McMaster University | HEALTH FORUM

COVID-END COVID-19 Evidence Network to support Decision-making ... in Canada

COVID-19 Living Evidence Profile #1

(Version 3: 11 February 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 in this second version (first update) of our living evidence profile (LEP). We have not made any changes to the framework since the first version of our LEP.

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)

Box 1: Our approach

We identified new 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 8-11 February 2021 period. We updated the 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.

- 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)
  - 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)
  - 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 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

We identified 20 new evidence documents since the last update of this LEP, of which we deemed nine to be highly relevant. The newly added highly relevant evidence documents include:

- two new guidelines developed using a robust process (e.g., GRADE);
- one new guideline developed using some type of evidence synthesis and/or expert opinion; and
- six new single studies that provides additional insight.

This LEP also includes evidence documents from the previous version that we deemed to still be highly relevant, for a total of 71 highly relevant documents.

We outline key highlights in narrative form below. This is accompanied by Table 1, which provides key findings from new evidence documents and the jurisdictional scans, as well as key findings from still-relevant evidence documents and jurisdictional scans from the previous version of our LEP. We also provide additional details about the highly relevant evidence documents in Table 2, and the type and number of all documents that were identified in Table 3. Lastly, we provide an overview of key insights from other countries and from Canadian provinces and territories in Table 4.

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 all evidence documents identified from the updated searches in this LEP version in Appendix 2a and all highly relevant documents that were identified in previous versions in Appendix 2b (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 have organized the findings for this LEP update in Table 1 according to three categories:

1) insights from newly identified highly relevant evidence documents and jurisdictional scans (which we abbreviate as 'New evidence and experiences' and which we highlight in yellow through the remainder of the LEP);
2) insights from previously identified but still highly relevant evidence documents (which we abbreviate as 'Evidence from previous version'); and
3) insights from previously identified but still highly relevant experiences from jurisdictional scans (which we abbreviate as 'Experiences from previous version').

One guideline from the World Health Organization (WHO) and one single study provide insights that cut across multiple components of the organizing framework. The WHO guideline provides interim recommendations for use of the Moderna mRNA-1273 vaccine against COVID-19. In relation to vaccine allocation, the guideline provides recommendations for use in specific populations, including those for whom supportive evidence is available (e.g., older adults and people with comorbidities) and those for whom there is limited or no supportive evidence available (e.g., frail older adults, people over the age of 95, children or adolescents under the age of 18, pregnant or breastfeeding women, people living with HIV, people with autoimmune conditions, those with a history of Bell's palsy, people who have already had confirmed COVID-19 or with current acute COVID-19, and those who previously received passive antibody therapy for COVID-19). Moreover, the guideline also provides recommendations in relation to administration, considerations for modifications, co-administration with other vaccines, the need for a booster dose, and whether it can be used with other mRNA vaccines.

The single study identified and analyzed 12 factors contributing to the success of Israel's vaccine roll-out in its initial phase, which broadly relate to:

- long-standing characteristics of Israel which are extrinsic to healthcare, such as Israel's small size in terms of both area and population;
- long-standing health-system features, such as a tradition of effective cooperation (particularly during national emergencies) among government, health plans, hospitals, and emergency care providers; and
- specific features of the COVID-19 vaccination effort in Israel, such as the mobilization of special government funding for vaccine purchase and distribution.

The remaining evidence documents provide insights about three elements of the organizing framework (communicating about vaccine-allocation plans, administering vaccines, and surveillance, monitoring and evaluation).

First, in terms of allocating vaccines, one single study identified public perceptions in relation to allocation priorities for the COVID-19 vaccine.

Second, in terms of communicating vaccine-allocation plans, another guideline from the WHO provides updates to the risk communication and community-engagement strategy, and proposes four objectives to improve trust and social cohesion, and reduce the negative impacts of COVID-19. In addition, four single studies discussed COVID-19 vaccination intention and uptake among different populations. These studies:

- showed that news of a variant strain and case escalation could reduce COVID-19 vaccine hesitancy;
- recommended scaling up public-health communication efforts targeting health workers;
- found that exposure to misinformation reduced respondents' intent to accept a vaccine relative to exposure to factually correct information, and effective public-health communication strategies should be tailored to counter vaccine misinformation; and
- found that different components of persuasive messaging had no significant effects on COVID-19 vaccination attitudes and intention.

Third, in relation to administering vaccines, a guideline from allergy centres in Germany provides guidance on allergological-risk assessment regarding COVID-19 vaccination.

Lastly, in relation to surveillance, monitoring and evaluation, the same guideline from the allergy centres in Germany states that reports of severe allergic reactions regarding COVID-19 vaccination can be made using an online questionnaire.

Key findings from the jurisdictional scan

We identified several new insights based on the experiences with the roll-out of the COVID-19 vaccine in eight countries (Australia, China, France, Germany, Israel, New Zealand, the U.K., and the U.S.), as well as all provinces and territories in Canada.

