McMaster University | HEALTH FORUM

Rapid Evidence Profile

Identifying vaccine delivery approaches or programs and their impact on vaccine uptake

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[MHF product code: REP 68]

Context

- During the COVID-19 pandemic, many innovative approaches were implemented across jurisdictions to support the roll-out and uptake of vaccines.
- There is an opportunity to identify initiatives that were successful either broadly, or for specific populations, that could be adopted to strengthen the delivery of vaccines outside of the context of public health emergencies.
- This rapid evidence profile identifies and explores the best-available evidence on different vaccine delivery approaches or programs, their impacts on vaccine access, uptake, program costs, efficiency, and patient and provider experiences, and any barriers to their implementation.

Question

- What do we know from the best-available evidence about the impacts of different vaccine delivery approaches or programs on vaccine access, uptake, program costs, efficiency, and patient and provider experiences?
- What do we know about barriers to implementation of vaccine delivery approaches?

Box 1: Evidence and other types of information

+ Global evidence drawn upon

Evidence syntheses selected based on relevance, quality, and recency of search

- Forms of domestic evidence used (🍁 = Canadian)

- Qualitative insights
- Evaluation
- Guidelines

+ Other types of information used

Jurisdictional scan of Canada

*** Additional notable features**

Prepared in three business days using an 'all hands on deck' approach

High-level summary of key findings

- We identified a total of 33 evidence syntheses and four single studies that were of high and medium relevance to the research questions, from which we have profiled insights specific to Canada and from the global evidence included in evidence syntheses.
- Vaccine delivery approaches that were identified from the evidence included school-based vaccination campaigns, mass vaccination, hospital-based vaccination programs, standing order protocols, mobile vaccination, fixed-post vaccination, and pharmacy-based immunization services.
- The evidence suggested that while large-venue vaccine delivery approaches used in Canada during the COVID-19 pandemic to reach large volumes of the population were effective in most provinces, equal efforts should have been made by governments to engage vulnerable communities in vaccination and provide easy and affordable access to vaccines in partnership with community organizations.

- Cost of vaccines was highlighted as a barrier to vaccination in several evidence syntheses, leading to a call for mechanisms to enhance funding mechanisms and increase financing options for vaccination programs that do not provide sufficient coverage for patients.
- Other barriers to vaccine delivery and uptake included logistical challenges of transporting and handling vaccines, planning and coordination of vaccination campaigns, time constraints and workload of healthcare professionals, limited monitoring and reporting systems, geographically far distances to vaccination sites for certain populations, difficulties navigating the health system due to cultural and linguistic barriers of some communities, and vaccine hesitancy.
- Several approaches to improve vaccine access and uptake across multiple vaccine delivery programs in Canada and other countries were identified, including training health professionals and peer educators to deliver culturally appropriate education about vaccines, making vaccines more widely available to the community, providing reminders and incentives for vaccination, implementing educational interventions in-person or through social marketing, delivering clear guidelines on vaccination, and engaging communities in the development and implementation of vaccination programs.
- These findings from the evidence were echoed by the findings of our high-level jurisdictional scan of vaccine delivery approaches in Canada, which identified national guidelines for vaccination programs and funding to increase vaccination, and also highlighted the need for more action by provincial governments to promote vaccines for adults.

Box 2: Approach and supporting materials

For this REP, we searched COVID-END Inventory, Health Systems Evidence, HealthEvidence and PubMed for evidence syntheses published on the research question within the last ten years on 26 February 2024. We conducted a second search in PubMed on 18 March 2024 for Canadian-specific literature to supplement the global evidence included in evidence syntheses. The search strategies used are included in Appendix 1. In contrast to synthesis methods that provide an in-depth understanding of the evidence, this profile focuses on providing an overview and key insights from relevant documents.

We appraised the methodological quality of evidence syntheses that were deemed to be highly relevant using AMSTAR. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. The AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to evidence syntheses pertaining to delivery, financial, or governance arrangements within health systems or to broader social systems.

