

COVID-19 Living Evidence Profile #1

(Version 1: 21 January 2021)

Question

What is known about anticipated COVID-19 vaccine roll-out elements?

Background to the question

The roll-out of the COVID-19 vaccine is arguably one of the largest health-system initiatives ever conducted. As such, there are many activities that vaccine roll-out plans will need to consider, which we summarize in the framework below. We use this framework to organize key findings from evidence documents and experiences from other countries and from Canadian provinces and territories.

Organizing framework

- **Securing and distributing a reliable supply of vaccines and ancillary supplies** (e.g., needles, diluents)
 - National purchasing
 - Delivery to country
 - Inventory management within country
 - Ordering within country
 - Distribution within country and to administration sites (including whether direct from centralized distributor to administering location and whether redistribution is allowed)
 - Storage and handling within country (e.g., cold-chain requirements and related supplies such as liquid nitrogen)
- **Allocating vaccines and ancillary supplies equitably**
 - Approaches to developing and adjusting allocation rules (e.g., citizen- and stakeholder-engagement processes)
 - Allocation rules (to priority populations, including those listed below, as well as to 'lower levels' in a federation and/or to providers who can reach priority populations)

Box 1: Our approach

We identified research evidence addressing the question by searching the COVID-END [inventory of best evidence syntheses](#) and the COVID-END [guide to key COVID-19 evidence sources](#) in the 11-15 January 2021 period. We also searched: 1) [HealthEvidence](#); and 2) [Health Systems Evidence](#) (see Appendix 1 for the search terms used). We identified jurisdictional experiences by searching jurisdiction-specific sources of evidence listed in the same COVID-END guide to key COVID-19 evidence sources and by hand searching government and stakeholder websites. We selected eight countries (Australia, China, France, Germany, Israel, New Zealand, the U.K., and the U.S.) that are advanced in their thinking and/or experiences with the roll-out of the COVID-19 vaccine.

We searched for guidelines that were developed using a robust process (e.g., GRADE), full systematic reviews (or review-derived products such as overviews of systematic reviews), rapid reviews, protocols for systematic reviews, and titles/questions for systematic reviews or rapid reviews that have been identified as either being conducted or prioritized to be conducted. Single studies were only included if no relevant systematic reviews were identified.

We appraised the methodological quality of full systematic reviews and rapid reviews using AMSTAR. Note that quality appraisal scores for rapid reviews are often lower because of the methodological shortcuts that need to be taken to accommodate compressed timeframes. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems or to broader social systems.

This update of the living evidence profile was prepared in the equivalent of two days of a 'full-court press' by all involved staff, and will be updated twice a month to provide evidence updates that can support COVID-19 vaccine roll-out.

- Front-line healthcare workers
- Residents in long-term care homes and other congregate-care settings
- People at increased risk of severe COVID-19 (e.g., older and/or frail adults, those with chronic health conditions)
- Essential workers (beyond front-line healthcare workers) and/or those in work environments that put them at elevated risk (e.g., food processing and transit)
- Children (school aged)
- Migrant workers
- People in social environments that put them at elevated risk for COVID-19 (e.g., Black, Indigenous and other people of colour; those with low socio-economic status and/or living in crowded and poorly ventilated housing; and those living in communities with outbreaks)
- People who have already had confirmed COVID-19
- Mass public
- People for whom vaccine safety and effectiveness has not yet been established (e.g., children under the age of 12 or 15, women who are pregnant or breastfeeding, immunocompromised, those with autoimmune conditions, those experiencing long episodes of COVID)
- People at significant risk for severe allergic reaction
- Ensuring equity (including whether and how access through private means can be achieved by those not initially prioritized)
- **Communicating vaccine-allocation plans and the safety and effectiveness of vaccines**
 - Target of intervention
 - General public
 - High-risk groups (see above list)
 - Individuals who are hesitant about or opposed to vaccination
 - Delivery of the intervention
 - By whom (e.g., health worker, research expert, teacher, business leader, government leader, community leader, citizen champion, media)
 - Frequency (e.g., daily, weekly)
 - Duration (i.e., how much or for how long)
 - Modality of delivery (e.g., social media, text, email, telephone, radio, television, face-to-face by video, face-to-face in person)
 - Content of messaging
 - Data and evidence about safety and about effectiveness in terms of both protection against COVID-19 (including duration of protection) and protection against transmission (and other factors that may contribute to vaccine acceptance and hesitancy)
 - Information about novel vaccine platforms (e.g., mRNA), current vaccine options (e.g., number of vaccines available in a country, number of doses required of any given vaccine), prioritized populations, and behaviours after vaccination
 - Information (for health workers) about vaccine-administration protocols
 - Myths and misinformation about vaccines
 - Risk-mitigation efforts (including complementary public-health measures used at time of vaccination)
 - Anticipated timing of when all those who want a vaccine will have been vaccinated
- **Administering vaccines in ways that optimize timely uptake**
 - With what explicit effort to leverage existing health-system arrangements (e.g., vaccination systems and primary-care practices/community health centres)
 - Where

- Community-based health settings (e.g., mobile clinics and pharmacies)
- Other community settings (e.g., schools, workplaces, shelters, community centres, Indigenous community hubs, and unconventional spaces like drive-through lots and arenas or tents)
- Primary-care settings (e.g., family doctor's offices, nursing stations, community health centres)
- Acute care (e.g., hospitals)
- Long-term care homes
- Public-health offices/centres
- Other (e.g., private clinics, prisons)
- With what appointment/scheduling and screening support, changes to physical spaces and patient flows through these spaces, and changes to hours of operation
- With what post-vaccination observation period and what physical distancing, personal protective equipment, sanitation and other public-health measures
- By whom (e.g., nurses, public-health workers, retired health workers) and with what changes to remuneration (e.g., increased vaccine-administration fee code)
- With what partnerships to reach early populations of focus (e.g., among black, Indigenous and people of color (BIPOC), and Indigenous leaders)
- With what broader, complementary health interventions (e.g., flu vaccination and routine immunization, ongoing public-health measures)
- With what second-dose provisions (e.g., from same manufacturer and from same or later supply than original dose)
- With what second-dose reminders
- With what reporting requirements (e.g., vaccine supply, expiration dates, temperature excursion, and uptake) and supporting immunization information systems (e.g., vaccine registries and COVID-19 apps) and broader healthcare information systems (e.g., EHRs)
- With what safety monitoring requirements (e.g., adverse events)
- With what injury-compensation program (for vaccine recipients) and liability immunity (for vaccine distributors, planners, and administering staff)
- **Surveillance, monitoring and evaluation and reporting**
 - Documenting vaccine-related opinions (e.g., vaccine acceptance and hesitancy)
 - Documenting vaccine status (e.g., for number of doses received and for use in cross-border travel and work-related migration)
 - Documenting adverse events and follow-up
 - Identifying sources of vaccine hesitancy
 - Monitoring supply safety (e.g., expiration dates, temperature excursion)
 - Identifying and measuring performance indicators (particularly those adjusted from standard vaccine programs)
 - Infrastructure to enable surveillance, monitoring and evaluation (e.g., patient-held records, electronic health records or reporting systems, online vaccination registries, COVID-19 apps)

What we found

Of the 122 evidence documents identified from our searches, we deemed 52 to provide highly relevant evidence in relation to one or more of the above activities, which include:

- 16 guidelines developed using a robust process (e.g., GRADE);
- eight full systematic reviews;
- 14 rapid reviews;

- three guidelines developed using some type of evidence synthesis and/or expert opinion; and
- 11 single studies that provide additional insight.

We outline in narrative form below our key findings related to COVID-19 vaccine roll-out from highly relevant evidence documents and based on experiences from other countries and from Canadian provinces and territories. We provide hyperlinks to the highly relevant evidence documents in Table 1 and the type and number of all documents that were identified in Table 2. In addition, we provide an overview of key insights from other countries and from Canadian provinces and territories in Table 3.