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

- with the vaccine now being approved in all countries assessed, some are now preparing for vaccine roll-outs in the coming weeks (Australia and New Zealand), while others are continuing to expand their vaccination plans;
- given its domestic advances in vaccine roll-out, China is making efforts to assist developing countries in securing COVID-19 vaccines by offering its vaccines to countries both directly or through COVAX; and
- provinces and territories in Canada have continued to make adjustments to their vaccination plans due to continued vaccine-supply challenges.

In terms of allocating vaccines and ancillary supplies equitably and administering vaccines in ways that optimize timely uptake, we found that:

- as more vaccines are approved and become available, some countries have adjusted their allocation rules to recommend that certain vaccines be administered to specific priority groups,
  - e.g., France is recommending that the Pfizer and Moderna vaccines be prioritized for people 65 years and older and those with comorbidities, and the AstraZeneca vaccine be administered to those 50 to 64 years old and to professionals in the health sector aged 18 to 64, and Germany's Vaccination Commission recommends that individuals 65 years and younger should be vaccinated with the Oxford/AstraZeneca vaccine;
- in Canada, several provinces are planning to open vaccination clinics in local communities in order to make vaccines more accessible to their residents; and
- resources provided for health workers involved in vaccine roll-outs range from accredited training modules (Australia) to 24/7 call centres to provide guidance and vaccine shipment information (Israel).

In terms of communicating vaccine-allocation plans and the safety and effectiveness of vaccines, efforts have been made to increase vaccine uptake, such as publicizing vaccination endorsements from political and religious leaders (Israel) and creating cash-prize incentives for residents who choose to get vaccinated (Nunavut). National immunization systems also continue to be adapted to monitor and evaluate COVID-19 vaccinations, with surveillance efforts producing statistical data in one country (Israel) on reductions in confirmed COVID-19 cases and hospitalizations as a result of vaccinations.

Table 1: Highlights from new and previous highly relevant evidence documents and experiences

COVID-19 vaccine roll-out activities	New evidence and experiences	Evidence from previous versions	Experiences from previous versions

General/cross-cutting insights	**Evidence documents**
	• A guideline from the WHO provides interim recommendations for use of the Moderna mRNA-1273 vaccine against COVID-19, including recommendations for:
	  ○ Use of the vaccine in specific populations, including those for whom supportive evidence is available and those for whom there is limited or no evidence available for use
	  ○ Administration, considerations for modifications, and co-administration with other vaccines
	• The same guideline indicated that there is no evidence for the need of a booster dose after the two-dose vaccine or about the interchangeability of Moderna mRNA-1273 vaccine with other mRNA vaccines
	• One single study identified and analyzed 12 specific factors contributing to the success of Israel's vaccine roll-out in its initial phase, which broadly relate to:
	  ○ Long-standing characteristics of Israel which are extrinsic to healthcare, such as Israel's small size in terms of both area and population
		• Two WHO guidelines provide insights across the organizing framework
		  ○ The Vaccine Introduction Readiness Assessment Tool is intended to be used by ministries of health as a roadmap for countries to plan for COVID-19 vaccine introduction
		  ○ Another guideline is designed to help countries develop their national COVID-19 vaccine deployment and plans in many aspects
		• A guideline from the American College of Obstetricians and Gynecologists (ACOG) recommends that:
		  ○ Pregnant and breastfeeding women should be offered the COVID-19 vaccine;
		  ○ A conversation between pregnant women and their clinical teams should include the potential efficacy of the vaccine, the safety of the vaccine for the pregnant patient and the fetus, and other prevention measures such as hand washing, physical distancing, and wearing a mask; and
		  ○ Vaccination of pregnant women may occur in any clinical setting and non-clinical community-based vaccination sites such as schools and community centres
			• All countries are working to secure sufficient and stable supply
			• The main cross-cutting issue is the supply issue in Canada, which affects the overall ability to continue to roll-out the vaccine

	○ Long-standing health-system features, such as a tradition of effective cooperation (particularly during national emergencies) between government, health plans, hospitals, and emergency care providers ○ Specific features of the COVID-19 vaccination effort in Israel, such as the mobilization of special government funding for vaccine purchase and distribution **Jurisdictional scan** • In the midst of Canada's vaccine-supply challenges, provinces and territories continue to increase health resources in preparation for a major ramp-up in vaccinations once vaccine supply increases		
Securing and distributing a reliable supply of vaccines and ancillary supplies (e.g., needles, diluents)	**Evidence documents** • No new evidence identified **Jurisdictional scan** • With the vaccine now being approved in all countries assessed, some are now preparing for vaccine roll-outs in the coming weeks (Australia and New Zealand) while others are continuing to expand their vaccination plans • Given its advancement in its domestic vaccine roll-out, China is making efforts to assist developing countries in securing COVID-19 vaccines by offering its vaccines to countries directly or through COVAX	*National purchasing* • A U.S. CDC guideline 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 *Delivery of vaccines at a country level* • One single study calls for strengthening national and international vaccine-supply chains to ensure the efficient distribution and administration for remote communities, and to avoid vaccine wastage *Vaccine distribution within country and to administration sites* • A WHO guideline provides a five-step decision-making framework for implementing mass-vaccination campaigns	• 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