A separate appendix document includes:
1) methodological details (Appendix 1)
2) details about each identified evidence synthesis (Appendix 2)
3) details about each identified single study (Appendix 3)
4) detailed findings from the pan-Canadian jurisdictional scan (Appendix 4)
5) documents that were excluded in the final stages of review (Appendix 5).

This rapid evidence profile was prepared in the equivalent of three days of a 'full court press' by all involved staff.

Framework to organize what we looked for

- Type of vaccination
  - Routine childhood vaccines
  - Seasonal influenza vaccines
  - COVID-19 vaccines
  - Adult vaccines (e.g., pneumococcal, shingles)
  - Vaccines during pregnancy
  - Human papilloma virus (HPV) vaccines
  - Travel vaccines
  - Other vaccines
- Where vaccines are delivered

    - In-home vaccination
    - Community-based health settings
        - Mobile clinics
        - Pharmacies
    - Other community settings
        - Schools
        - Workplaces
        - Shelters
        - Community centres
        - Indigenous community hubs
    - Primary care (e.g., family doctor offices, nursing stations, community health centres, maternity care settings)
    - Specialty care settings (e.g., hospitals, travel vaccine clinics)
    - Long-term care homes
    - Public health offices/centres
- By whom vaccines are delivered (including expansion of scope of practice and/or team-based approaches with any of the following types of providers)
    - Physicians
    - Nurses
    - Pharmacists
    - Public-health workers
    - Allied health professionals
    - Midwives
    - Lay/community health workers
- Supports used as part of vaccine delivery approaches to enhance access and uptake
    - Information or education provision
    - Decision aids
    - Appointment/scheduling and screening support
    - Reminders from prompts (e.g., using EMRs and patient portals)
    - Community engagement strategies (e.g., in the design and delivery of a vaccine program)
- Priority populations
    - People who are pregnant
    - New parents
    - Parents of children who have not received recommended vaccinations
    - People who are vaccine hesitant
    - New immigrants and refugees
    - Older adults
    - BIPOC communities
    - People of lower socio-economic status
    - People experiencing homelessness
    - People living in rural or remote areas
- Outcomes
    - Barriers to implementation
    - Vaccine access (including culturally responsive vaccination)
    - Vaccine uptake (including adherence to vaccine schedules)
    - Efficiency of vaccine delivery
    - Patient, family and/or caregiver experience
    - Provider experience
    - Costs

What we found

Key findings from the evidence

We identified a total of 33 evidence syntheses and four single studies that were of high and medium relevance to the research questions. Evidence was identified on vaccine delivery approaches for all vaccine types in the organizational framework except travel vaccines. Our findings are summarized below by vaccine type, with insights provided from the global literature, as well as those specific to Canada that were identified from studies conducted in Canada that were included in the evidence syntheses and/or from a targeted search of Canadian literature (see Box 1).

Routine childhood vaccines

Childhood vaccines are among the most effective public health interventions around the world. In Canada, text message reminders were used as part of a childhood immunization strategy in a pilot project conducted at two health centres in Alberta where SMS text messages with a link to web-based information on immunization in multiple languages were sent to parents of 18-month-old children.(1) The pilot study reported that while there was minimal reduction in vaccination appointment no-shows, all participants found the reminders helpful, and most parents reported that their child received their 18-month vaccination on schedule. Additionally, the availability of information in multiple languages proved to be very useful, suggesting the need for translated information about immunization.

