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Evaluation of a Canadian Post-Licensure Educational Program for Registered Nurses in Primary Care: A Mixed-Methods Study Protocol

Évaluation d'une formation continue canadienne pour les infirmières et infirmiers en soins de première ligne : protocole d'une étude à méthodes mixtes

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nurses; primary care; mixed-methods; post-licensure education; competencies

Abstract

Introduction: In Canada, Registered Nurses (RNs) in primary care fulfill diverse roles to meet population needs. Although Canadian competencies define the roles of RNs in primary care, few educational interventions effectively support alignment with these competencies. Given that continuing education is rarely specific to primary care nursing, our team co-developed a bilingual, evidence-informed educational program tailored to RNs in primary care. **Objectives**: 1) To assess the impacts of the educational program on RNs' learning outcomes, professional practices, and interprofessional collaboration. 2) To evaluate implementation by identifying factors that support or hinder the successful deployment in primary care settings in Canadian provinces. **Methods**: A mixed-methods evaluation guided by the RE-AIM Framework, Eco-Normalization Theory, and the New World Kirkpatrick Model will be conducted. Three populations will be involved: RNs in primary care, facilitators supporting learners, and administrators or managers engaged in implementation. Quantitative data will be collected via online demographic and pre- and post-training questionnaires. Qualitative data will be obtained through open-ended questions, semi-structured interviews and the research team's logbook. Data integration will examine interactions between the program, RNs and primary care settings. **Discussion and Research Spin-offs**: This national-scale educational program is the first in Canada designed specifically for RNs practising in primary care. A rigorous evaluation of its implementation across diverse organizational models will improve understanding of its mechanisms and impacts. Findings will contribute critical insights to strengthen the RNs' role in primary care and support a sustainable transformation of their practice.

Mots-clés

infirmières; soins de première ligne; méthodes mixtes; formation continue; compétences

Résumé

Introduction : Au Canada, le personnel infirmier en soins de première ligne assume divers rôles pour répondre aux besoins de la population. Ces rôles infirmiers sont définis par les compétences canadiennes. Toutefois, peu de formations favorisent l'adéquation entre la pratique et ces compétences. Pour y remédier, notre équipe a codéveloppé une formation fondée sur les données probantes en soins de première ligne adaptée au personnel infirmier. **Objectifs** : 1) Évaluer les effets de la formation sur l'apprentissage, les pratiques professionnelles et la collaboration interprofessionnelle. 2) Évaluer sa mise en œuvre en identifiant les facteurs qui favorisent ou entravent son déploiement dans les différentes provinces canadiennes. **Méthodes** : Ce devis mixte s'appuie sur le RE-AIM, l'Économalisation et le *New World Kirkpatrick Model*. Trois populations seront incluses : le personnel infirmier, les personnes facilitatrices (en soutien aux apprentissages) et les gestionnaires. Les données quantitatives seront recueillies par des questionnaires en ligne (démographiques, pré- et post-formation). Les données qualitatives proviendront de questions ouvertes, d'entretiens semi-dirigés et du journal de bord. L'intégration des données visera à comprendre l'interaction entre la formation, le personnel infirmier et les milieux de soins. **Discussion et retombées anticipées** : Cette formation d'envergure nationale, au Canada, est la première conçue spécifiquement pour le personnel infirmier exerçant en soins de première ligne. L'évaluation rigoureuse de sa mise en œuvre dans différents modèles organisationnels permettra de mieux en comprendre les modalités et les impacts. Les résultats contribueront à générer des connaissances essentielles pour renforcer le rôle infirmier en première ligne et soutenir une transformation durable de la pratique infirmière.

INTRODUCTION

A strong nursing presence in primary care has been shown to promote health equity and improve access to care, continuity, patient satisfaction, and clinical outcomes, especially for vulnerable populations (Breton et al., 2022). The integration of nurses is critical to improving health system performance (Flaubert et al., 2021). Registered Nurses (RNs) are key partners in interprofessional teams providing care for individuals, families, and communities and are increasingly embedded in primary care delivery (Barrett et al., 2021; Freund et al., 2015).

