



Roles of Nursing in Vaccination Services and Follow-Up within Primary Health Care Clinics

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Abstract:

Nursing plays a pivotal role in vaccination services within primary health care clinics, serving as the frontline advocates for public health. Nurses are not only responsible for the administration of vaccines but also for educating patients about the importance of immunization. They assess patient eligibility, address misconceptions about vaccine safety and efficacy, and ensure that individuals receive appropriate vaccines according to recommended schedules. Their expertise in patient care and communication enhances community trust in vaccination programs, leading to improved immunization rates. Furthermore, nurses play a crucial role in managing vaccine storage and handling, adhering to guidelines to maintain vaccine potency, which is essential for ensuring public safety and effectiveness. Beyond the administration of vaccines, nursing professionals are integral in follow-up care within primary health care settings. They monitor patients for adverse reactions post-vaccination and maintain comprehensive records to track vaccination histories. This follow-up ensures timely reminders for subsequent doses and helps in identifying any trends in vaccine-related side effects, contributing to ongoing quality improvement in immunization services. Moreover, nurses often participate in outreach programs, conducting health education sessions in the community to raise awareness about the significance of vaccinations not only for individuals but for overall community health. By promoting and following through on vaccination services, nursing enhances the overall efficacy of primary health care in mitigating preventable diseases.

1. Introduction

Vaccination stands as one of the most transformative and cost-effective public health interventions in human history, having irrevocably altered humanity's relationship with infectious disease. Its scientific legacy, from Edward Jenner's pioneering work with cowpox to the modern-day rapid development of mRNA platforms, chronicles a triumphant narrative of human ingenuity. The eradication of smallpox, a scourge that claimed hundreds of millions of lives, and the near-elimination of paralytic poliomyelitis, measles, and rubella in many regions of the world, stand as irrefutable testaments to the power of immunization [1]. The World Health Organization (WHO) estimates that vaccines currently prevent between 3.5 to 5 million deaths annually from diseases like diphtheria, tetanus, pertussis, influenza, and measles, a figure that underscores their profound and ongoing impact on global mortality and morbidity [2]. This success, however, is not merely a product of laboratory brilliance and pharmacological innovation. The most elegant vaccine science remains tragically inert if confined to vials and research papers. The true translation of immunological promise into population-wide protection is fundamentally dependent on the intricate, human-centric systems meticulously designed to deliver these biological agents safely, effectively, and equitably to diverse populations across the lifespan. The journey from manufacturer to the individual's immune system is a complex logistical, social, and clinical pathway, vulnerable to breakdown at any point, where failure negates decades of scientific effort. It is within the

operational landscape of this critical pathway that Primary Health Care (PHC) clinics assume a role of paramount importance. Conceptualized in the Alma-Ata Declaration as the cornerstone of a just and effective health system, PHC represents the first level of contact individuals, families, and communities have with the national health apparatus [3]. These clinics operate at the frontline of community health, embedded within the social and cultural fabric of the populations they serve. They are uniquely positioned to understand local health beliefs, logistical barriers, and social determinants that influence health behaviors. In the context of immunization, PHC clinics serve as the critical nexus—the essential juncture—where abstract national immunization policies and global health recommendations are translated into tangible, individual action and collective protection. They are the point of delivery where policy documents become injections, where vaccination schedules meet the lived realities of a mother with an infant, a teenager, or an older adult with comorbidities. The effectiveness of the entire immunization enterprise, from global procurement to local coverage rates, is therefore ultimately determined by the performance, accessibility, and acceptance of these frontline PHC services.

Within this essential community-based setting, the nursing profession emerges not as a peripheral participant or a supportive auxiliary, but as the central, indispensable pillar supporting every facet of vaccination service delivery, sustainability, and evolution. The image of a nurse administering a vaccine, while iconic, captures only a fleeting moment in a far more expansive continuum of responsibility. The role of the nurse in PHC

immunization is a tapestry woven from multiple, interdependent threads of competency. It extends far beyond the technical, albeit vital, act of safe injection. This role encompasses the foundational work of advocacy—championing the cause of immunization to health authorities and within communities. It is grounded in the art and science of education, requiring nurses to translate complex immunological concepts into accessible information for caregivers and patients, often in the face of pervasive misinformation and doubt. It demands rigorous clinical assessment to identify contraindications and ensure patient safety, a process requiring judicious critical thinking to avoid both unnecessary risk and missed opportunities for vaccination.