For those who want to know more about our approach, we provide a detailed summary of our methods in Appendix 1. In addition, we provide the full list of included evidence documents in Appendix 2 (including their relevance to the categories in the organizing framework, key findings and when they were conducted or published), detailed summaries of COVID-19 vaccine roll-out plans from other countries in Appendix 3, and from Canadian provinces and territories in Appendix 4. We also provide abstracts for highly relevant documents in Appendix 5 and documents excluded at the final stages of reviewing in Appendix 6. These appendices are provided in a [separate document](#).

Key findings from highly relevant evidence documents

We provide below a brief overview of the key insights from the 53 evidence documents that we deemed to be of high relevance according to the five domains of the framework.

Securing and distributing a reliable supply of vaccines and ancillary supplies

We found three guidelines (two from WHO and one from the U.S. Centers for Disease Control and Prevention (CDC)) that were developed using a robust process and two single studies, which provided insights related to national purchasing of vaccines and ancillary supplies. The first WHO guideline focuses on [the Vaccine Introduction Readiness Assessment Tool, which is intended to be used by ministries of health as a roadmap for countries to plan for COVID-19 vaccine introduction](#). The second WHO guideline provides guidance on [helping countries develop their national COVID-19 vaccine deployment and plans in many aspects](#). The U.S. CDC guideline also describes [several considerations related to securing and distributing a reliable supply of vaccines](#). One single study reveals that [international institutions, governments and vaccine manufacturers need to plan for sufficient vaccine production and negotiate affordable prices for low- and middle-income countries](#). Another single study calls for [equitable sharing globally by indicating that high-income countries have secured more than half of the vaccine doses](#).

In relation to delivery of vaccines at a country level, we found one single study calling for [strengthening national and international vaccine-supply chains to ensure the efficient distribution and administration for remote communities, and to avoid vaccine wastage](#).

We found three guidelines (one from WHO, one from European Centre for Disease Prevention and Control (European CDC), and one from the Health Information and Quality Authority) that were developed using a robust process, which provided insights related to vaccine distribution within country and to administration sites. The WHO guideline provides [a five-step decision-making framework for implementing mass-vaccination campaigns for the prevention of vaccine-preventable diseases and high-impact diseases](#). The European CDC reports that the [COVID-19 vaccine will be](#)

[provided free of charge in most countries](#). The Health Information and Quality Authority guideline from Ireland stresses [how vaccination-site location \(and no or low vaccination costs\) can contribute to equitable access](#).

Allocating vaccines and ancillary supplies equitably

We found several international and national guidelines proposing guiding principles to allocate COVID-19 vaccines between different populations in a context of limited supply. For example, the U.S. guideline provides a recommended [approach for national, state, tribal, local and territorial levels that is guided by four ethical principles \(maximize benefits and minimize harms; promote justice; mitigate health inequities; and promote transparency\) which should be accompanied by additional considerations based on science \(e.g., safety and efficacy\) and feasibility of implementation \(e.g., storage and handling\)](#). While there are some variations, the top priority groups for COVID-19 vaccines commonly include front-line healthcare workers, older adults, and individuals with select comorbidities.

A medium-quality rapid review emphasized that [COVID-19 vaccines must be administered in accordance with the priority groups that have been established to uphold the ethical integrity of the process](#). However, the prioritization could still be criticized as one single study from the U.K. revealed that [32.6% of respondents were concerned that the government's priority list made no reference to Black, Asian and minority ethnic groups](#).

Other guidelines are proposing principles to guide the allocation of COVID-19 vaccines both at the population level, but also across world regions. For instance, the guidance document from the WHO proposed [a values framework for COVID-19 vaccine allocation and prioritization, which consists of six core principles: 1\) human well-being; 2\) equal respect; 3\) global equity; 4\) national equity; 5\) reciprocity; and 6\) legitimacy](#). Two single studies provided additional insights about the disparities in the availability and distribution of COVID-19 vaccines due to limited vaccine production, supply capacity, and market forces in [developing countries](#) and [low- and middle-income countries](#).

Communicating vaccine-allocation plans and the safety and effectiveness of vaccines

We found four guidelines, one medium-quality systematic review, one low-quality rapid review, and seven single studies that can provide insights about the target of communication interventions. Some guidelines focus on strategies to drive demand, acceptance and/or uptake of vaccines. For instance, a WHO guideline provides [behavioural insights related to drivers of vaccine acceptance and uptake with a focus on the drivers of vaccine uptake including: 1\) an enabling environment; 2\) social influences; and 3\) motivation](#).

Some of the evidence focused on communication interventions targeting the general public or community opinion leaders to [ensure evidence-based information is being relayed to the general public](#). It was also emphasized that communication interventions should be [tailored to mitigate inequalities, particularly to Black, Asian and minority ethnic groups who have higher rates of infection, morbidity and mortality](#), as well as [unvaccinated or under-vaccinated populations](#).

Evidence was also found about the importance of targeting [healthcare professionals \(who should be educated about the vaccine prior to the initiation of any vaccination program\)](#) and ensuring that

[healthcare workers have the opportunity, skills and information to effectively communicate with patients and support vaccine-related decisions.](#)

We found four systematic reviews (of which one was of high quality and three were medium quality), two rapid reviews (both of which are medium quality), and five single studies that provide insights about the delivery of communication interventions. The key insights from these documents were consistent and, as noted in one of the documents (a medium-quality rapid review), communication of [reliable, frequent, and tailored information about vaccines should be shared with community members through multiple platforms, including social media, traditional media, and providers, and providers must be educated about vaccines and provided with appropriate training to increase provider vaccine recommendations to patients.](#) However, it is important to note that a high-quality systematic review found that [interventions involving risk messages were found to have no effect on the intention of participants to vaccinate, their behaviour towards vaccines, and their perception of the severity of the disease.](#)

We found one guideline developed using a robust process, three rapid reviews (all medium quality), two other types of guidelines, and three single studies about the content of messages delivered during communications about the vaccine. The robust guideline emphasized that eligible groups who [understand why vaccination is particularly important for them are more likely to be vaccinated, and that professionals should address any misconceptions about it.](#) A medium-quality rapid review shows that [vaccine hesitancy is universal across countries and is typically manifested in the preference to wait to be vaccinated or to reject vaccination altogether,](#) and the most cited reasons for vaccine hesitancy or refusal included fear of side effects, safety, and effectiveness, as well as the expedited development of the COVID-19 vaccines, perceived political interference, and misinformation. Therefore, it is [recommended that confidence in the COVID-19 vaccines can be improved by emphasizing transparency and compliance with scientific standards throughout the vaccine development and approval processes,](#) and that communication strategies use positive cues to vaccinate through engagement with loved ones and family members, and trusted figures like doctors and religious leaders.

Administering vaccines in ways that optimize timely uptake

We found one guideline from the European CDC that was developed using a robust process, two rapid reviews (both low quality) and one guideline developed using some type of evidence synthesis and/or expert opinion, which provided insights related to explicit efforts to leverage existing health-system arrangements to administer vaccines. The European CDC guideline recommends [using pre-existing vaccination structures and delivery services in the models for the roll-out of COVID-19 vaccines.](#) One of the low-quality rapid reviews noted that [leveraging community-based teaching methods and community partnerships for greater vaccination uptake by hard-to-reach populations,](#) and the other low-quality rapid review provided a framework for [operationalizing programs to increase vaccine coverage, including increasing vaccinators capacity and training, and synergistically re-integrating immunization services.](#) Another guideline (from the Johns Hopkins Center for Health Security and Texas State University Department of Anthropology) recommends [enhancing vaccination by home visits, preparing educational materials, training vaccinators, and fostering partnerships with government, health departments, and the media.](#)

In relation to locations for administering vaccines, we found three full systematic reviews (of which two are of medium quality and one low quality), one low-quality rapid review and one single study. One medium-quality full systematic review found that [school and childcare centre-located vaccination programs were beneficial for vaccination rates and outcomes,](#) and a low-quality full

systematic review revealed [the benefits of vaccination requirements for childcare, school, and college attendance](#). The other medium-quality full systematic review found that [using an immunization information system was effective for increasing vaccination rates](#). The low-quality rapid review found [three models for vaccination delivery in non-healthcare settings: social-distancing clinics, drive-through vaccination clinics, and mini-mobile teams](#). One single study indicated [a heavy-lift UAV quadcopter can expand COVID-19 vaccine delivery to Indigenous people living in villages impeded by rugged terrain](#).