To effectively meet the needs of primary care patients, RNs must develop core competencies, specific to primary care practices (Brzozowski et al., 2023; Lukewich et al., 2020; Poitras et al., 2018). These include interprofessional collaboration skills, a commitment to continuous quality improvement, and leadership (Halcomb et al., 2016; Norful et al., 2017; Poitras et al.). However, in Canada, entry-to-practice nursing education does not formally require primary care-specific content (Barrett et al., 2021; Calma et al., 2019). While some nursing programs incorporate selected primary care-specific approaches and activities within broader community health courses (Lukewich et al., 2023), there is no structured preparation addressing the specific competencies required for primary care settings. As a result, many RNs acquire this knowledge and skill set after entering the primary care workforce (Lukewich et al., 2018; Lukewich et al., 2023; Mirza et al., 2019).

Without proper education in primary care nursing, RNs may feel unprepared, lack confidence, provide suboptimal care, and fail to engage patients effectively (Fortin et al., 2011; Loan et al., 2018; Lukewich et al., 2021; Oelke et al., 2014). Since RNs form the second largest workforce in Canadian primary care (Canadian Nurses Association, 2022; Drummond et al., 2022; Flood et al., 2023), the lack of primary care-specific education must be addressed to support quality care and to emphasize patient engagement (Lukewich et al., 2018; Lukewich et al., 2022; MacLean et al., 2014; Morin et al., 2023). While many continuing education programs exist for RNs, they are not primary care specific and/or do not have a nursing-specific focus (Lukewich et al., 2024). In some countries, such as Denmark and the United States, standardized continuous education has led to the delivery of high-quality evidence-based nursing care and improved confidence and perceived competency among nurses (Calder et al., 2021; Siju et al., 2021).

DESCRIPTION OF THE TEAM PRIMARY CARE NURSE (TPCN) POST-LICENSURE EDUCATIONAL PROGRAM

To address the need for continuing education tailored to RNs working in primary care, the TPCN Post-Licensure Educational Program has been co-developed and implemented across Canada (Poitras et al., 2024). The program is evidence-informed and guided by two key frameworks: the "Patient's Medical Home (PMH) Vision" of the College of Family Physicians of Canada (CFPC) (CFPC, 2019), and the "Canadian Competencies for RNs in Primary Care" developed by the Canadian Family Practice Nurses Association (CFPNA) (CFPNA, 2019; Lukewich et al., 2020). TPCN environmental scan revealed that these frameworks are poorly integrated into existing post-licensure educational offerings (Lukewich et al., 2024). Therefore, TPCN engaged in a co-construction process guided by the Knowledge-to-Action (KTA) framework (Graham et al., 2006; Poitras et al.). TPCN comprises primary care RNs, other health professionals, patient partners, nurse educators, managers, decision-makers, and health researchers (Graham et al.; Poitras et al.).

Table 1 outlines the program's format, module topics, and learning outcomes. The course consists of six modules, available in both French and English, and lasts 4 hours. It is offered in a virtual, asynchronous format. The program has been built on pardeux's zest^{MC} authoring tool (Pardeux, 2024) and is hosted on the uxpertise LMS (UXPERTISE INC., 2026).

Since mentorship structures contribute to RNs' job satisfaction and even retention in primary care (Halcomb et al. 2021), TPCN integrated a support structure into the program. This structure includes facilitators in each region who interact with learners through a community of practice hosted on the CFPNA website or, when possible, in the clinical setting (Huybrecht et al., 2011).

Table 1

Description of the Educational Program's Format, Modules, and Learning Outcomes

Description	
Format of the educational program	Asynchronous digital learning environment
Duration	4 hours
Language	French and English
Description of the modules' content	
Modules	Learning outcomes
1. Current State of Primary Care Nursing in Canada	Recognize the importance of nursing practices in primary care in delivering equitable healthcare.
2. Patient's Medical Home Model and the Primary Care Nurse	Learn about the Patient's Medical Home (PMH) vision, differentiate its fundamental pillars and recognize its implications in primary care nursing practices.
3. Scope of Practice and Role in Primary Care	Develop strategies to optimize Registered Nurses' (RNs) scope of practice in primary care by deepening their understanding of the contextual factors impacting their scope of practice and expected role and activities.
4. Canadian Competencies for RNs in Primary Care	Differentiate competency domains and explain how competencies for RNs promote the unique contribution of RN to team functioning and care delivery within a PMH vision.
5. Patient Engagement in Primary Care	Structure practices to support patient engagement, considering patients' personal characteristics, aspirations and needs.
6. Engage in the Journey of an RN in a Collaborative Primary Care Team	Demonstrate knowledge and its practical application through a clinical case study using critical thinking.