Furthermore, the nursing role is defined by vigilant monitoring for adverse reactions, both immediate and delayed, and the competency to manage them. It involves rigorous documentation, a task of profound public health significance that transforms a clinical event into a data point for coverage tracking, pharmacovigilance, and recall systems. It calls for active community mobilization, reaching beyond the clinic walls to engage leaders and hard-to-reach populations. Finally, it requires a systematic commitment to long-term follow-up, ensuring the completion of vaccine series and integrating immunization into the life-course model of preventive care. This complex, holistic portfolio positions the nurse as the linchpin of the vaccination process, the professional whose actions most directly influence vaccine confidence, coverage, and safety at the point of care.

This comprehensive essay will therefore delineate and analyze these multifaceted dimensions of nursing roles within the ecosystem of PHC vaccination services. It will argue with substantive evidence that nurses are the key agents—the primary catalysts—in optimizing vaccine uptake through trusted communication, ensuring individual and systemic safety through strict protocols, maintaining the integrity of the vital cold chain, building and repairing the community trust that underpins program success, and conducting the systematic follow-up necessary to achieve and sustain high coverage. Each of these functions is paramount to achieving the high and equitable coverage rates required for herd immunity, the community-wide protection that shields the vulnerable and ultimately leads to the interruption of disease transmission [4]. The success of global initiatives like the Immunization Agenda 2030 and national immunization programs hinges not just on vaccine supply, but on this skilled, distributed workforce capable of executing the “last mile” of delivery with competence and compassion [5].

The evolving scope of nursing practice in this domain reflects a significant and necessary shift within healthcare. It marks a transition from historically task-oriented, physician-delegated functions toward a holistic, patient-centered, and public health-driven model of care. Modern nurses in PHC are expected to be educators, counselors, advocates, managers, and clinicians. This expanded role is not an academic abstraction but a pragmatic response to contemporary challenges. It is essential for addressing longstanding obstacles such as logistical barriers in rural areas and socioeconomic inequities in access. More critically, it is the frontline defense against emerging and potent threats like the sophisticated global infodemic of vaccine hesitancy, which requires empathetic communication and trust-building skills more than mere information dissemination [6].

2. Foundational Roles: Nurses as Coordinators, Educators, and Advocates

The effective operation of a vaccination service in a PHC clinic is predicated on meticulous coordination and foundational patient engagement, areas where nurses exercise primary responsibility. Prior to any clinical encounter, nursing roles are instrumental in laying the groundwork for successful immunization.

Nursing staff are fundamentally involved in the logistical planning and coordination of vaccination sessions. This includes managing vaccine inventories, forecasting needs based on the target population (e.g., infants, pregnant women, elderly), and ensuring the timely requisition of supplies to prevent stock-outs [1]. They develop and maintain immunization schedules and recall systems, often leveraging electronic health records to generate lists of children due or overdue for vaccinations [2]. By organizing clinic flow, managing appointment systems, and preparing the clinical environment, nurses ensure that vaccination services are efficient, accessible, and minimize waiting times, which is a crucial factor in service acceptability for caregivers [3].

Perhaps one of the most critical pre-vaccination roles is that of health education and informed consent facilitation. Nurses engage in direct, often nuanced, communication with patients, parents, or guardians to explain the benefits and risks of vaccines, the diseases they prevent, and the recommended schedule [4]. This educational role is vital in an era of widespread misinformation. Nurses assess the caregiver’s or patient’s understanding, clarify misconceptions, and provide evidence-based information tailored to the individual’s literacy level and cultural context [5].

The process of obtaining informed consent is a nursing-led dialogue, not a mere signature on a form. It involves verifying the recipient's identity, confirming the correct vaccine and dose, and ensuring there are no contraindications—a preliminary screening that nurses are expertly positioned to conduct [6].

Furthermore, nurses act as powerful advocates for immunization at both the individual and community levels. At the individual level, they advocate for the patient's right to health by ensuring access to vaccination services. At a broader level, they champion immunization programs within their communities, participating in health promotion campaigns and collaborating with community leaders to underscore the collective benefit of high vaccination coverage [7]. This advocacy is rooted in the ethical principle of justice, striving to ensure equitable access to vaccination for all segments of the population, including marginalized and hard-to-reach groups [8].