We found one medium-quality full systematic review, one low-quality rapid review and one guideline developed using some type of evidence synthesis and/or expert opinion, which provided insights related to providers administering vaccines. The medium-quality full systematic review found that [allowing pharmacists to administer influenza vaccinations had small positive effects on vaccination rates, which was increased with greater autonomy](#). The low-quality rapid review discussed [the recruitment of individuals with or without medical backgrounds and training approaches](#). The guideline from Public Health England recommends [changes to the Human Medicines Regulations to permit non-registered healthcare professionals to administer the COVID-19 vaccine with assigned training](#).

In relation to the partnerships to reach early populations of focus, we found two low-quality rapid reviews. One discussed [setting up familiar and accessible vaccination sites, community-based teaching methods and community partnerships for hard-to-reach populations](#). The other rapid review also focused on [efforts through culturally specific education campaigns and engagement of stakeholders and community partners](#).

In relation to safety monitoring requirements, we found one low-quality rapid review proposing several considerations for safety monitoring, including [establishing a separate waiting area for post-vaccination monitoring, training staff, educating patients, administering to patients with a known history of adverse reactions, monitoring patient flow and clinic layout](#).

In relation to other aspects of vaccine administration, we found one medium-quality full systematic review discussing [the education of clinicians and parents to reduce vaccination pain, fear and distress](#), and one guideline (from the U.S. CDC) developed using some type of evidence synthesis and/or expert opinion stating that [adults should complete their second vaccination with the same vaccine product as the first dose](#).

Surveillance, monitoring and evaluation, and reporting

In relation to documenting vaccine status, we found one WHO guideline that was developed using a robust process, which focuses on [the Vaccine Introduction Readiness Assessment Tool, which includes a framework and a set of recommended indicators for countries to self-monitor their readiness progress for COVID-19 vaccines](#).

We found one WHO guideline that was developed using a robust process, one low-quality rapid review (not yet publicly available) and one single study, which provided insights related to identifying sources of vaccine hesitancy. The WHO guideline focuses again on [the Vaccine Introduction Readiness Assessment Tool \[this time\] as part of establishing data-collection systems for social-media listening and rumour management, and assessing behavioural and social data](#). The low-quality rapid review identified a series of associated factors that can influence the willingness to receive a COVID-19 vaccine. In addition, a single study found that [previous vaccine history could be an](#)

[indicator to best predict COVID-19 vaccine acceptance.](#)

In relation to infrastructure for vaccine surveillance, monitoring and evaluation, we found one guideline from the European CDC that was developed using a robust process, which recommends [using electronic immunization registries to help monitor vaccine safety, efficacy, coverage and acceptance.](#)

Key findings from the jurisdictional scan

We examined experiences with the roll-out of the COVID-19 vaccine in eight comparator countries (Australia, China, France, Germany, Israel, New Zealand, the U.K., and the U.S.), as well as all provinces and territories in Canada. Key insights from these countries and provinces and territories are presented below.

For securing and distributing a reliable supply of vaccines and ancillary supplies, we found that:

- all countries examined have finalized advance purchasing agreements with vaccine developers to secure doses as they become available (in many occasions with multiple companies that have developed or are currently developing COVID-19 vaccines);
- some countries (like Germany, the U.K. and the U.S.) have re-purposed existing capacity and invested in new vaccine manufacturing capacity to help expedite the production of vaccines; and
- all countries have developed strategies and systems for managing distribution of vaccines as they become available, including for cold-chain requirements.

In terms of allocating vaccines and ancillary supplies equitably, we found that:

- aside from minor differences in policies, most countries prioritize healthcare workers and long-term care residents, along with some other at-risk populations (e.g., older adults, individuals with chronic conditions, at-risk adults in Indigenous communities), and in some cases others such as immunocompromised individuals and select caregivers; and
- some countries (China and New Zealand) have prioritized border workers to contain infections.

For communicating vaccine-allocation plans and the safety and effectiveness of vaccines, we found that:

- countries are using several modalities for communicating vaccine-allocation plans, including government websites, online FAQs and other online tools, social media and SMS messages on mobile devices, press releases, radio, public Q&A sessions with experts, and engaging the public and stakeholders through local partnerships; and
- countries have used strategies (or are recommending the use of strategies) to tailor information for culturally and linguistically diverse groups and at-risk populations.

In terms of administering vaccines in ways that optimize timely uptake, we found that:

- most countries are currently (or planning to) leverage existing health-system arrangements to administer COVID-19 vaccines in settings such as hospitals, general-practice clinics, pharmacies and vaccination centres;
- for large-scale vaccinations, some countries are using venues in the community such as football stadiums, or pop-up/on-site vaccination clinics, and/or mobile clinics (particularly for rural and remote areas); and
- to increase capacity for administering COVID-19 vaccines, some Canadian provinces have developed online training to expand the scope of practice for some healthcare professionals.

In terms of surveillance, monitoring and evaluation, and reporting, we found that:

- several countries are utilizing national immunization registers and electronic health records to enable surveillance, monitoring and evaluation of COVID-19 vaccinations;
- several countries have developed new or additional systems or indicators specific for COVID-19 to monitor vaccine roll-out program implementation; and
- some countries will monitor adverse reactions through pre-existing mechanisms.

Table 1: Key findings from highly relevant documents related to one or more COVID-19 vaccine roll-out elements

COVID-19 vaccine roll-out activities	COVID-19 evidence
Securing and distributing a reliable supply of vaccines and ancillary supplies (e.g., needles, diluents)	
National purchasing	<i>Guidelines developed using a robust process (e.g., GRADE)</i> - A guideline from the Advisory Committee on Immunization Practices (ACIP) through the U.S. Centers for Disease Control and Prevention describes several considerations related to securing and distributing a reliable supply of vaccines in its description of rationale and recommendations on the use of Moderna COVID-19 vaccine for U.S. adults aged 18 years or older for the prevention of COVID-19 (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention; last update 20 December 2020) - A guideline from the World Health Organization (WHO) provides guidance on developing COVID-19 national deployment and vaccination plans, touches on many components of the organizing framework for this living evidence profile, and includes (note that this guideline is listed here, but not again for the many categories that it covers in the rest of the table): - regulatory preparedness - planning and coordination - costing and funding - identification of target populations - vaccine-delivery strategies - preparation of supply chain and management of healthcare waste - human-resource management and training - vaccine acceptance and uptake (demand) - vaccine-safety monitoring, management of adverse effects following immunization (AEFI) and injection safety - immunization monitoring systems - COVID-19 surveillance - evaluation of COVID-19 vaccine (World Health Organization; last update 16 November 2020) The Vaccine Introduction Readiness Assessment Tool (VIRAT) is intended to be used by ministries of health as a roadmap for countries to plan for COVID-19 vaccine introduction (WHO technical guidance; last update 21 September 2020) <i>Single studies in areas where no reviews were identified</i> To vaccinate the 60-80% of the world's population required for herd immunity of COVID-19, international institutions, governments and vaccine manufacturers need to plan for sufficient vaccine production and allocation, and negotiate vaccine prices that will be affordable for low- and middle-income countries (published 15 December 2020)