Among the international evidence we found, a recent medium-quality evidence synthesis explored the barriers and enablers to measles, mumps, and rubella (MMR) and human papilloma virus (HPV) vaccination in minority populations in middle- and high-income countries. The evidence synthesis found that limited clinic times, geographically far distances to clinics, difficulties navigating the health system, and lack of translated culturally appropriate materials led to low vaccine uptake amongst minority populations.(2) Recommendations to promote MMR and HPV vaccination among minority populations included having health professionals, who have been trained to deliver health services and education in a culturally appropriate manner, making vaccinations more widely available at no cost to the community, and developing clear guidelines to help new immigrants and other minority groups access the new healthcare system. A high-quality evidence synthesis assessed the effectiveness of supplemental immunization activities (SIAs) and school-based vaccine (SBV) campaigns on childhood vaccine uptake in youth and identified benefits and challenges of both vaccine delivery approaches.(3) While SIAs, which facilitated mass vaccination of youth within a geographical area regardless of vaccination status, were found to show a higher vaccination coverage than SBVs and be more cost-effective, SIAs were more disruptive to routine immunization services as staff had to split their time to supervise the SIA campaign. On the other hand, SBV campaigns that delivered vaccines on school premises during school hours were found to be most cost-efficient in areas with a large school enrolment and in countries with strong inter-ministerial collaboration. According to a medium-quality evidence synthesis, SIAs were also associated with workforce strengthening and capacity building, increased community awareness, and confidence in vaccine programmes.(4)

Some of the evidence we identified focused on identifying interventions to promote the uptake of childhood vaccination, including face-to-face educational interventions for expectant parents, the development of policies and programs that address socio-economic disparities and logistical challenges, and community engagement strategies involving stakeholder consultations, community dialogues, or partnerships with community leaders.(5-7) In particular, community engagement strategies were found to be successful because of community leaders providing insights on logistics, engagement, and social norms during the design and implementation of vaccination strategies.

Seasonal influenza vaccines

We did not identify any specific evidence on influenza vaccine delivery programs in Canada, but we did find that vaccination approaches in other countries that increased uptake of seasonal influenza vaccines included hospital-based vaccination interventions for adult inpatients and pharmacy-based interventions. A medium-quality evidence synthesis found that standing order protocols (SOPs) that give healthcare workers the authority to administer vaccines to eligible patients without the approval or supervision of a physician were most effective at increasing vaccine uptake and delivery in acute-care settings when combined with other interventions, such as chart/face-to-face reminders and patient education.(8) Influenza vaccination acceptance rates increased by 27% with pharmacy-based interventions compared to standard care, according to a medium-quality evidence synthesis, and the most successful pharmacy interventions employed an active pharmacist role in routine care and involved immediate and direct communication between pharmacists and patients to provide education.(9) Lastly, a low-quality evidence synthesis that explored social marketing approaches to increase influenza vaccine uptake in university students identified several vaccination promotion programs that consisted of a combination of educational materials (e.g., posters, pamphlets), educational group meetings, email reminders about vaccination, rewards (e.g., gift cards) to incentivize vaccination, vaccination promotors (e.g., peer champions, university staff, healthcare workers), and mobile vaccine teams.(10) The authors concluded that there was insufficient evidence available to determine the effectiveness of these approaches in changing students' actual behaviour to vaccinate and called for additional field studies on the topic.

COVID-19 vaccines

Two of the evidence documents we identified explored lessons learned about vaccine delivery approaches in Canada during the COVID-19 pandemic. A mixed-methods study that assessed vaccination strategies across multiple Canadian jurisdictions through the lens of vulnerability found that COVID-19 vaccine delivery systems used in early phases of the rollout (i.e. large-venue vaccination sites) presented several barriers for individuals living in vulnerable communities, and that engagement with these communities was not initiated until later phases of most provincial vaccine rollouts with limited support from provincial governments.(11) To address these and other barriers to vaccine delivery, such as misinformation and language barriers, the authors recommended that vaccine delivery strategies should be developed to ensure equitable access to barrier-free, multi-lingual and culturally safe vaccination environments. This finding is echoed in another study we found that explored strategies to achieve equitable COVID-19 vaccine coverage among immigrants and newcomer refugees in Calgary, Alberta, between Spring 2021 and Fall 2022.(12) Specialized vaccine delivery models for immigrants and newcomer refugees, such as mobile clinics for Temporary Foreign Workers in remote locations, vaccination upon arrival at temporary housing for refugees, and tailored community clinics providing low-barrier vaccine access with no requirement for a healthcare number, had a significant impact on vaccine uptake among immigrant and refugee groups due to increased access and vaccine confidence of participants.