3. Core Clinical Competencies: Assessment, Administration, and Safety Monitoring

The clinical execution of vaccination is a specialized nursing competency that integrates technical skill with vigilant clinical judgment and a commitment to safety protocols. This phase represents the most visible aspect of the nurse's role but is deeply interconnected with all other functions.

A comprehensive pre-vaccination assessment is a mandatory nursing responsibility. This involves taking a detailed health history, with a particular focus on identifying possible contraindications and precautions. Nurses screen for acute illnesses, severe allergic reactions to previous vaccines or their components, immunosuppressive conditions, and pregnancy status where relevant [9]. They also assess the patient's current physiological state, such as checking for fever, which might necessitate deferring vaccination. This assessment requires critical thinking to distinguish between true contraindications and minor conditions where vaccination can safely proceed, thus preventing unnecessary missed opportunities [10].

The actual administration of the vaccine is a procedure governed by strict protocols to ensure both efficacy and patient safety. Nurses must demonstrate proficiency in correct injection techniques—intramuscular, subcutaneous, and occasionally intradermal—selecting the appropriate needle size and injection site based on the patient's age, muscle mass, and the specific vaccine requirements [11]. Aseptic non-touch technique is paramount to prevent injection-site infections.

Equally critical is the verification of the correct vaccine, correct diluent if needed, correct dose, correct route, and correct patient—the "five rights" of medication administration applied specifically to immunobiologics [12]. Nurses are also responsible for the proper handling and reconstitution of vaccines, adhering to manufacturer guidelines to maintain potency.

Immediate post-vaccination, the nurse's role shifts to safety monitoring and management. They are required to observe patients for a recommended period (typically 15-30 minutes) for any signs of an immediate adverse reaction, particularly anaphylaxis [13]. Nurses in PHC clinics must be trained and equipped to recognize and initiate emergency management for anaphylactic reactions, including the administration of intramuscular adrenaline [14]. Beyond immediate observation, nurses provide clear, verbal and written instructions to patients or caregivers on common minor side effects (e.g., local redness, fever, fussiness in infants) and their management, as well as guidance on when to seek medical attention for more serious concerns [15]. This education alleviates anxiety, promotes appropriate self-care, and prevents unnecessary visits to emergency departments for expected, mild reactions.

4. Ensuring Pharmaceutical Integrity: The Cold Chain and Documentation

The biological potency of vaccines is exceptionally fragile, dependent on maintenance within a precise temperature range from manufacturer to administration. This "cold chain" is a logistical lifeline that nurses in PHC clinics are primarily tasked with safeguarding, alongside maintaining impeccable records.

Nurses are typically the frontline custodians of vaccine storage equipment, such as refrigerators and freezers, in the clinic. Their responsibilities include daily temperature monitoring and recording using calibrated thermometers, with immediate action taken if temperatures fall outside the recommended range (usually +2°C to +8°C for most vaccines) [16]. They must understand the principles of proper vaccine storage: organizing vaccines correctly, ensuring adequate air circulation, avoiding overcrowding, and never storing vaccines in the refrigerator door [17]. In the event of a power failure or temperature excursion, nurses follow specific protocols to quarantine affected vaccines and report the incident, preventing the use of potentially compromised products [18]. This role is crucial, as administration of a vaccine that has lost potency offers no

protection to the recipient while falsely assuring them of immunity, a serious public health risk.

Concurrent with cold chain management is the non-negotiable duty of accurate and timely documentation. Nurses record every vaccine administered in the patient's permanent medical record and, crucially, on an individual immunization card provided to the patient or caregiver [19]. This card serves as a portable history that is essential for tracking an individual's status across different healthcare providers. Furthermore, nurses are responsible for reporting vaccination data to local or national immunization registries. These registries are powerful tools for monitoring coverage at the population level, identifying pockets of low uptake, generating reminder/recall notices, and facilitating life-course immunization by providing a consolidated record [20]. Documentation also extends to the mandatory reporting of adverse events following immunization (AEFI) to pharmacovigilance authorities. Nurses are often the first to identify and document these events, initiating a process crucial for ongoing vaccine safety surveillance [21].