	• An analysis of the pre-market purchases of COVID-19 vaccines from manufacturers indicates that high-income countries have secured more than half of the vaccine doses, and calls for sharing of COVID-19 vaccines globally in a more equitable way (published 15 December 2020)
• Delivery to country	<i>Single studies in areas where no reviews were identified</i> • Given the potential complexity of delivering COVID-19 vaccines to remote communities in both developed and developing countries, national and international vaccine supply chains should be strengthened in order to ensure that vaccines are distributed and administered efficiently to remote and rural populations, and to avoid vaccine wastage (published 15 December 2020)
• Inventory management within country	No highly relevant evidence documents identified
• Ordering within country	No highly relevant evidence documents identified
• Distribution within country and to administration sites (including whether direct from centralized distributor to administering location and whether redistribution is allowed)	<i>Guidelines developed using a robust process (e.g., GRADE)</i> • Within the interim recommendations of European countries, the COVID-19 vaccine will be free of charge (European Centre for Disease Prevention and Control; published 2 December 2020) • A guideline from Ireland stressed the importance of ensuring equitable access to the vaccine by varying populations by taking into account the location of immunization centres, and vaccination costs as a means of improving uptake (Health Informant and Quality Authority; published 16 December 2020) • WHO technical guidance provides a decision-making framework for implementing mass-vaccination campaigns for the prevention of vaccine-preventable diseases and high-impact diseases (VPD/HID), which includes five steps: 1) assessing the potential impact of the VPD/HID outbreak using key epidemiological criteria; 2) assessing the potential benefits of a mass-vaccination campaign and the country capacity to implement it safely and effectively; 3) considering the potential risk of increased COVID-19 transmission associated with the mass-vaccination campaign; 4) determining the most appropriate actions considering the COVID-19 epidemiological situation; and 5) if a decision is made to proceed with a mass-vaccination campaign, implementing best practice (WHO technical guidance; last update 22 May 2020)
• Storage and handling within country (e.g., cold-chain requirements and related supplies such as liquid nitrogen)	No highly relevant evidence documents identified
Allocating vaccines and ancillary supplies equitably	
• Approaches to developing and adjusting allocation rules (e.g., citizen- and stakeholder-engagement processes)	<i>Guidelines developed using a robust process (e.g., GRADE)</i> • A U.S. guideline provides a recommended approach for national, state, tribal, local and territorial levels which is guided by four ethical principles (maximize benefits and minimize harms; promote justice; mitigate health inequities; and promote transparency) which should be accompanied by additional considerations based on science (e.g., safety and efficacy) and feasibility of implementation (e.g., storage and handling) (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention; last update November 2020)
• Allocation rules (to priority populations, including those listed	<i>Guidelines developed using a robust process (e.g., GRADE)</i>

below, as well as to 'lower levels' in a federation and/or to providers who can reach priority populations) ○ Front-line healthcare workers ○ Residents in long-term care homes and other congregate-care settings ○ People at increased risk of severe COVID-19 (e.g., older and/or frail adults, those with chronic health conditions) ○ Essential workers (beyond front-line healthcare workers) and/or those in work environments that put them at elevated risk (e.g., food processing and transit) ○ Children (school aged) ○ Migrant workers ○ People in social environments that put them at elevated risk for COVID-19 (e.g., Black, Indigenous and other people of colour; those with low socio-economic status and/or living in crowded and poorly ventilated housing; and those living in communities with outbreaks) ○ People who have already had confirmed COVID-19 ○ Mass public ○ People for whom vaccine safety and effectiveness has not yet been established (e.g., children under the age of 12 or 15, women who are pregnant or breastfeeding, immunocompromised, those with autoimmune conditions, those experiencing long episodes of COVID-19)	● The order of priority of COVID-19 vaccinations in the a guideline from the Department of Health and Social Care in the U.K. are as follows: ○ Residents in a care home for older adults and their carers ○ All those 80 years of age and over and frontline health and social care workers ○ All those 75 years of age or over ○ All those 70 years of age and over and clinically extremely vulnerable individuals ○ All those 65 years of age and over ○ All individuals aged 16 years to 64 years with underlying health conditions which put them at higher risk of serious disease and mortality ○ All those 60 years of age and over ○ All those 55 years of age and over ○ All those 50 years of age and over (Department of Health & Social Care, Government of UK; published 6 January 2021) ● Within the interim recommendations of European countries, the top priority group for COVID-19 vaccines included older adults, healthcare workers, and individuals with select comorbidities (European Centre for Disease Prevention and Control; Published 2 December 2020) ● A Norwegian guideline recommends a dynamic approach to vaccine prioritization based on four possible scenarios for the COVID-19 pandemic and recommends that risk groups and healthcare workers be given priority in pandemic scenarios ranging from “control”, “control with clusters” to “partial control”, but where there is widespread transmission the order of priority should be amended in the order of healthcare workers, risk groups and critical societal functions (Norwegian Institute of Public Health; published 15 November 2020) ● A guideline from the WHO provides guidance on prioritizing limited supply of COVID-19 vaccines, including staging priority groups in relation to group size and supply, gender considerations, addressing pregnant women, lactating women and children, and considering comorbidities in vaccine prioritization (World Health Organization; last update 13 November 2020) ● A U.S. guideline outlines a phased approach to vaccine allocation: ○ Phase 1a – High-risk health workers ○ Phase 1b – People of all ages with comorbid and underlying conditions that put them at significantly higher risk, and older adults living in congregate or overcrowded settings ○ Phase 2 – K-12 teachers, school-staff childcare workers, critical workers in high-risk settings, people of all ages with comorbid and underlying conditions that put them at moderately higher risk, people in homeless shelters or group homes, and all older adults not included in phase 1 ○ Phase 3- young adults, children, workers in key industries at increased risk not included in phases 1 and 2 ○ Phase 4 – Everyone not included in previous phases Source (National Academies of Sciences, Engineering and Medicine; last update October 2020)
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○ People at significant risk for severe allergic reaction	• A guidance document from the WHO provides a values framework for COVID-19 vaccine allocation and prioritization, which consists of six core principles: 1) human well-being; 2) equal respect; 3) global equity; 4) national equity; 5) reciprocity; and 6) legitimacy (World Health Organization; last update 13 September 2020) • The WHO Secretariat's proposal for the allocation of COVID-19 vaccines among countries, in the context of the COVID-19 Vaccines Global Access (COVAX) Facility access mechanism, includes: 1) an initial proportional allocation of doses to countries until all countries have enough doses to cover 20% of their population; and 2) a follow-up phase to expand coverage to other populations; if severe supply constraints persist, a weighted allocation approach would be adopted, taking account of a country's COVID threat and vulnerability (WHO technical guidance; last update 9 September 2020) <i>Guidance developed using some type of evidence synthesis and/or expert opinion</i> • The equitable allocation of vaccines where there is limited supply needs to take into account who is most at risk of exposure and severe outcomes, feasibility and acceptability of the vaccine and ethical considerations, and should also ensure flexibility in vaccine-delivery methods (The Chief Public Health Officer of Canada, Government of Canada; published October 2020) <i>Single studies that provide additional insight</i> • This study aimed to evaluate the optimal allocation of COVID-19 vaccines in the U.S. based on age and occupational status (i.e., essential worker or non-essential worker) and the optimal allocation of COVID-19 vaccines was reported to prioritize the treatment of older-aged essential workers; the study also showed that younger essential workers should be prioritized when trying to control the spread of the disease, while prioritization should be given to seniors when trying to control mortality (published 6 October 2020) • Using a vaccine-allocation strategy that prioritizes maintaining core societal functions, protecting vulnerable people, and controlling community transmission, a recommended approach prioritizes front-line workers followed by adults with underlying conditions and in high-risk settings, before the general adult population (published 15 December 2020) • A study of 9,122 respondents from the U.K. revealed that 22.7% disagreed with the government's prioritization for COVID-19 vaccination and 70.3% were against allowing payment for expedited vaccination (Pre-print – last edited 8 December 2020)
• Ensuring equity (including whether and how access through private means can be achieved by those not initially prioritized)	<i>Guidelines developed using a robust process (e.g., GRADE)</i> • A U.S. guideline cited above provides a recommended approach for national, state, tribal, local and territorial levels which is guided by four ethical principles (maximize benefits and minimize harms; promote justice; mitigate health inequities; and promote transparency) (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention; last update November 2020) <i>Rapid reviews</i> • To uphold ethical integrity, COVID-19 vaccines must be administered in accordance with the priority groups that have been established (date of literature search not reported - published 27 August 2020; AMSTAR rating 4/9)

