provider-
56 patient interaction (e.g., using electronic medical records, using simulation for clinical-based
57 training/education). Nurses should be actively involved in the virtual service being delivered,
58 where the virtual care modality is situated in the primary care setting. Similarly, various
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terms will be used in the search strategy to capture primary care as it is referred in other jurisdictions (i.e., family practice, general practice, primary healthcare). The search will not be limited by country; rather all studies situated in primary care (that meet the other inclusion criteria for this review) will be included. We will exclude studies that are situated in another area of community health nursing, such as home care or public health (e.g., communicable disease management); however, we will include studies if a primary care context can be inferred despite the study setting labelled broadly as community health (e.g., rural/remote settings with community health nurses).[11]

Types of sources

In this review, we will consider qualitative studies including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research and feminist research. We will also consider both experimental and quasi-experimental quantitative studies, (e.g., randomized controlled trials, non-randomized controlled trials, before and after studies, interrupted time-series studies). In addition, we will consider analytical observational studies, including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies; and descriptive observational studies including case series, individual case reports and descriptive cross-sectional studies for inclusion. Lastly, we will exclude text/opinion pieces and conference abstracts. Systematic reviews with research questions that align with the aim of this scoping review will not be included; rather, we will hand search their reference lists to identify relevant primary studies to consider for inclusion.

#	Query	Results
S1	MH "Nurses+" OR TI nurs* OR AB nurs*	698,556
S2	MH "Primary Health Care" OR MH "Family Practice" OR MH "Office Nursing" OR MH "Family Nursing" OR "primary care" OR "primary health care" OR "primary healthcare" OR "general practice" OR "family practice" OR "family nursing"	157,253
S3	MH "Telehealth+" OR telehealth OR "tele health" OR telenursing OR "tele nursing" OR "telepractice" OR "digital health care" OR "digital healthcare" OR "virtual care" OR "virtual health care" OR "virtual healthcare" OR "virtual consult*" OR "virtual appointment*" OR "virtual visit*" OR "remote care" OR "remote health care" OR "remote healthcare" OR "remote consult*" OR "remote appointment*" OR "remote visit*" OR "online care" OR "online health care" OR "online healthcare" OR "online consult*" OR "online appointment*" OR "online visit*" OR MH "Text Messaging" OR "text messag*" OR "instant messag*" OR "short message service" OR "SMS"	41,257
S4	S1 AND S2 AND S3	541

Table 1. Search strategy for CINAHL database.

Search strategy

The search strategy will aim to locate both published and unpublished sources using a three-step process.[38] We undertook an initial limited search of CINAHL and MEDLINE to identify relevant articles and review text words contained in the titles and abstracts, and index terms used to describe the articles. These text words and index terms were used to develop a full search strategy for CINAHL (Table 1), MEDLINE, Embase, and APA PsycInfo in

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3 consultation with a librarian (MS). The search strategy, including all identified keywords and
4 index terms, will be adapted for each included database and/or information source. We will
5 screen relevant systematic reviews to assess the validity of the search and key words and
6 identify primary studies that were not located from other information sources. Additionally,
7 we will screen the reference list of all included sources for other appropriate studies; and will
8 use the descendancy approach to identify relevant articles that referenced an earlier, key
9 study included in this review. If titles indicate relevance to the topic, abstracts will be
10 searched and reviewed to improve the relevancy of studies included using these approaches.
11 Studies published in English and French will be included. Due to the recency of digital
12 healthcare advancements and primary care reforms, there will be no date limitation placed on
13 the search.
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16 Information sources

17 The databases to be searched include CINAHL, MEDLINE, Embase, and APA
18 PsycInfo. Sources of unpublished grey literature to be searched include, but are not limited
19 to, dissertations/theses, organizational/government reports, and nursing-specific policies.
20 Databases to be searched for grey literature include ProQuest Dissertations and Theses
21 Global and Google Scholar, in addition to website searches of national nursing organizations
22 (e.g., Canadian Nurses Association, Australian Primary Health Care Nurses Association),
23 digital health-focused organizations (e.g., Digital Health Canada), and primary care
24 networks/centres. This is not an exhaustive list as website searches for unpublished sources
25 may evolve throughout the duration of the data collection process.
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30 **Stage 3: Study selection**