5. Community Engagement and Outreach: Extending the Clinic's Reach

The walls of the PHC clinic do not bound the nurse's responsibility. A significant proportion of individuals missing vaccinations are those who face barriers in accessing static clinic services. Therefore, active community engagement and outreach are integral components of a comprehensive immunization strategy, with nurses frequently at its helm.

Nurses participate in and often lead outreach vaccination activities. This may involve conducting scheduled immunization sessions in satellite clinics, community centers, schools, or even home visits for bedbound patients [22]. These efforts are vital for reaching geographically isolated populations, nomadic communities, or those in urban slums with limited access to fixed health facilities. During outreach, nurses must transport vaccines using cold boxes with validated cold packs, maintaining the cold chain throughout the mobile session—a skill in itself [23].

Beyond the act of vaccination, community engagement involves building relationships and trust. Nurses act as liaisons between the formal health system and the community. They participate in community meetings, collaborate with local leaders, teachers, and traditional healers to promote acceptance of vaccination, and help tailor health messages to local cultural beliefs and practices [24]. This role is particularly important in

addressing context-specific fears or rumors that may fuel vaccine hesitancy. By being a consistent, knowledgeable, and respectful presence in the community, nurses can dispel myths and foster a culture of preventive health [25].

Identifying defaulters—individuals who have missed scheduled doses—is another key outreach function. Using clinic registers or electronic databases, nurses can identify children or adults who are overdue for vaccinations and initiate follow-up actions. This may involve phone calls, text message reminders (where infrastructure allows), or home visits by community health workers who operate under the nurse's supervision [26]. This proactive, 追踪 approach is essential for closing immunization gaps and ensuring that individuals complete the full recommended series for optimal protection.

6. Systems for Follow-Up and Continuity of Care

Vaccination is rarely a single event but a series of interactions over an individual's lifespan. Effective follow-up systems are therefore critical, and nurses are the primary architects and operators of these systems within PHC, ensuring continuity of care and lifelong protection.

The establishment of reminder and recall systems is a core nursing function to improve series completion and timely vaccination. Reminder systems notify individuals or parents of upcoming vaccinations, while recall systems contact those who are overdue [27]. Nurses manage these systems, which can be based on manual registers, computerized databases, or increasingly, mobile health technology. The personal touch of a nurse-led phone call for recall can be particularly effective, as it allows for addressing specific concerns or barriers that may have caused the delay [28].

Follow-up also encompasses the management of minor Adverse Events Following Immunization (AEFI). Nurses in PHC clinics often provide the first point of contact for caregivers concerned about post-vaccination symptoms. Through phone consultation or follow-up clinic visits, nurses assess reported symptoms, provide reassurance and advice for managing expected reactions, and triage cases that require further medical evaluation [29]. This accessible post-vaccination support enhances confidence in the program and ensures serious events are properly escalated.

For the growing agenda of adolescent and adult immunization, nurse-led follow-up becomes even more prominent. Nurses integrate vaccine needs assessment into routine care for chronic disease

management (e.g., offering influenza and pneumococcal vaccines to diabetic patients), prenatal visits (e.g., Tdap and influenza), and well-adult check-ups [30]. They review immunization histories, recommend catch-up vaccinations, and schedule future doses, embodying the life-course approach to immunization. This requires nurses to be knowledgeable about complex schedules and indications for different risk groups.

7. Leadership, Quality Improvement, and Professional Development

The modern nursing role in PHC immunization transcends direct clinical care to include leadership in quality assurance and a commitment to lifelong learning, ensuring services are not only delivered but continuously improved.

Nurses often assume leadership positions within PHC clinic immunization teams. In this capacity, they supervise other staff, including nursing assistants and community health workers, involved in the vaccination process [31]. They are instrumental in developing and updating clinic protocols based on national guidelines and best practices. Furthermore, nurses lead or participate in routine audits of immunization coverage within their clinic's catchment area, analyzing data to identify drop-out rates, timeliness of vaccination, and equity gaps [32]. This data-driven approach allows for targeted interventions to improve program performance.

Engagement in continuous quality improvement (CQI) initiatives is a natural extension of this leadership. Nurses can identify bottlenecks in clinic flow, breakdowns in the cold chain, documentation errors, or training needs through routine monitoring and incident reporting [33]. By leading or contributing to CQI cycles (e.g., Plan-Do-Study-Act), they implement practical solutions, such as redesigning vaccine storage areas, streamlining consent processes, or introducing new client education materials, thereby enhancing the overall safety, efficiency, and effectiveness of the service [34].