	<i>Single studies that provide additional insight</i> • Disparities in the availability and distribution of COVID-19 vaccine within and between world regions caused by limited vaccine production, supply capacity and market forces requires a global effort to plan for equitable allocation of affordable vaccines to developing countries (published 15 December 2020) • Transparency about purchasing contracts between vaccine manufacturers and pooled procurement of COVID-19 vaccines for low- and middle-income countries are needed to ensure equitable access to vaccines that are affordable for populations around the world (published 15 December 2020) • A study of 9,122 respondents from the U.K. indicated that 32.6% of respondents were concerned that the government's priority list made no reference to Black, Asian and Minority Ethnic (BAME) groups (Pre-print – last edited 8 December 2020)
Communicating vaccine-allocation plans and the safety and effectiveness of vaccines	
• Target of intervention ○ General public ○ High-risk groups (see above list) ○ Individuals who are hesitant about or opposed to vaccination	<i>Guidelines developed using a robust process (e.g., GRADE)</i> • Immunization advice and communication programs should be tailored to mitigate inequalities. Specifically, programs should be tailored to Black, Asian and minority ethnic groups who have higher rates of infection, morbidity and mortality (Department of Health & Social Care, Government of UK; published 6 January 2021) • A guideline from Ireland indicated that healthcare professionals (who should be educated on the vaccine prior to the initiation of any vaccination program) and community opinion leaders should be educated on the COVID-19 vaccine to ensure evidence-based information is being relayed to the general public (Health Informant and Quality Authority; published 16 December 2020) • A WHO guideline provides behavioural insights related to drivers of vaccine acceptance and uptake with a focus on the drivers of vaccine uptake including: 1) an enabling environment, 2) social influences and 3) motivation (World Health Organization; last update 15 October 2020) • A WHO guideline emphasized the need to design a demand plan (including advocacy, communications, social mobilization, risk and safety communications, community engagement, and training) to generate confidence, acceptance and demand for COVID-19 vaccine, alongside crisis-communications preparedness planning (World Health Organization; last update 21 September 2020), which is reiterated in another WHO guideline <i>Full systematic reviews</i> • Interventions that resulted in the largest increases in vaccine uptake were those which directly targeted unvaccinated or under-vaccinated populations, and that targeted specific populations (e.g., healthcare workers) (literature last searched 2013; AMSTAR rating 7/10) <i>Rapid review</i> • Healthcare workers need the opportunity, skills and information to effectively communicate with older adults, consider the possible tension between wanting to increase vaccine uptake and wanting to support individual decisions, based on findings from a forthcoming Cochrane Review, and questions and prompts

	to support people planning communication strategies are provided (date of last search or publication not stated - listed as forthcoming; AMSTAR rating 1/9) <i>Single studies that provide additional insight</i> • The survey found that an estimated 68% of participants would be open to receiving a COVID-19 vaccine, and longer vaccine-testing periods, increased efficacy and vaccines that would be developed in the U.S. were found to be significantly associated with increased COVID-19 vaccine acceptance (published 3 October 2020) • A survey randomly assigned 7,064 respondents in the United States to read pro-vaccine communication materials with information emphasizing personal-health risks, economic costs or collective public-health consequences of not vaccinating, that had the message source (ordinary people or medical experts) also randomly assigned (last updated 8 September 2020, pre-print) • A survey of 311 older adults and 216 chronic respiratory patients in the U.K. showed 86% are willing to receive a future vaccine for COVID-19, and the willingness to receive a COVID-19 vaccination was positively associated with the belief that COVID-19 will persist over time and negatively associated with the perception that the media has over-exaggerated the risks of catching the virus (published 5 September 2020) • Exposure to pro- and anti-vaccination messaging significantly influences Americans' intentions to take the COVID-19 vaccine based on a study of the casual effect of distinct message framing that included information about vaccine safety and efficacy, and opinions of others who are vaccine hesitant (pre-print, last edited 6 January 2021) • A study of 9,122 respondents in the U.K. indicated that age and female gender were, respectively, strongly positively and negatively associated with wanting a COVID-19 vaccine; these results identify factors that can inform critical public-health messaging (pre-print, last edited 8 December 2020) • The study examined how timing and elite endorsement affect public opinion about COVID-19 vaccines in the United States and demonstrated that public opinion toward COVID-19 vaccinations may be responsive to political motivation and support (pre-pint, last edited 28 October 2020) • A global survey (13,426 people in 19 countries) showed the differences in COVID-19 vaccine-acceptance rates ranged from almost 90% (in China) to less than 55% (in Russia) (published 20 October 2020)
• Delivery of the intervention ○ By whom (e.g., health worker, research expert, teacher, business leader, government leader, community leader, citizen champion, media) ○ Frequency (e.g., daily, weekly) ○ Duration (i.e., how much or for how long)	<i>Full systematic reviews</i> • Interventions involving risk messages were found to have no effect on the intention of participants to vaccinate, their behaviour towards vaccines, and their perception of the severity of the disease (literature last searched September 2017; AMSTAR rating 8/11) • Vaccine uptake and coverage has been found to be improved through interventions that apply new media (e.g., computer-generated text messaging, internet promotions, and computerized standing orders) and reminders for healthcare providers, but there is uncertainty about the effects of social-media networks, email communications and smartphone applications (published January 2015; AMSTAR rating 7/10)

○ Modality of delivery (e.g., social media, text, email, telephone, radio, television, face-to-face by video, face-to-face in person)	• Interventions to increase vaccine uptake that have multiple components and/or have a focus on dialogue-based approaches tend to be more effective, and interventions that resulted in the greatest increases in knowledge and awareness were education initiatives (especially where new knowledge was embedded into routine processes), those that improved convenience and access to vaccination, aimed to increase vaccination knowledge and awareness, mandated vaccinations, and engaged religious or other influential leaders (literature last searched 2013; AMSTAR rating 7/10) • Combinations of interventions should be used in efforts to increase vaccination rates in targeted populations (Literature last searched February 2012; AMSTAR rating 6/9) <i>Rapid reviews</i> • Evidence on the effectiveness of digital interventions to promote vaccine uptake is mixed and fragmented, but mobile reminders may encourage people to vaccinate; online prompts from health providers make little or no difference to adolescent vaccine uptake, and the effects of vaccination reminders via online patient portal systems or of educational videos for parents are uncertain (date of literature search not stated - published October 2020; AMSTAR rating 4/9) • Reliable, frequent and tailored information about vaccines must be shared with community members through multiple platforms, including social media, traditional media and providers, and providers must be educated about vaccines and provided with appropriate training to increase provider vaccine recommendations to patients (date of literature search not reported - published 27 August 2020; AMSTAR rating 4/9) <i>Single studies that provide additional insight</i> • Targeted messages that promote COVID-19 vaccination and that alleviate concerns of individuals who are hesitant to receive vaccines should be disseminated, and a sufficient amount of time should be dedicated to these efforts prior to COVID-19 vaccine release to ensure maximum vaccine uptake (published 3 October 2020) • A survey randomly assigned 7,064 respondents in the United States to read pro-vaccine communication materials with information emphasizing personal-health risks, economic costs or collective public-health consequences of not vaccinating that had the message source (ordinary people or medical experts) also randomly assigned (last updated 8 September 2020, pre-print) • The willingness to receive a COVID-19 vaccination was negatively associated with the perception that the media has over-exaggerated the risks of catching the virus (published 5 September 2020) • A positive statement by President Donald Trump and Dr. Anthony Fauci had significant positive effects on public reactions towards COVID-19 vaccines, and the effect was found to be four times larger amongst Democrats than Republicans; if President Trump endorsed the COVID-19 vaccine, confidence was raised about as much as Dr. Fauci's statement amongst Republicans, but confidence among Democrats was lowered (pre-print, last edited 28 October 2020)
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	• A global survey (13,426 people in 19 countries) showed respondents reporting higher levels of trust in information from government sources were more likely to accept a vaccine and take their employer's vaccine advice (published 20 October 2020)
• Content of messaging ○ Data and evidence about safety and about effectiveness in terms of both protection against COVID-19 (including duration of protection) and protection against transmission (and other factors that may contribute to vaccine acceptance and hesitancy) ○ Information about novel vaccine platforms (e.g., mRNA), current vaccine options (e.g., number of vaccines available in a country, number of doses required of any given vaccine), prioritized populations, and behaviours after vaccination ○ Information (for health workers) about vaccine-administration protocols ○ Myths and misinformation about vaccines ○ Risk-mitigation efforts (including complementary public-health measures used at time of vaccination) ○ Anticipated timing of when all those who want a vaccine will have been vaccinated	• <i>Guidelines developed using a robust process (e.g., GRADE)</i> • People in eligible groups who understand why vaccination is particularly important for them are more likely to be vaccinated, and therefore professionals need to explain the benefits of vaccination and address any misconceptions about it, which needs to be combined with a multi-component approach to develop and deliver programs to increase uptake (National Institute for Health and Care Excellence; last update 22 August 2018) • <i>Rapid reviews</i> • An analysis of over 100 surveys show that vaccine hesitancy is universal across countries and is typically manifested in the preference to wait to be vaccinated or to reject vaccination altogether, and the most cited reasons for vaccine hesitancy or refusal included fear of side effects, safety and effectiveness, as well as the expedited development of the COVID-19 vaccines, perceived political interference, and misinformation ○ Based on this, it is recommended that confidence in the COVID-19 vaccines can be improved by emphasizing transparency and compliance with scientific standards throughout the vaccine-development and approval processes, and that communication strategies could use positive cues to vaccinate through engagement with loved ones and family members, and trusted figures like doctors and religious leaders (last search 20 October 2020; AMSTAR rating 7/9) • Communication strategies with the public about vaccines should aim to: identify concerns and misconceptions about the vaccine; provide information that is perceived to be trustworthy; make information about how the vaccine was developed, what it contains, its effects and safety, and the background for its recommendation easily accessible; provide transparent, timely, consistent, accessible and easily understandable information, including to hard-to-reach groups; and include practical information about where to get the vaccine and what the procedure is (date of literature search not stated - published October 2020; AMSTAR rating 4/9) • To maintain public support among non-priority groups, it is critical that key stakeholders effectively communicate all evidence-informed decisions clearly (date of literature search not reported - published 27 August 2020; AMSTAR rating 4/9) • <i>Guidance developed using some type of evidence synthesis and/or expert opinion</i> • The recommendations from the <i>Working Group on Readyng Populations for COVID-19 Vaccine</i> emphasized the need to inform public expectations about COVID-19 vaccination benefits, risks and supply (forecast range of scenarios, temper expectations, provide transparency of vaccine safety systems, seek input from marginalized populations), and communicate in meaningful ways (public well-being at the centre of communication, reject political tensions, conduct qualitative studies to understand local and community needs and concerns, conduct surveys on attitudes and beliefs across subgroups, engage network of trusted champions and spokespersons to deliver a unified message) (Johns Hopkins Center for Health Security and Texas State University Department of Anthropology; published 20 October 2020)