According to a medium-quality evidence synthesis on COVID-19 vaccine delivery models in countries around the world, COVID-19 vaccine delivery in most countries during the pandemic was facilitated through mass vaccination, mobile vaccination, and/or fixed-post vaccination delivery models.(13) Challenges were experienced with planning and coordination, securing human resources to administer vaccines, transportation and handling of vaccines, cultural and linguistic barriers of vaccine recipients, and vaccine hesitancy. In ethnic minority populations, vaccine hesitancy was a consistent barrier, according to a medium-quality evidence synthesis, due to concerns about the speed of the vaccine's development, vaccine side effects, and excessive mistrust of medical professionals and government.(14) During the pandemic, the challenges mentioned were addressed through information, education, and communication (IEC) campaigns and partnerships with organizations that provided logistical management, site security, scheduling support, and infection prevention and control. A medium-quality evidence synthesis also indicated that early efforts to up-scale vaccination that prioritized front-line health professionals, the elderly, and those with comorbidities resulted in decreases of COVID-19 cases, hospitalizations, and deaths.(15) Recommended

strategies to up-scale the vaccination process included using mass-vaccination hubs, using novel delivery techniques, and engaging communities to increase vaccine awareness and acceptance.

Adult vaccines

In terms of adult vaccination, we found evidence that explored pharmacy-based immunization interventions. In Canada, Quebec pharmacists, who were given authorization to prescribe and administer vaccines in the province during the COVID-19 pandemic, were awarded with a continuing education unit credit from the pharmacist regulatory body of Quebec (the Ordre des pharmaciens du Québec) after completing a workshop aimed to equip them with the skills to optimize adult vaccinations in their communities. According to the 2023 qualitative study that reported on the workshop, pharmacists participating in the workshop indicated that most adult vaccinations at pharmacies occur because patients specifically request them. The participating pharmacists also suggested that the absence of a mandatory immunization policy for adults, lack of coordinated care, and vaccine hesitancy resulted in low adult vaccination rates.(16) The study found that facilitators of vaccination by pharmacists should include co-promoting vaccinations, using pharmacy assistants to optimize workflow and identify individuals who are eligible for vaccination, improving vaccine administration and scheduling processes, and increasing educational opportunities for pharmacists to enhance their clinical knowledge and be more proactive in encouraging vaccination.

Given the training, capacity and confidence of pharmacists, pharmacy-based immunization services (PBIS) are an accessible and cost-effective strategy that can increase vaccine access and uptake in adults, according to a medium-quality evidence synthesis.(17) Some of the barriers to PBIS identified in this synthesis included concerns about legal liability, high workloads, insufficient training to address adverse events, and issues with insurance billing, but these can be addressed by expansion of pharmacists' scope of practice as immunizers, formal training for pharmacists in administering vaccinations, and continuous evaluation and adaption of vaccination strategies. We also identified another medium-quality evidence synthesis on vaccination interventions for people with rheumatoid arthritis, which highlighted that reminders, vaccine documentation, educational resources for patients, and intervention evaluations were helpful tools that can improve vaccine uptake in this patient group.(18)

Vaccines during pregnancy (maternal vaccination)