OBJECTIVES

This protocol aims: 1) To assess the impacts of the educational program on the learning outcomes, professional practices, and interprofessional collaboration of RNs in primary care. 2) To evaluate implementation by identifying key factors that support or hinder the successful deployment of the educational program in primary care settings within Canadian provinces.

METHODS

1. STUDY DESIGN AND FRAMEWORKS

A developmental evaluation approach (Patton, 2010) will be used within a mixed-methods design (Creswell & Plano Clark, 2018) to conduct an in-depth assessment of TPCN program. This approach is particularly well-suited to complex and evolving contexts, as it allows flexibility and adaptability throughout the evaluation process. The evaluation will be informed by the integration of three evaluative frameworks, as presented in Table 2.

A well-known planning and program evaluation framework - RE-AIM (Glasgow et al., 2006), will be used (Glasgow et al., 2001; Sasseville et al., 2023) to assess five key outcomes: **R**each (absolute number, proportion and representativeness of individuals into the program), **E**ffectiveness (impacts on outcomes such as learning or professional practice changes), **A**doption (absolute number, proportion and representativeness of settings that implement the program), **I**mplementation (consistency of delivery, time and cost of the intervention, adaptations) and **M**aintenance (the extent to which the program becomes implemented among institutions and long-term impacts of the program outcomes (Glasgow & Estabrooks, 2018).

To identify the conditions necessary for the sustainability of TPCN educational program, the Eco-Normalization Theory (Hamza & Regehr, 2021) will be used as an analytical framework. It will guide the evaluation through the ecology of change lens with six questions that evaluate three interdependent core aspects: the **innovation** (i.e., the educational program), the **people doing the work** (i.e., RNs), and the **system** (i.e., primary care settings, provincial and national healthcare structures).

The New World Kirkpatrick Model (Kirkpatrick & Kirkpatrick, 2016) will be used as a structured framework to assess program impacts across multiple outcome levels (Poitras et al., 2024). Impacts may be direct or indirect and include the overall influence or implications of the educational program (Pluye & Grad, 2006). Specifically, the evaluation will examine participants' **Reaction** (Level 1), assessed through perceived relevance and satisfaction. **Learning** outcomes (Level 2) will include changes in knowledge, confidence, commitment, and intention. **Behavioral** changes in nursing practice (Level 3) will also be explored to assess the extent to which the Learning and newly acquired skills are reflected in self-reported or observed changes in practice (Kirkpatrick & Kirkpatrick; Poitras et al., 2022).

Together, the three frameworks will enable a comprehensive evaluation of the educational program and guide the development of data-collection tools to measure its **I**mplementation, as well as its impacts on nursing professional practice in primary care settings and interprofessional collaboration.

2. STUDY POPULATIONS AND INCLUSION/EXCLUSION CRITERIA

For all populations, participation in the study will be voluntary.

Registered Nurses in Primary Care. All RNs trained through the TPCN educational program are eligible to participate in the research project. Nurse participants must be licensed as Registered Nurses (RNs), i.e., have a bachelor's degree or equivalent throughout Canada. There is an exception in Quebec, where RNs obtain their title through either a college or university course. To secure a position in a primary care clinic, a university degree is typically required. They must practice in a primary care setting and be able to communicate in English or French. Students, Nurse Practitioners, and Licensed Practical Nurses (LPNs) (also known as Registered Practical Nurses or RPNs in the province of Ontario) are excluded from this research.