	• Efforts to maintain trust in government throughout the pandemic are key to ensuring vaccine uptake, as well as proper communication to counter misinformation and disinformation related to vaccines, through the development of tailored messages for specific contexts and groups, working with community leaders, media-literacy experts, community organizations and other key influencers (The Chief Public Health Officer of Canada, Government of Canada; published October 2020) <i>Single studies that provide additional insight</i> • Interventions that relay information regarding the safety of vaccines should help to improve COVID-19 vaccine acceptance (published 3 October 2020) • A survey found that messages that emphasize personal-health risks and collective health consequences of not vaccinating were found to significantly increase intentions to vaccinate, and the effects were similar regardless of the message source and efforts to pre-emptively debunk concerns about safety of expedited clinical trials; economic cost frames were found to have no discernible effect on vaccine intentions (last updated 8 September 2020, pre-print) • Perceived facilitators to the COVID-19 vaccination uptake included perceptions of risk to personal health, severity of COVID-19, and health consequences to others from COVID-19; concerns about vaccine safety acted as a barrier to COVID-19-vaccination uptake; and the content of mass-media interventions to improve vaccine uptake should focus on the behaviour-change techniques (BCTs) of information about health, emotional, social and environmental consequences, and salience of consequences (published 5 September 2020)
Administering vaccines in ways that optimize timely uptake	
• With what explicit effort to leverage existing health-system arrangements (e.g., vaccination systems and primary-care practices/community health centres)	<i>Guidelines developed using a robust process (e.g., GRADE)</i> • Within the interim recommendations of European countries, models will use pre-existing vaccination structures and delivery services for the roll-out of COVID-19 vaccines (European Centre for Disease Prevention and Control; published 2 December 2020) <i>Rapid review</i> • One rapid review noted that community-based teaching methods and community partnerships may be leveraged to enable greater vaccination uptake by hard-to-reach populations (date of literature search not reported - published 27 August 2020; AMSTAR rating 3/9) • The Global Routine Immunization Strategic Plan (GRISP) provides a framework for operationalizing programs to increase vaccine coverage in countries where early COVID-19 mitigation measures have had an impact, and indicates that to maximize reach, services should be designed to reach all equitably, vaccinator capacity and training should be increased, and immunization services should be re-integrated as synergistically as possible (literature last searched June 2020; AMSTAR rating 3/9) <i>Guidance developed using some type of evidence synthesis and/or expert opinion</i> • The recommendations from the <i>Working Group on Readyng Populations for COVID-19 Vaccine</i> emphasized the need to make vaccination available in safe, familiar places (e.g., schools, pharmacies, places of worship, workplaces, grocery stores, health departments, senior centres and home visits; prepare educational

	materials and train individuals tasked with vaccination; develop hesitancy campaign plans; foster partnerships with government, health departments, media) (Johns Hopkins Center for Health Security and Texas State University Department of Anthropology; published 20 October 2020)
- Where - Community-based health settings (e.g., mobile clinics and pharmacies) - Other community settings (e.g., schools, workplaces, shelters, community centres, Indigenous community hubs, and unconventional spaces like drive-through lots and arenas or tents) - Primary-care settings (e.g., family doctor's offices, nursing stations, community health centres) - Acute care (e.g., hospitals) - Long-term care homes - Public-health offices/centres - Other (e.g., private clinics, prisons)	<i>Full systematic reviews</i> School and childcare centre-located vaccination programs are effective in increasing vaccination rates, and decreasing rates of vaccine-preventable morbidity and mortality (literature last searched February 2012; AMSTAR rating 6/9) There is strong evidence on the effectiveness of vaccination requirements for childcare, school, and college attendance in increasing vaccination rates and decreasing rates of vaccine-preventable disease and associated morbidity and mortality (literature last searched 2015; AMSTAR rating 3/10) Use of an immunization information system (IIS) was found to be an effective intervention to increase vaccination rates, and studies with benefit information focused on administrative efficiency of clinical vaccination activities, and savings resulting from decreased over-vaccination (literature last searched March 2012; AMSTAR rating 4/9) <i>Rapid reviews</i> - There are three models for vaccination delivery in non-healthcare settings: - Social-distancing clinics, which were found to be effective, although monitoring social distancing was challenging - Drive-through immunization clinics, which allow for greater social distancing, but with less efficiency and with greater risk of use of an improper vaccine-administration technique - Mini-mobile teams, which increase ability to monitor social distancing and decrease the risk of exposure, but have significant logistical challenges (date of literature search not reported - published 27 August 2020; AMSTAR rating 3/9) <i>Single studies that provide additional insight</i> A heavy lift UAV quadcopter can expand COVID-19 vaccine delivery to Indigenous people living in villages impeded by rugged terrain, and the travel time to a village normally accessible via walking a 2km trail that takes almost one hour took, an estimated 1.23-1.38 minutes, and 1.57-1.66 minutes, and an average of 3.13 minutes for drones with 100, 250 and 500 vial loads, respectively (last updated 12 January 2021, pre-print)
With what appointment/scheduling and screening support, changes to physical spaces and patient flows through these spaces, and changes to hours of operation	<i>Rapid reviews</i> A separate waiting area must be established to allow patients to be monitored post-vaccination for 15 minutes (date of literature search not reported - published 27 August 2020; AMSTAR rating 2/9)
With what post-vaccination observation period and what physical distancing, personal protective	No highly relevant evidence documents identified