Maternal vaccination is a key component of antenatal care for improving maternal and child health. While we did not find any Canadian-specific evidence on maternal vaccination delivery approaches, a medium-quality evidence synthesis that we identified explored the barriers and facilitators of maternal influenza vaccine delivery in general. This evidence synthesis highlighted several approaches to facilitate influenza vaccine delivery and improve vaccine uptake during pregnancy, including having vaccine champions and dedicated vaccine teams, maternal healthcare professionals (MCHPs) who have knowledge and encouraging attitudes about influenza vaccines, trusting relationships and good communication with pregnant women accessing care services, electronic vaccination reminders, and national vaccination guidelines.(19) However, systemic barriers to vaccine access and delivery, such as time constraints and workload of MHCPs, ineffective cold-chain management, lack of sustainable financing mechanisms, and limited monitoring and reporting systems need to be considered when developing and implementing influenza vaccination strategies for pregnant women.(20)

Human papilloma virus (HPV) vaccines

According to the evidence, delivery approaches for HPV vaccines are typically targeted in schools and health facilities. A medium-quality evidence synthesis conducted in 2022 found that HPV vaccination strategies that consist of educational strategies for parents and children and for vaccine delivery personnel, targeted vaccine delivery programs (e.g., school-based, health facility-based), stakeholder collaboration, funding, HPV vaccine coverage rate monitoring systems (including systematic reminders), and parental consent can support HPV vaccine access and uptake around the world.(21) One vaccine-delivery approach explored in a medium-quality evidence

synthesis was the integration of HPV vaccines with cervical cancer screening. The synthesis determined that when using different approaches of integrating HPV vaccination and cervical cancer screening services, such as co-dissemination of HPV vaccines and cervical self-sampling screening, co-location of screening services, co-recruitment, and integrated health communication, it is important to have sufficient resources to ensure that integration is effective.(22)

A medium-quality evidence synthesis we identified explored barriers and facilitators to HPV vaccine uptake in Canada and found that HPV vaccine uptake was impacted by knowledge of the vaccine and the ability to perceive 'acceptability' of the vaccine at the patient level, the appropriateness of an intervention at the provider level, and attitudes of providers in vaccination programs at the system level.(23) Strategies that were suggested to increase HPV vaccine uptake in Canada included training providers on culturally appropriate communication and service delivery for different populations, using social media platforms to create awareness about HPV, and holding regular quality improvement surveys and feedback sessions to ensure continuous improvement to HPV vaccination programs. Additional barriers to HPV vaccine delivery and uptake were identified from international evidence, including concerns about vaccine safety and effectiveness, the cost of the vaccine, unavailable or inaccessible medical services, stigma associated with sexual behaviours, the socio-economic status of certain populations, and general mistrust of vaccines and the healthcare system in some communities.(24-27) To increase HPV vaccine uptake, health professionals can play an active role in patient care through education and advocacy about the benefits of the vaccine and possible side effects, improving access to vaccination in cost-effective ways, and implementing new strategies for vaccine delivery.(24; 28) Another medium-quality evidence synthesis also emphasized the need to identify and adopt sustainable strategies that are cost effective, such as reminders, parent/child education, financial incentives, health campaigns, integrating multiple vaccinations, and class-based immunization recall.(29) However, the cost of diverting health professionals' time to facilitate program implementation and modifying existing workflow processes should be considered.

Multiple vaccines

We also identified evidence that examined vaccination programs in general or for multiple vaccines in Canada and internationally. A medium-quality scoping review from 2022 that assessed the characteristics of immunization programs in Canada found that most programs identified were based in Ontario and Quebec and focused on HPV vaccination, followed by influenza vaccines, hepatitis B, COVID-19 vaccine, and all routine childhood vaccines.(30) While most programs offered a combination of in-person and online (i.e., social media or web-based) informational support, only some programs incorporated structural supports for participants, including providing transportation, decision aids, access to vaccine clinics, and peer support. Program personnel, including multidisciplinary teams, school staff, web designers, clinicians and medical residents, researchers and volunteers, were highlighted as facilitators of vaccine delivery programs, as was making program participation convenient, limiting time commitments for vaccination, and collaboration among entities involved in implementation of the programs.