Table 2

Summary of Items to Assess with the Combination of the Three Frameworks

Objectives	Frameworks	Items assessed
1. Evaluate the implementation process	RE-AIM Reach Effectiveness Adoption Implementation Maintenance	- Number of clicks, duration of visits on the learning management system - Duration and frequency of training - Number of participants per module/training - Proportion of targeted Registered Nurses (RNs) who have completed training - Number of completed training courses - Dissemination strategies used by designated persons in healthcare facilities - Proportion of establishments/regions/type of concerned people who have implemented training - Material and resource utilization
	Eco-normalization Theory Core aspects Innovation: Educational program People doing the work: RNs System: Primary care settings & healthcare structures	- Does the training program, in practice, align with the grand aspirations of change (here, strengthen the nursing workforce in primary care)? - Does the innovation evoke meaning to the action and agency of the people doing the work that will lead to aspirations of change? - Does the grand aspiration of change align with concerned people's local aspirations? - Does the system support people doing the work that will lead to the aspirations of change? - Does the system align with the grand aspiration of change? - Does the innovation interact with the system in a way that will lead to the aspiration of change?
2. Assess RNs' perception of the training they received	New World Kirkpatrick Model Level 1 "Reaction"	- Trained RN's satisfaction with: o Duration, quality, content o Available feedback o Educational plan and clear objectives o Relevance to their practice o Convergence between needs and training content o Sufficient opportunities for active learning
3. Assess the impacts of training on RN's knowledge, intentions, confidence, commitment, attitude and skills	New World Kirkpatrick Model Level 2 "Learning" and Level 3 "Behavior"	- RN is familiar with the concepts presented during training - RN understands the importance of the concepts presented during training - RN knows how to apply new knowledge in practice - RN plans how to apply the new knowledge - RN's level of confidence in applying the new skills - RN's level of intention to apply new skills - RN's acquisition of knowledge and new skills translates into changes in practice

While NPs and LPNs play an integral role in primary care, these regulatory designations have educational pathways and scopes of practice different from those of RNs.

Facilitators. Regional facilitators must support the deployment of the TPCN educational program, complete the required training on program content, assist learners and liaise with the research team. Facilitators must be RNs with at least 5 years of primary care experience and have a job position that legitimizes clinical support activities (e.g., Professional Practice Lead, Immediate Supervisor's Assistant).

Managers and Decision-Makers. Managers in primary care settings and provincial or regional administrators will be invited to participate in the study. They will contribute to a better understanding of the deployment of the TPCN educational program within their settings or provinces. In Canada, healthcare is a provincial responsibility, and the structure of primary care networks, as well as the employer of RNs, varies from province to province. Administrators will primarily be individuals responsible for nursing direction. As for managers, they may be in a clinical coaching position or manage primary care settings or RN teams. Manager and decision-maker participants must have received communication about the TPCN educational program and observed its deployment in their area or its impacts on professional practices.

3. Sample Size and Sampling

Registered Nurses Sampling Procedures. A voluntary sampling strategy combining convenience and snowball approaches will be used (Miles et al., 2014) to recruit a minimum of 500 RNs across Canada, with an anticipated distribution of approximately 50 RNs per province.

For the quantitative component, the target sample was determined based on power considerations. According to Cohen (1988), an effect size of $f^2 = 0.057$ represents a small but meaningful within-subject effect. A sample size of 500 participants is required to achieve 80% of statistical power with an alpha level of 0.05. If the assumption of sphericity is not met (with a correction factor of e = 0.5), the minimum detectable effect size under the same parameters would be $f^2 = 0.072$, which remains within the small-effect range (Cohen). For the qualitative component, a purposive sampling strategy (Miles et al., 2014) will be used to recruit a subsample of five RNs per province (n=50) among participants who completed the program and consented to be contacted for follow-up. These participants will be invited to a semi-structured interview.

Facilitators and Managers or Decision-Makers Sampling Procedures. A purposive sampling approach (Miles et al., 2014) will be used to recruit at least two regional facilitators for each province (i.e., 10 Canadian provinces; n=20). The same sampling approach for recruiting managers or decision-makers (n=20) will be applied. The number of facilitators or managers/decision-makers per province will vary depending on how the primary care network and healthcare system are structured in each province or area.

4. Recruitment

Registered Nurses in Primary Care. RNs will be informed about the educational opportunity via several channels, including emails to CFPNA members, through the research team's network and the facilitators' network. Facilitators will promote the TPCN program within their respective professional networks, which include a range of primary care settings, such as Family Health Teams, Primary Care Networks, and Family Medicine Groups.