equipment, sanitation and other public-health measures	
By whom (e.g., nurses, public-health workers) and with what changes to remuneration (e.g., increased vaccine-administration fee code)	<i>Full systematic reviews</i> Small positive effects on vaccination rates were found with allowing pharmacists to administer influenza vaccinations, and pharmacists with the most autonomy had the largest vaccination rate increases (literature last searched July 2019; AMSTAR rating 5/10) <i>Rapid reviews</i> Individuals with or without backgrounds in medicine can be recruited to deliver vaccination through several avenues, and, to support preparation, it was found that in-person immunization trainings and just-in-time trainings were not found to be more effective than distant or traditional training methods, respectively (date of literature search not reported - published 27 August 2020; AMSTAR rating 3/9) <i>Guidance developed using some type of evidence synthesis and/or expert opinion</i> To ensure that there is a sufficient workforce to deliver the vaccination program in England, changes to the Human Medicines Regulations now permit non-registered healthcare professionals to administer the COVID-19 vaccine, and all individuals administering COVID-19 vaccines are required to complete assigned training (Public Health England; last updated 11 January 2021)
With what partnerships to reach early populations of focus (e.g., BIPOC, Indigenous leaders)	<i>Rapid reviews</i> Hard-to-reach groups may be reached by vaccine-delivery programs by setting up vaccination sites in familiar and accessible population-specific spaces, and community-based teaching methods and community partnerships may be leveraged to enable greater vaccination uptake by hard-to-reach populations (date of literature search not reported - published 27 August 2020; AMSTAR rating 3/9) The Global Routine Immunization Strategic Plan (GRISP) provides a framework for operationalizing programs to increase vaccine coverage in countries where early COVID-19 mitigation measures have had an impact, and indicates that efforts should be made to engage communities and create demand for immunization through culturally specific education campaigns and engagement of stakeholders and community partners (literature last searched June 2020; AMSTAR rating 3/9)
With what broader, complementary health interventions (e.g., flu vaccination and routine immunization, ongoing public-health measures)	<i>Full systematic reviews</i> An evaluation of the effectiveness of process interventions (e.g., education for clinicians, parent presence, education of parents before and on day of vaccination, and education of patients on day of vaccination) on reducing vaccination pain, fear, and distress and increasing the use of interventions during vaccination found that: clinicians should be educated about vaccine-injection pain management; parents should be present; parents should be educated before the vaccination day; parents should be educated on the vaccination day; and individuals three years of age and above should be educated on the day-of-vaccination fear (date of literature search not reported – published in 2015; AMSTAR rating 6/10)
With what second-dose provisions (e.g., from same manufacturer and	<i>Guidelines developed using a robust process (e.g., GRADE)</i>

from same or later supply than original dose)	The ACIP states that adults should complete their second vaccination with the same vaccine product as the first dose (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention; last update 20 December 2020)
With what second-dose reminders	No highly relevant evidence documents identified
With what reporting requirements (e.g., vaccine supply, expiration dates, temperature excursion, and uptake) and supporting immunization information systems (e.g., vaccine registries and COVID-19 apps) and broader healthcare information systems (e.g., EHRs)	No highly relevant evidence documents identified
With what safety monitoring requirements (e.g., adverse events)	<i>Rapid reviews</i> Several considerations in relation to safety monitoring are important to consider: - A separate waiting area must be established to allow patients to be monitored post-vaccination for 15 minutes - Training staff to identify signs of adverse vaccine reactions, respond to adverse reactions, and enable quick access to emergency medical supplies are central to mitigating risks associated with vaccination - Ensuring patients are aware of how to get help in drive-through clinic models (i.e., through honking) and administering vaccines in-clinic for patients with a known history of adverse reactions are also critical to safety - For in-clinic vaccine administration, patient flow and clinic layout must be strictly monitored (date of literature search not reported - published 27 August; AMSTAR rating 2/9) - The same review indicated that training staff to identify signs of adverse vaccine reactions, respond to adverse reactions, and enable quick access to emergency medical supplies are central to mitigating risks associated with vaccination, and ensuring patients are aware of how to get help in drive-through clinic models (i.e., through honking) and administering vaccines in-clinic for patients with a known history of adverse reactions are also critical to safety (date of literature search not reported - published 27 August 2020;
With what injury-compensation program (for vaccine recipients) and liability immunity (for vaccine distributors, planners and administering staff)	No highly relevant evidence documents identified
Surveillance, monitoring and evaluation, and reporting	
Documenting vaccine-related opinions (e.g., vaccine acceptance and hesitancy)	No highly relevant evidence documents identified

Documenting vaccine status (e.g., for number of doses received and for use in cross-border travel and work-related migration)	<i>Guidelines developed using a robust process (e.g., GRADE)</i> The Vaccine Introduction Readiness Assessment Tool (VIRAT) offers a tool for countries to self-monitor their readiness progress against key milestones, and a set of recommended indicators (coverage, acceptability, disease surveillance) for a COVID-19 vaccine (WHO technical guidance; last update 21 September 2020)
Documenting adverse events and follow-up	No highly relevant evidence documents identified
Identifying sources of vaccine hesitancy	<i>Guidelines developed using a robust process (e.g., GRADE)</i> As part of establishing data-collection systems, the Vaccine Introduction Readiness Assessment Tool (VIRAT) identifies the need for social-media listening and rumour management, and assessing behavioural and social data (WHO technical guidance; last update 21 September 2020) <i>Rapid reviews</i> - Findings from 18 surveys on individuals' willingness to receive a COVID-19 vaccine indicated that the percentage of respondents inclined towards receiving a vaccine ranged from 58% in a U.S.-based sample to 93% in an Indonesian sample; greater perceived risk of COVID-19, characteristics such as being older, male, more educated and having higher income, and valuing healthcare providers' recommendations were positively associated with willingness to receive a COVID-19 vaccine; and willingness to receive a COVID-19 vaccine was negatively associated with being of Latino or Black racial/ethnic background, and concerns about vaccine safety (rapid review not yet publicly available; literature last searched December 2020; AMSTAR rating 3/9) <i>Single studies that provide additional insight</i> The indicator that can best predict COVID-19 vaccine acceptance was found to be previous vaccine history (published 3 October 2020)
Monitoring supply safety (e.g., expiration dates, temperature excursion)	No highly relevant evidence documents identified
Identifying and measuring performance indicators (particularly those adjusted from standard vaccine programs)	No highly relevant evidence documents identified
Infrastructure to enable surveillance, monitoring and evaluation (e.g., patient-held records, electronic health records or reporting systems, online vaccination registries, COVID-19 apps)	<i>Guidelines developed using a robust process (e.g., GRADE)</i> Within the interim recommendations of European countries, electronic immunization registries will be used to help monitor vaccine safety, efficacy, coverage, and acceptance (European Centre for Disease Prevention and Control; published 2 December 2020)

Table 2: Overview of type and number of documents related to one or more COVID-19 vaccine roll-out elements

Type of document	Total (n=122)*	Securing and distributing a reliable supply of vaccines and ancillary supplies (n=12)	Allocating vaccines and ancillary supplies equitably (n=34)	Communicating vaccine-allocation plans and the safety and effectiveness of vaccines (n=60)	Administering vaccines in ways that optimize timely uptake (n=45)	Surveillance, monitoring and evaluation, and reporting (n=22)
Guidelines developed using a robust process (e.g., GRADE)	46	7	15	10	7	7
Full systematic reviews	30	0	0	14	15	1
Rapid reviews	24	0	4	9	9	2
Guidelines developed using some type of evidence synthesis and/or expert opinion	19	2	6	4	4	3
Protocols for reviews that are underway	20	0	1	8	4	7
Titles/questions for reviews that are being planned	9	0	2	4	1	2
Single studies that provide additional insight	25	3	6	11	5	0

*Some documents were tagged in more than one category so the column total does not match the total number of documents.