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32 Following the search, we will collate and upload all identified citations into
33 Covidence and remove duplicates. Trained reviewers will perform a pilot test following a
34 framework for pilot testing, proposed by JBI.[38] First, a random sample of 5-10% of
35 identified articles will be selected and reviewers will screen the titles/abstracts against the
36 inclusion criteria for this review. Any discrepancies will be discussed between reviewers and
37 the inclusion/exclusion criteria will be modified accordingly. Reviewers will require 75%
38 agreement in the pilot test to initiate the source selection process for the review.
39

40 Once the pilot test is complete, Covidence software will facilitate a collaborative team
41 approach for screening among trained reviewers. We will screen titles/abstracts for
42 assessment against the inclusion criteria for this review. Potentially relevant sources will be
43 retrieved in full and assessed in detail against the inclusion criteria by two independent
44 reviewers. We will record and report reasons for exclusion of sources when screening full
45 texts if they go beyond the pre-determined inclusion/exclusion criteria. Any disagreements
46 that arise between the reviewers at each stage of the selection process will be resolved
47 through discussion, or with an additional reviewer. The results of the search and the study
48 inclusion process will be reported in full in the final scoping review and presented in a
49 PRISMA-ScR flow diagram.[40]
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52 **Stage 4: Charting the data**

53 Data extraction

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55 Two independent reviewers will extract data from papers included in the scoping
56 review using a data extraction tool developed by the reviewers. The data extracted will
57 include specific details about the participants, concept, context, study design, methods and
58 key findings relevant to the review objectives. Each reviewer will use a data extraction table
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to collect data from studies that meet inclusion criteria. In addition to study details (e.g., design, methods, results), primary care practice context will be described (e.g., urban/rural/unspecified, availability of community supports/resources, practice model). As well, we will describe the attributes of virtual models of care, including type of intervention (e.g., consultation, prescription renewal), target patient population (e.g., demographics, disease group), delivery source (e.g., telephone, video), and any barriers or facilitators that contributed to virtual care delivery. Nursing data will include demographic details (e.g., level of education/specialty training), professional designation, and activity/task (or role) performed. Role type will be extracted in adherence with the NREM which identifies roles (or processes) as independent, dependent (e.g., requires physician order), or interdependent (i.e., collaborative delivery with other practitioners).[30] Each reviewer will independently pilot test the extraction of descriptive data on three sources to ensure all relevant data is being extracted consistently across studies.

Source details	Citation
	Country
	Document type
	Design
	Purpose/aim
	Methods
	Results
Primary care context	Setting
	Model of care
	Geographical region, community type/characteristics
	Team composition
Virtual care context	Type of intervention (if applicable)
	Patient population/needs being addressed
	Delivery source
	Barriers/facilitators
Nurse contributions	Demographic information
	Professional designation
	Role(s)
	Role type

Table 2. Data extraction table template

We will revise the draft data extraction tool (Table 2) based on the pilot tests and acknowledge any modifications in the scoping review. Any disagreements that arise between the reviewers will be resolved through discussion, or with an additional reviewer. If appropriate, authors of papers will be contacted to request missing or additional data.