In addition, program information will be disseminated to government institutions, educational institutions, nursing associations, communities of practice, and social media. Registration for the educational program will be available via the learning management system (LMS) and accessible free of charge. Personal identifiers such as names and email addresses will not be transferred to the research dataset. All RNs registering for the course will receive study information via the LMS, including an information letter, and consenting participants will provide electronic informed consent prior to completing the study questionnaires.

Facilitators. A list of potential facilitators will be established based on the research team's network across several provinces, individuals identified during the co-construction phase of the

educational program, and partnerships with primary care nursing associations. Potential facilitators who meet the inclusion criteria will be invited by email. This communication will describe their role and provide the context and objectives of the educational initiative. Facilitators who agree to participate will attend training workshops offered in French or English that outline their responsibilities and present the associated research project. Facilitators who wish to participate in the research project will be invited to provide informed consent by signing a consent form, confirming their agreement to take part.

Managers and Decision-Makers. The research team's network of collaborators will be used to compile a list of potential managers or decision-makers who meet the specified inclusion criteria. They will receive an email, in accordance with the ethics committee's approval, inviting them to share their perspectives on the educational program deployment in their area. Volunteers will meet virtually with a member of the research team, who will provide an overview of the study and obtain their consent.

5. Data Collection and Tools

Figure 1 presents the learners' pathway in relation to the different time points of the data collection.

Quantitative Data

All web-based questionnaires will be administered via the REDCap platform, version 16.1.3 (REDCap consortium, 2026) and the data will be stored on the secure server of the CRED computer hosted by the *Centre Hospitalier Universitaire de Sherbrooke* Research Center. The CRED IT platform is ISO 27001 certified for information security management.

Sociodemographic Questionnaire. Before the educational program starts, all RNs consenting to the study will complete a sociodemographic questionnaire. Facilitators, managers and decision-makers who consent to the research will also complete it. Sociodemographic characteristics include age, gender, language, belonging to equity-seeking-groups, professional experience (level of education, years as an RN, years in primary care, type of primary care setting, official employer), community size and province. During the analysis phase, the research team will verify learners' eligibility through the sociodemographic questionnaire.

Web-Based, pre- and Post-Training Questionnaires. To assess **E**ffectiveness (according to Kirkpatrick levels **Reaction** and **Learning**) (Kirkpatrick & Kirkpatrick, 2016), participating RNs will complete short (10-minute) questionnaires, available in English or French, at multiple time points: before the program and each module, after each module and the whole program (Figure 1). Reaction will be measured after completing each module and upon completion of the educational program. **M**aintenance and **Behaviour** changes will be assessed via the 6-month post-education questionnaire. The evolution of knowledge and confidence in interprofessional collaboration will be included in the post-module questionnaires of all modules that address this topic (Glasgow et al., 2006; Kirkpatrick & Kirkpatrick; La Duke, 2017).

Quantitative Digital Indicators. Data, such as the number of RNs who started the program and the number of RNs who completed the program, will be extracted from the LMS and compiled into a logbook to assess **R**each and **A**doption (i.e., RE-AIM elements) (Glasgow & Estabrooks, 2018). Personal information will not be collected during the research phase. These indicators will be monitored throughout the data collection period to allow adjustments in the **I**mplementation strategies.

Qualitative Data

Qualitative data from the interviews will be stored on secure servers at *Université de Sherbrooke*. Transcripts will be anonymized, and the document linking participants' identities will be password-protected.

Semi-Structured Interviews with Trained RNs. To assess the **I**mplementation process and the **M**aintenance (i.e., RE-AIM elements) (Glasgow & Estabrooks, 2018), transforming outcomes (in alignment with the Eco-Normalization Theory) (Hamza & Regehr, 2021) and **Behavior** changes (Kirkpatrick & Kirkpatrick, 2016), semi-structured interviews of approximately 1 hour will be conducted in French or English (Guest et al., 2013; Miles et al., 2014). Interviews will take place 6 months after the completion of the educational

program. This interval is considered appropriate for observing changes in practice related to program content while minimizing the risk of recall bias (Carrier et al., 2025; Glasgow & Estabrooks; Stanhope et al., 2019). RNs' perspectives on the application of acquired knowledge and skills in their professional practices and the barriers and facilitating factors impacting the enhancement of professional and collaborative practices will be documented.