At the international level, interventions to improve adolescent vaccinations for HPV, influenza, Tdap (tetanus-diphtheria-acellular-pertussis), and meningococcal vaccines were evaluated in a high-quality evidence synthesis, which found that educating adolescents, implementing mandatory vaccination laws for school entry, and adopting multifaceted strategies for healthcare providers can significantly enhance adolescent vaccination coverage.(31) To increase vaccine uptake in ethnic minority populations, evidence suggested including peer coaching with nurse case management, health passports to remind parents of the childhood vaccination schedule, onsite vaccination following education, training of peer health educators, and providing culturally specific education in local languages of the ethnic minority groups.(32) Barriers to vaccine uptake in these groups often include the experience of sickness after a previous vaccination and fear of vaccine side effects. In migrant populations in Europe, face-to-face awareness strategies, increased access in community settings, vaccine mandates, and reduced costs for vaccines were found to promote vaccine access and uptake, according to a high-quality evidence synthesis.(33) Another medium-quality evidence synthesis reported that personal electronic health records (PEHRs) access had a moderate positive impact on uptake of influenza and pneumococcal vaccines as well as routine childhood immunization, and

suggested that the addition of digital communication features like educational messages, reminders, and scheduling features with PEHRs access may also increase vaccine uptake when compared to PEHRs access alone.(34) Shared decision-making (SDM) interventions in the form of patient decision aids and decision support interventions were also found to have a positive effect on vaccine uptake, according to medium-quality evidence.(35)

Equity considerations

A few evidence syntheses we identified provided insight into vaccine delivery for marginalized groups and populations, including Indigenous populations, migrant populations, people living in rural or remote areas, and people living and working in prisons. For Indigenous populations, the evidence highlighted the importance of considering the input of the Indigenous community in the design and delivery of awareness initiatives as well as community involvement in the co-creation of HPV vaccine health recommendations.(27) One high-quality evidence synthesis exploring barriers and facilitators to the vaccine uptake in migrant populations living in Europe found that vaccine access and uptake in migrant populations were enhanced by face-to-face awareness strategies, increased access in community settings, vaccine mandates, and reduced costs for vaccines.(33) A medium-quality evidence synthesis also indicated that in rural communities, it may be 1.3 to 2 times more costly to vaccinate people when considering the costs of supplementary vaccinator training, labour, and travel.(36) However, the authors concluded that additional exploration of the costs associated with vaccinating hard-to-reach populations is needed to understand how to increase vaccine uptake. Finally, a medium-quality evidence synthesis examining COVID-19 vaccinations for people living and working in prisons determined that, while many countries acknowledged the importance of vaccinating people in prisons who were at higher risk of COVID-19 transmission during the pandemic, only a minority explicitly prioritized this group for COVID-19 vaccination.(37) Documents analyzed in this review revealed an absence of any unified approach regarding prioritization of people living and working in prisons and highlighted the need to consider the healthcare needs of disenfranchised populations like these.

Key findings from pan-Canadian jurisdictional scan

Our high-level jurisdictional scan of vaccine delivery approaches in Canada emphasized the need for increased efforts to make vaccines more easily available and accessible for the Canadian population. At the federal level, the National Advisory Committee on Immunization (NACI) continues to provide guidelines for public health vaccination programs, such as programs for routine childhood vaccines, influenza vaccines, and COVID-19 vaccines, and the Government of Canada continues to fund programs to increase vaccination coverage in Canada through the Immunization Partnership Fund, which was renewed for 2023 to 2024 to fund a list of ongoing projects described on its website. However, advocacy organizations like CanAge continue to emphasize the importance of provincial governments taking immediate action to make influenza, pneumonia, shingles, COVID-19, and respiratory syncytial virus (RSV) vaccines more available and affordable for adults and to prevent life-threatening diseases from spreading in the Canadian population.

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