Given the rapid evolution in vaccinology—with new vaccines, new schedules, and new challenges like pandemic response—continuous professional development is imperative. Nurses have a professional responsibility to maintain and update their knowledge and skills. This involves participating in in-service training on updated immunization schedules, new vaccine introductions, advanced communication techniques for addressing hesitancy, and emergency response drills [35]. By staying current, nurses ensure their

practice remains evidence-based and responsive to public health needs.

8. Navigating Contemporary Challenges: Hesitancy, Equity, and Pandemics

The landscape of immunization is fraught with contemporary challenges that test the resilience and adaptability of PHC systems. Nurses are on the front lines of navigating these complex issues, requiring advanced skills in communication, cultural competence, and crisis management.

Vaccine hesitancy, defined as a delay in acceptance or refusal of vaccines despite availability, is a multifaceted challenge directly confronted by PHC nurses daily. Addressing hesitancy requires moving beyond simple information provision to empathetic, person-centered communication. Nurses must employ motivational interviewing techniques to explore the roots of an individual's concerns, acknowledge their emotions without judgment, and guide them toward a decision that aligns with scientific evidence and public health benefit [36]. Building a trusting, longitudinal relationship within the PHC setting gives nurses a unique advantage in gently countering misinformation and reinforcing the value of vaccination over time [37].

Promoting equity in vaccination coverage is another persistent challenge. Nurses play a critical role in identifying underserved populations—whether due to poverty, migration status, ethnicity, religion, or geographic isolation—and advocating for tailored strategies to reach them. This may involve collaborating with social services, participating in mobile outreach specifically targeted at these groups, or ensuring clinic environments are culturally safe and non-discriminatory [38]. Nurses act as bridges, translating systemic health goals into accessible care for the most vulnerable.

The COVID-19 pandemic starkly illustrated the expanded and intensified role of PHC nurses in mass vaccination campaigns. Nurses were central to every phase: planning clinic logistics for an unprecedented volume of patients, administering vaccines often for extended hours, managing large-scale post-vaccination observation areas, and dealing with immense public anxiety and misinformation [39]. The pandemic also accelerated the integration of digital tools, with nurses adapting to new digital registration and reporting systems. Furthermore, PHC nurses became pivotal in administering booster doses and addressing complex questions about mixing vaccine platforms, demonstrating the need for agile and ongoing education [40]. The experience

underscored that a robust, nurse-competent PHC system is the foundation of pandemic resilience.

9. Conclusion:

In conclusion, the roles of nurses within vaccination services and follow-up in Primary Health Care clinics are profoundly comprehensive, dynamic, and indispensable. Far from being limited to vaccine administration, nursing practice in this domain encompasses a vast continuum: from logistical coordination and community advocacy to clinical assessment, safe injection, cold chain vigilance, meticulous documentation, proactive follow-up, and quality leadership. Nurses are the human interface between complex immunization science and diverse communities; they are the educators who build trust, the clinicians who ensure safety, the guardians of vaccine potency, and the vigilant monitors of both individual and population-level immunity. Their work directly determines the equity, efficiency, and ultimate success of national immunization programs. As the challenges of vaccine hesitancy, health inequities, and pandemic threats persist and evolve, the role of the PHC nurse will only grow in complexity and importance. Investing in nursing education, supportive supervision, and enabling environments within PHC is not merely an investment in a profession but a fundamental investment in the very infrastructure of public health. The goal of achieving and sustaining high vaccination coverage for communal protection—herd immunity—relies irrevocably on the knowledge, skill, dedication, and pivotal presence of the nursing workforce at the heart of primary care. Their multifaceted contributions affirm that effective immunization systems are, in essence, built and sustained by nursing excellence.