Open-Ended Questions in the Web-Based Questionnaires. To reinforce the understanding of RNs' Reaction and Learning experiences (Kirkpatrick & Kirkpatrick, 2016), three open-ended questions will be included in the post-education questionnaire: 1) "What did you like best about this education program (e.g., content, dynamism, case studies, design) and why?" 2) "Which module did you like best and why?" 3) "Please let us know if you have any general comments on how we can improve this education program". Similarly, three questions will be asked in each post-module questionnaire: 1) "Which activity did you prefer in this education module, and why?" 2) "What did you like best about this education module (e.g., content, dynamism, design, etc.) and why?" 3) "Please let us know if you have any general comments on how we can improve this module". See Figure 1 for the timeline of data collection.

Semi-Structured Interviews with Facilitators, Managers, or Decision-Makers. Six months after the educational program launch, 1-hour semi-structured interviews will be conducted with facilitators, managers, and decision-makers. The educational program's implementation and its impacts on professional and collaborative practices will be explored (Glasgow et al., 2006; Guest et al., 2013; Hamza & Regehr, 2021; Kirkpatrick & Kirkpatrick, 2016). The questions will focus on the process of implementing the educational program, barriers, and facilitating factors.

Training and Deployment Support Process Logbook. The national coordinator (MG) associated with the research team will maintain a logbook to continuously document all activities regarding the program's deployment (Guest et al., 2013). MG will also report on the supporting or hindering factors for deployment and any adaptations made. To document the **Learning** and **I**mplementation process (Glasgow & Estabrooks, 2018; Hamza & Regehr, 2021; Kirkpatrick & Kirkpatrick, 2016), the facilitators will complete a weekly reflection questionnaire, and their observations will be included in the logbook (Guest et al.). Table 3 presents a synthesis of the data collection tools.

6. Data Analysis

According to the developmental evaluation (Patton, 2010), qualitative and quantitative data will be analyzed iteratively to support our team's understanding of the deployment (Miles et al., 2014). The developmental evaluation approach was selected to support assessment across multiple stages of the project and to allow for iterative adjustments. For instance, during initial implementation, modifications may be made to the LMS or program components to address reported technical issues. Similarly, if variations in program deployment are observed across provinces, dissemination strategies may be adapted to better reflect the local context. Upon completion of data collection, the quantitative and qualitative data will be integrated (Pluye, 2012) to support an in-depth understanding of the program's implementation and impacts.