Data analysis and presentation

We will use the NREM to descriptively map review findings in tabular format. That is, data describing the virtual care/primary care context and nurse demographics will create the structure component and the nursing roles concept will describe the process component. In a figure/table, we will visually present virtual models of care as they relate to both primary care and nursing. Roles may be further reduced/analyzed by designation (i.e., RN, NP, LPN/RPN) and/or role type (i.e., independent, dependent, interdependent). Quantitatively, we will analyze certain characteristics of both the structure (i.e., virtual care/primary care context) and process (i.e., nurse roles) components (e.g., virtual care interventions, patient

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3 population, roles) by providing frequency counts. In addition to figures/tables of
4 qualitative/quantitative analyses, we will provide a narrative summary of the findings, as they
5 relate to the research questions/objectives.
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8 **Nursing practice, policy, research implications**

9 Digital technology is becoming a relied upon resource across healthcare systems,
10 including primary care. Nurses are key providers in the delivery of primary care services,
11 requiring nursing-specific evidence and guidance to support the optimization of their roles in
12 new, virtual modalities of healthcare delivery. This scoping review has the potential to
13 portray the current state of virtual primary care nursing and promote growth in this area of
14 nursing practice. As well, findings from this review may guide the development of policy to
15 create a more structured, evidence-informed, patient-centred practice. This is an introductory
16 study in the area of virtual primary care nursing; therefore, next steps for future related
17 research will be identified.
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20 **ETHICS AND DISSEMINATION**

21 This review will involve the collection of published and/or publicly available sources
22 for secondary analysis; therefore, ethics approval is not required. To optimize the reach and
23 visibility of this scoping review, results will be published in an international peer-reviewed
24 journal and presented at national and international conferences in the presence of global
25 primary care stakeholders.
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30 scoping review protocol. We look forward to collaborating on this review.
31
32

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34 Writing – review & editing; Funding acquisition. JL – Conceptualization; Methodology;
35 Writing – review & editing; Funding acquisition; Supervision. MM – Methodology; Writing
36 – review & editing. LH – Methodology; Writing – review & editing. MP – Methodology;
37 Writing – review & editing. SA – Methodology, Writing – review & editing. MS –
38 Methodology, Writing – review & editing. DR – Methodology; Writing – review & editing.
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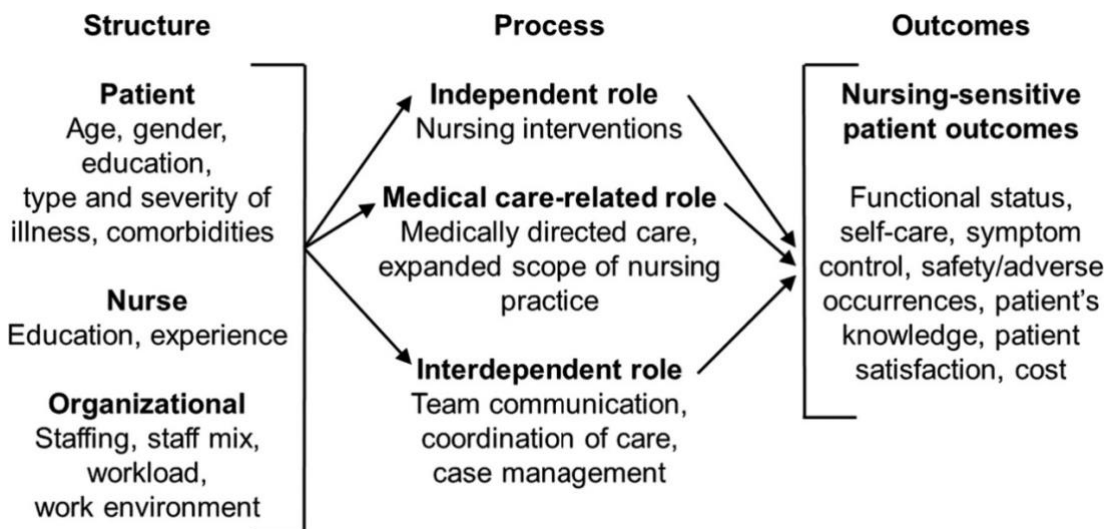
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LEGEND

Figure 1. Adapted from the Nursing Role Effectiveness Model.[25, 26]. Medical care-related roles will be referred to as “dependent” roles throughout this study.

For peer review only

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