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References

1. Heck, L. O. , Carrara B. S., Mendes I. A. C., and Arena Ventura C. A.. 2022. "Nursing and Advocacy in Health: An Integrative Review." *Nursing Ethics* 29, no. 4: 1014–1034. 10.1177/09697330211062981.
2. International Council of Nurses . 2020. "Success of Mass COVID-19 Vaccination Programmes Will Depend on Frontline Nurses and Nurse Leader at the Highest Level of Government." ICN.
3. Mathews, M. , Meredith L., Ryan D., et al. 2023b. "An Analysis of Policies Supporting the Roles of Family Physicians in Four Regions in Canada During the COVID-19 Pandemic." *Healthcare Management Forum* 36, no. 5: 333–339. 10.1177/08404704231183174.
4. Bardosh, K. , Figueiredo A. D., Gur-Arie R., et al. 2022. "The Unintended Consequences of COVID-19 Vaccine Policy: Why Mandates, Passports and Restrictions May Cause More Harm Than Good." *BMJ Global Health* 7, no. 5: e008684. 10.1136/bmjgh-2022-008684.
5. Bergen, N. , and Labonté R.. 2020. "“Everything Is Perfect, and We Have No Problems”: Detecting and Limiting Social Desirability Bias in Qualitative Research." *Qualitative Health Research* 30, no. 5: 783–792. 10.1177/1049732319889354.
6. Gonnella, K. , and Mankikar D.. 2023. "Instilling Confidence in the COVID-19 Vaccine." *Nursing Clinics of North America* 58: 77–85. 10.1016/j.cnur.2022.11.001.
7. Canadian Nurses Association . 2015. "Framework for the Practice of Registered Nurses in Canada 2015." CNA.
8. Lessard, D. , Ortiz-Paredes D., Park H., et al. 2022. "Barriers and Facilitators to COVID-19 Vaccine Acceptability Among People Incarcerated in Canadian Federal Prisons: A Qualitative Study." *Vaccine*: X 10: 100150. 10.1016/j.jvacx.2022.100150.
9. BBC . "Why Canada Is Falling Behind in Covid Vaccinations." BBC.
10. Canadian Family Practice Nurses Association . 2019. "National Competencies for Registered Nurses in Primary Care."
11. Aggarwal, M. , Kokorelias K. M., Glazier R. H., Katz A., Shiers-Hanley J. E., and Upshur R. E. G.. 2023. "What Is the Role of Primary Care in the COVID-19 Vaccine Roll-Out and the Barriers and Facilitators to an Equitable Vaccine Roll-Out? A Rapid Scoping Review of Nine Jurisdictions." *BMJ Open* 13, no. 4: e065306. 10.1136/bmjopen-2022-065306.
12. International Council of Nurses . 2021. "Report on the Role of Nurses in COVID19 Pandemic."