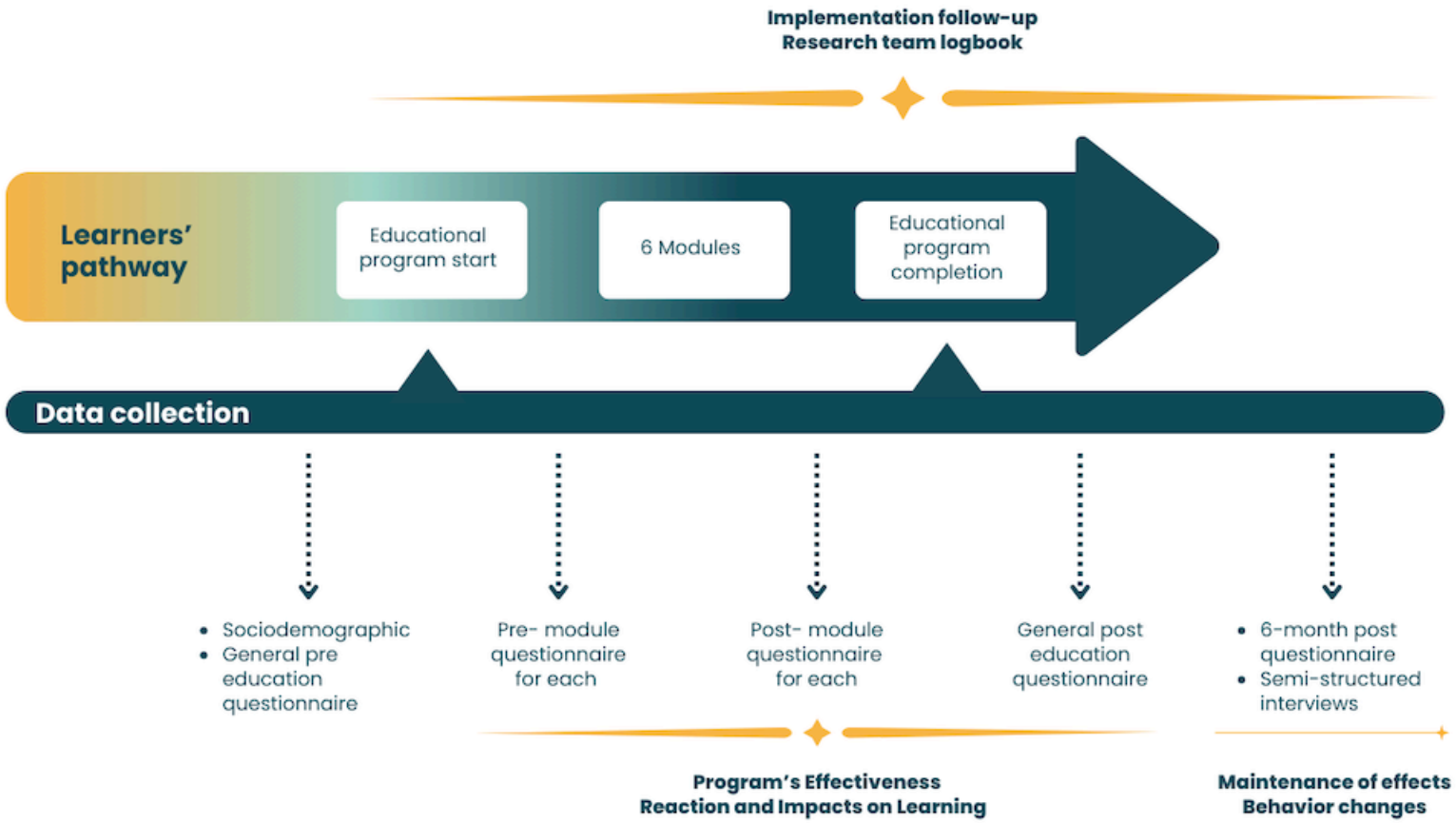
Quantitative Data

All data will be anonymized. Research participants will have a unique identifier on REDCap (REDCap consortium, 2026), which is entirely independent of the LMS. This identifier will be used to pair pre- and post-data and perform statistical analysis.

Sociodemographic data will be analyzed and reported as descriptive statistics (i.e., means, frequencies, standard deviations, ranges) (Girden, 1991). Quantitative data from the pre- and post-education questionnaires will be analyzed descriptively. Comparative analyses of means (ANOVA) for repeated measures (Girden) will be performed to assess Kirkpatrick (2016) levels (i.e., Level 1: **Reaction** and Level 2: **Learning**). A repeated-measures ANOVA will be used to evaluate changes from baseline (before the education) to completion of the final module (after the program) and 6 months after (95% confidence interval) (Fritz & Morris, 2018).

Figure 1

Learners' Pathway in Relation to Data Collection Timeline



Note. The learners' pathway above shows the data collection timeline. The lower section presents the different data collection tools and their respective purposes. Data collection time points are aligned with the study objectives, namely the evaluation of program impact (i.e., effectiveness and maintenance) and program implementation. Open-ended questions are included in each post-module questionnaire and in the general post-education questionnaire.

Table 3

Synthesis of Quantitative and Qualitative Data Collection Tools

Data collection tools		Study populations			
		Registered Nurses	Facilitators	Managers and Decision-Makers	National Coordinator[1]
Quantitative Data	- Socio-demographic questionnaire	x	x	x	
	- Web-based, pre-post-education general questionnaires	x			
	- Web-based, pre-post-module questionnaires	x			
	- Web-based, 6-month post-education questionnaire	x			
	- E-learning platform metrics	x			x
Qualitative Data	- Web-based, post-education questionnaire open-ended questions	x			
	- Web-based post-modules open-ended questions	x	x	x	
	- Semi-structured interviews	x	x	x	
	- Research team logbook		x		x

Note. [1]The national coordinator is not a study population but will be responsible for filling out the research team's logbook.