Table 3: Key insights from COVID-19 vaccine roll-out elements in other countries and in Canadian provinces and territories

Domains of COVID-19 vaccine roll-out activities	Key insights from COVID-19 vaccine roll-out elements in other countries	Key insights from COVID-19 vaccine roll-out elements in Canadian provinces and territories
Securing and distributing a reliable supply of vaccines and ancillary supplies	• All countries finalized agreements with vaccine developers to secure doses as they become available • Germany, the U.K. and the U.S. have re-purposed existing capacity and invested in new vaccine manufacturing capacity to help expedite the production of vaccines • All countries assessed have developed strategies and systems for managing distribution of vaccines, including for cold-chain requirements • The number of doses secured through agreements range from 8.9 million in New Zealand to 900 million with the option to purchase another 300 million in the U.S. • Some countries (Australia and New Zealand) have not started administering doses of COVID-19 vaccines, while others, such as the U.K. and U.S. have administered approximately four million (as of 16 January 2021) and 12.28 million (as of 15 January 2021) respectively	• Canada established advance purchasing agreements with seven companies that have developed or are currently developing COVID-19 vaccines ◦ The doses secured are enough for all Canadians who wish to be vaccinated • The National Operations Centre within the Public Health Agency of Canada (PHAC) has established 14 vaccine-delivery sites across Canada and has developed vaccine storage and distribution capacity in the form of equipment, supplies and logistical coordination • Canada has received 765,100 vaccines as of 14 January 2021 • Except for Nunavut, where the vaccine strategy is still under development, provinces and territories across Canada have built strategies and capacity for distributing vaccine doses as they become available (e.g., storage equipment and preparing immunization clinics) • British Columbia (B.C.), Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador have all begun administering COVID-19 doses and have plans for continued shipments of additional doses • The number of total doses administered range from more than 152,000 in Ontario as of 12 January 2021 and more than 115,000 in Quebec as of 14 January 2021, to 4,226 doses administered in Prince Edward Island as of 12 January 2021

Allocating vaccines and ancillary supplies equitably	• China is prioritizing vaccine doses for cold-chain industry workers, border workers and those who plan to work or study in countries with medium or high risk of COVID-19 infection, and those who work in ship piloting, aviation, public transport, fresh markets and healthcare settings • New Zealand prepared three different scenarios based on level of transmission present within the country at the time of roll-out. Priority for vaccination includes border workers, front-line healthcare workers and their close contacts • All other countries prioritize healthcare workers and long-term care residents, along with some other at-risk populations in some cases such as immunocompromised individuals and select caregivers • Second and third priority populations across all countries include other essential worker groups judged to be at high risk of transmission as well as groups who are most at risk of developing severe COVID-19 (e.g., older adults, individuals with chronic conditions)	• Top priority for Canada's vaccination effort includes residents and staff of care facilities, front-line health care and personal-support workers, adults aged 70 years and older and at-risk adults in Indigenous communities • Second priority of vaccine distribution in Canada will include essential workers, other healthcare professionals and other congregate facility residents and staff (e.g., correctional facilities and homeless shelters) • Aside from minor differences in policies (e.g., Saskatchewan prioritizing long-term care residents over 50 years of age living in remote areas in addition to residents over 70), all provinces generally follow NACI recommendations and roll-out plans are relatively consistent across the country
Communicating vaccine-allocation plans and the safety and effectiveness of vaccines	• In addition to government websites, countries have explicitly highlighted several modalities for communicating vaccine-allocation plans as part of their official plan for communicating vaccine-allocation plans, including press releases (Australia, China, France), social media (China) and SMS messages (Israel) • To improve the uptake and dissemination of information, countries have used strategies such as tailoring information for culturally diverse groups and at-risk populations (Australia, Germany, U.K.), engaging the public and stakeholders through local partnerships (U.K., U.S.) and having medical experts assist with information dissemination to the public (Australia)	• In December 2020, the Public Health Agency of Canada required that federal, provincial and territorial governments provide ongoing access to comprehensive, clear and accurate information about COVID-19 vaccines and immunization plans through partnerships with First Nations, Inuit and Metis leaders, health professionals and other relevant stakeholders • NACI recommends efforts to make this information more accessible through cultural and linguistically diverse educational resources • Provinces and territories reported using a variety of modalities as part of their plan to disseminate information about vaccine-allocation plans including online tools such as FAQs (British Columbia, Alberta, Manitoba, Ontario, Quebec,

		New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, Yukon and Northwest Territories), news releases (Saskatchewan, Yukon), radio (Yukon) public Q&A sessions (Nunavut) and social media (Yukon)
Administering vaccines in ways that optimize timely uptake	• Many countries are currently (China, France, Germany, Israel, U.K., U.S.) or planning to (Australia) leverage existing health-system arrangements to administer COVID-19 vaccines in settings such as hospitals, general practice clinics, pharmacies and vaccination centres • For large-scale vaccinations, the U.K. is using venues in the community such as football stadiums • For some countries, mobile clinics are being used to administer COVID-19 vaccines in rural and remote areas (e.g., Israel and the U.K.)	• Provinces and territories in Canada are responsible for allocating, delivering, storing, distributing and administering vaccines according to the Government of Canada's planning guidance for administration of COVID-19 vaccine • Many provinces and territories are leveraging existing health-system arrangements to administer vaccines such as through vaccination clinics, community health centres, and public and primary-care nurses (British Columbia, Alberta, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, Yukon) • To increase capacity for administering COVID-19 vaccines, several provinces have developed online training to expand the scope of practice for some healthcare professionals (Manitoba, Quebec) • Provinces and territories are using or planning to use pop-up/on-site vaccination clinics (Manitoba, Ontario) and/or mobile clinics (Manitoba, Northwest Territories) to optimize timely uptake of COVID-19 vaccines • To optimize uptake, several provinces and territories are establishing vaccination sites and strategies to better serve Indigenous populations (Manitoba, Ontario, Yukon, Northwest Territories)
Surveillance, monitoring and evaluation, and reporting	• Countries are utilizing national immunization registers and electronic health records to enable	• The Public Health Agency of Canada will monitor adverse reactions through several pre-existing mechanisms

	surveillance, monitoring and evaluation of COVID-19 vaccinations (Australia, China, Israel, U.K., U.S.) • Several countries have developed new or additional systems (Australia, Germany, New Zealand, U.S.) or indicators (France) specific for COVID-19 to monitor vaccine roll-out program implementation ○ Australia developed a monitoring program for COVID-19 through a partnership with Accenture ○ In Germany, the Robert Koch Institute and Paul Ehrlich Institute will lead the surveillance and evaluation efforts for COVID-19 including app-based cohort studies and long-term hospital-based case-control studies ▪ Additionally, the Robert Koch Institute will use de-personalized vaccine data to build a web-based portal ○ New Zealand is in the process of replacing their National Immunisation Register with the National Immunisation Solution to better support COVID-19 rollout by allowing health workers to record vaccinations more efficiently	○ Canada Vigilance Program ○ Canadian Adverse Events Following Immunization Surveillance System ○ Immunization Monitoring Program ACTIVE (IMPACT) network ○ Canadian Immunization Research Network ○ Canadian Vaccine Safety Network ○ Special Immunization Clinics Network • Provinces and territories are using pre-existing reporting systems to enable the surveillance, monitoring and evaluation of COVID-19 through their respective health authorities and provide information to the national mechanisms listed above (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Northwest Territories) • In addition to recording, storing and managing COVID-19 vaccination records, Saskatchewan and the Yukon both use an immunization administration system (Panorama), which also provides reminders for second-dose follow-ups • Nunavut's vaccine strategy is still under development
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Wilson MG, DeMaio P, Wang Q, Gauvin FP, Alam S, Ahmad A, Bain T, Bhuiya A, Drakos A, Sharma K, Whitelaw S, Lavis JN. COVID-19 living evidence profile #1 (version 1): What is known about anticipated COVID-19 vaccine roll-out elements? Hamilton: McMaster Health Forum, 20 January 2021.

The COVID-19 Evidence Network to support Decision-making (COVID-END) is supported by an investment from the Government of Canada through the Canadian Institutes of Health Research (CIHR). To help Canadian decision-makers as they respond to unprecedented challenges related to the COVID-19 pandemic, COVID-END in Canada is preparing rapid evidence responses like this one. The opinions, results, and conclusions are those of the evidence-synthesis team that prepared the rapid response, and are independent of the Government of Canada and CIHR. No endorsement by the Government of Canada or CIHR is intended or should be inferred.



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