13. Canadian Council of Registered Nurse Regulators . 2023. "Nurse Practitioner Entry-Level Competencies Development Report."
14. Creswell, J. W. 2014. *Research Design—Qualitative, Quantitative and Mixed Methods Approaches*. 4th ed. Thousand Oaks: SAGE Publications Ltd.
15. Canadian Institutes of Health Research , Sciences and Engineering Research Council of Canada , and Social Sciences and Humanities Research Council of Canada . 2022. "Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans."
16. Guay, M. , Maquiling A., Chen R., et al. 2022b. "Measuring Inequalities in COVID-19 Vaccination Uptake and Intent: Results From the Canadian Community Health Survey 2021." *BMC Public Health* 22, no. 1: 1708. 10.1186/s12889-022-14090-z.
17. Guay, M. , Maquiling A., Chen R., et al. 2022a. "Sociodemographic Disparities in COVID-19 Vaccine Uptake and Vaccination Intent in Canada." *Health Reports* 33, no. 12: 37–54. 10.25318/82-003-x202201200004-eng.
18. Government of Ontario . 2021a. "Ontario Pharmacies and Primary Care Settings to Begin Offering COVID-19 Vaccinations." King's Printer for Ontario.
19. Canadian Nurses Association . n.d. "Advanced Nursing Practice. CNA." Accessed July 22, 2024.
20. Government of Nova Scotia . 2021. "Update on Nova Scotia's Immunization Plan." Government of Nova Scotia.
21. Kholina, K. , Harmon S. H. E., and Graham J. E.. 2022. "An Equitable Vaccine Delivery System: Lessons From the COVID-19 Vaccine Rollout in Canada." *PLoS One* 17, no. 12: e0279929. 10.1371/journal.pone.0279929.
22. Canadian Council for Practical Nurse Regulators . 2019. "Entry-Level Competencies for Licensed Practical Nurses." CCPNR.
23. Mathews, M. , Meredith L., Ryan D., et al. 2023a. "The Roles of Family Physicians During a Pandemic." *Healthcare Management Forum* 36, no. 1: 30–35. 10.1177/08404704221112311.
24. Hill, M. C. , Salmon D., Chudleigh J., and Aitken L. M.. 2021. "Practice Nurses' Perceptions of Their Immunization Role and Strategies Used to Promote Measles, Mumps, and Rubella Vaccine Uptake in 2014–2018: A Qualitative Study." *Journal of Advanced Nursing* 77, no. 2: 948–956. 10.1111/jan.14652.
25. Canadian Nurses Association , and Nurse practitioners . n.d. "What Are Nurse Practitioners? CNA." Accessed March 11, 2024.
26. Guay, M. , Maquiling A., Chen R., et al. 2023. "Racial Disparities in COVID-19 Vaccination in Canada: Results From the Cross-Sectional Canadian Community Health Survey." *CMAJ Open* 11, no. 6: e1075–e1082. 10.9778/cmajo.20230026.
27. Canadian Institute for Health Information . 2022. "Canadian COVID-19 Intervention Timeline." CIHI.
28. Canadian Council of Registered Nurse Regulators . 2019. "Entry-Level Competencies (ELCs) for the Practice of Registered Nurses." 2018. CCRNR.
29. Arya, N. , Redditt V. J., Talavlikar R., et al. 2021. "Caring for Refugees and Newcomers in the Post–COVID-19 Era: Evidence Review and Guidance for FPs and Health Providers." *Canadian family physician Medecin de famille canadien* 67, no. 8: 575–581. 10.46747/cfp.6708575.
30. Coughlin, S. S. 1990. "Recall Bias in Epidemiologic Studies." *Journal of Clinical Epidemiology* 43, no. 1: 87–91. 10.1016/0895-4356(90)90060-3.
31. Carcary, M. 2009. "The Research Audit Trial–Enhancing Trustworthiness in Qualitative Inquiry." *Electronic Journal of Business Research Methods* 7, no. 1: 11–24.
32. Aylsworth, L. , Manca T., Dubé È., et al. 2022. "A Qualitative Investigation of Facilitators and Barriers to Accessing COVID-19 Vaccines Among Racialized and Indigenous Peoples in Canada." *Human Vaccines & Immunotherapeutics* 18, no. 6: 2129827. 10.1080/21645515.2022.2129827.
33. Ali, F. , Kaura A., Russell C., et al. 2023. "Identifying Barriers and Facilitators to COVID-19 Vaccination Uptake Among People who Use Drugs in Canada: A National Qualitative Study." *Harm Reduction Journal* 20, no. 1: 99. 10.1186/s12954-023-00826-6.
34. Berg, B. L. 1995. *Qualitative Research Methods for the Social Sciences*. 2nd ed. Boston: Allyn and Bacon.
35. Government of Ontario . 2021b. "Ontario Expanding Pharmacy and Primary Care Locations for COVID-19 Vaccinations." King's Printer for Ontario.
36. Lukewich, J. , Edge D. S., VanDenKerkhof E., Williamson T., and Tranmer J.. 2018. "Team Composition and Chronic Disease Management Within Primary Healthcare Practices in Eastern Ontario: An Application of the Measuring Organizational Attributes of Primary Health Care Survey." *Primary Health Care Research & Development* 19, no. 6: 622–628. 10.1017/S1463423618000257.
37. Ashcroft, R. , Donnelly C., Lam S., et al. 2024. "A Qualitative Examination of Primary Care Team's Participation in the Distribution of the COVID-19 Vaccination. BMC." *Primary Care* 25, no. 85: e1–e10. 10.1186/s12875-024-02327-2.
38. Guest, G. , MacQueen K. M., and Namey E. E.. 2012. *Applied Thematic Analysis*. Los Angeles: SAGE Publications Ltd.
39. Bajnok, I. , Catton H., Skinner T., Shamian J., and Pavlovic T.. 2018. "The Role of Nurses in Immunisation: A Snapshot From OECD Countries." *International Council of Nurses*, 1–37.
40. American Nurses Association . 2020. "American Nurses Association Underscores nurses' Role in Successful Mass Vaccination Campaigns: 'Most Trusted' Profession Key to Building Public Confidence." ANA.