Subgroup analyses will be conducted to identify factors influencing Kirkpatrick's Levels 1 and 2 (Kirkpatrick & Kirkpatrick, 2016). Statistical analyses will be performed using SPSS software (version 24), and a *p*-value < 0.05 will be considered statistically significant (Ploeger-Lyons, 2017).

Qualitative Data

An inductive-deductive approach will guide the thematic content analysis following three concurrent analytical processes: condensation, presentation and verification of conclusions (Miles et al., 2014). The following themes will be investigated: facilitators and barriers related to contexts that may have influenced the program's deployment and the appropriation of its content. The **E**ffectiveness of the program, as reported by RNs themselves on learning and changes in practice, as well as applying new skills and attitudes to interprofessional collaboration, will be combined with changes observed by facilitators, managers or decision-makers (Charif et al., 2017).

Data Integration

First, qualitative and quantitative data will be integrated through a pooling approach (Pluye, 2012). Qualitative findings will be iteratively compared with quantitative results, and both strands will be interpreted conjointly to generate integrated inferences and to better understand the program's impacts where observed (Fetters, 2020).

7. Integrated Knowledge Transfer

Consistent with the KTA model (Graham et al., 2006), a range of strategies will be implemented to promote knowledge transfer and support dissemination and uptake. Dissemination activities will rely on complementary channels to maximize **R**each and **E**ffectiveness (Glasgow & Estabrooks, 2018; Graham et al.). Tailored knowledge-transfer tools (e.g., infographics, video capsules) will be developed for different knowledge users to share advances and preliminary results throughout the project. The involvement of the CFPNA will facilitate the dissemination of knowledge generated as the project evolves. All tools will also be widely available on the research website Poitraslab.com and its social media platforms (Facebook and LinkedIn), with a Reach of 220,000 since 2023. Results will be presented to professional and scientific audiences at provincial, national, and international levels, and published in an open-access journal.

Ethical Considerations

This project has been approved by the *Éducation et Sciences sociales – Université de Sherbrooke* Ethics committee. It granted ethics approval on November 10, 2023, under the reference 2023-3889. All methods followed the relevant guidelines and regulations (Declaration of Helsinki).

Discussion and Research Spin-offs

The literature along with prior experiences with educational interventions points to two potential challenges (Charif et al., 2017; Ebrahimi et al., 2012; Poitras et al., 2021; Poitras et al., 2022): 1) the complexity of implementing a program across Canada for RNs working in varied primary care models, healthcare structures, and regulatory frameworks and 2) RNs' work overload constraints.

Effective engagement of RNs across Canada will be key to successful implementation. Partnerships with the CFPNA and the facilitators' network will help disseminate information and recruit in primary care, supporting snowball and purposive sampling (Miles et al., 2014). Guided by a developmental evaluation approach, the implementation will be monitored at multiple time points, and strategies will be adjusted as needed (Glasgow & Estabrooks, 2018; Patton, 2010).

A significant barrier to continuous education is RNs' busy schedules (Ebrahimi et al., 2012; Shahhosseini & Hamzehgardeshi, 2014). The program's online, asynchronous format will accommodate this reality (Harlan et al., 2021). RNs will progress at their own pace, according to availability. In addition, the quality and dynamism of the learning modules should encourage program completion (Harlan et al.).

This is the first Canadian project to support RNs' knowledge and skills development in primary care on a national scale. TPCN education will

enhance the quality of care by strengthening nursing and collaborative practices while integrating the PMH vision (CFPC, 2019). Findings will identify gaps in education and generate potential topics for future learning modules tailored to specific regions and those where primary care nursing is still being established. They will also guide the implementation of other national post-licensure education programs across Canada. Ultimately, this project and the knowledge it generates will help strengthen Canadian primary healthcare and support the delivery of quality care.

Authors' contribution: MEP, JL are the principal co-investigators and developed the original design of this project. TK is the project manager, and SB, RDB and SE are co-investigators and contributed to the study's design and the protocol's writing. MDP and TW are patient partner co-leaders and contributed to developing the research protocol. All authors contributed to the co-construction of research design, educational program development and evaluation design. MG drafted the paper and is the national coordinator. DR, AM, DC, CV, ASL, DB and MM contributed significantly to the writing and approved the manuscript.

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