	• Provinces and territories in Canada have continued to make adjustments to their vaccination plans due to continued vaccine-supply challenges
	  ○ The Moderna vaccine supply has been delayed and dose shipments in the coming weeks will be lower than expected
	  ○ Shipments of the Pfizer-BioNTech vaccine doses may change as a result of Health Canada's recent approval to extract six, rather than five doses from its vials
		for the prevention of vaccine-preventable diseases and high-impact diseases
		• A European CDC guidelines reports that the COVID-19 vaccine will be provided free of charge in most countries
		• A guideline from 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
			the production of vaccines
			• All countries have developed strategies and systems for managing distribution of vaccines as they become available, including for cold-chain requirements
			• Most countries have continued to build on their vaccine manufacturing capacity and distribution channels as well as to secure additional procurement agreements with vaccine manufacturers in order to meet high vaccination demand
			• Vaccination plans in Canada have been reconfigured at the provincial level to accommodate the absence of supply of the Pfizer vaccine during the week of 25 January 2021
			• Millions of special syringes have been ordered by Canada to ensure that all six of the doses contained in Pfizer's vaccine vials can be extracted

Allocating vaccines and	**Evidence documents** *Approaches to developing and adjusting allocation rules*	*Approaches to developing and adjusting allocation rules* • A U.S. guideline provides a recommended approach for national, state, tribal, local and territorial levels that is	• Aside from minor differences in policies, most countries prioritize

ancillary supplies equitably	• One single study identified public perceptions in relation to allocation priorities for the COVID-19 vaccine and found that in addition to prioritizing health workers and those at risk for contracting COVID-19 or developing severe symptoms, participants emphasized the need to prioritize a broad range of other essential workers and to those of low socio-economic status
	
	Jurisdictional scan
	• As more vaccines are approved and become available, some countries have adjusted their allocation rules to recommend that certain vaccines be administered to specific priority groups
	  ○ French authorities have recommended the Pfizer and Moderna vaccines for individuals 65 years and older and those with comorbidities, while the AstraZeneca vaccine will be administered to those 50 to 64 years old and to professionals in the health sector aged 18 to 64
	  ○ Germany's Vaccination Commission recommends that individuals 65 years and younger should be vaccinated with the Oxford/AstraZeneca vaccine
	• In Canada, several provinces are planning to open vaccination clinics in local communities to make vaccines more accessible to their residents
		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)
		Allocation rules
		• A U.S. CDC guideline updated the interim vaccine-allocation recommendations for COVID-19 vaccination program planning and implementation in federal, state and local jurisdictions
		• 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
		• A low-quality rapid review indicated that most U.S. medical centres will offer COVID-19 vaccination to pregnant or breastfeeding women based on the shared decision-making principle, but organizations in the U.K. consider pregnancy and breastfeeding to be contraindications for the vaccine
		• A guideline (from the European Academy of Allergy and Clinical Immunology) recommends that COVID-19 vaccines should be administered to patients with allergies who do not have a history of allergic reactions to vaccine components
		• However, 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
		Ensuring equity
		• A 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-
			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
			• Some countries (China and New Zealand) have prioritized border workers to contain infections
			• Most countries that have begun vaccinations are continuing to vaccinate prioritized healthcare workers, long-term care residents, and some other at-risk populations (e.g., older adults, individuals with chronic conditions, at-risk adults in Indigenous communities), with the exception of Israel where vaccination has begun for residents 40 years and older, and residents aged 17 and 18 years old who will be writing examinations

		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	**Evidence documents** *Target of the intervention* • A guideline from WHO updated the risk communication and community-engagement strategy to cover anticipated COVID-19 related events, and proposes four objectives for people-centred and community-led approaches to improve trust and social cohesion, and reduce negative impacts of COVID-19 • Four single studies discussed COVID-19 vaccination intention and uptake among different populations, which found: ○ Low COVID-19 vaccine uptake among healthcare workers in Saudi Arabia and recommended to scale up targeted public-health communication efforts ○ News of a variant strain and case escalation could reduce COVID-19 vaccine hesitancy ○ Exposure to misinformation reduced the intent to accept a vaccine relative to exposure to factually correct information ○ Components of persuasive messaging had no significant effects on COVID-19 vaccination attitudes and intention *Content of messaging*	*Target of the intervention* • 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 • A high-quality rapid review proposes that future vaccination-messaging campaigns for the public should ensure clear communication about vaccine eligibility and availability, and the engagement of target groups • A single study found the majority of participants used traditional media to obtain information on the COVID-19 vaccine, but that there is an opportunity for social-media platforms to reduce vaccine hesitancy *Delivery of the intervention* • A high-quality rapid review indicates that messages delivered in mixed-media campaigns in communities and hospitals could improve vaccine uptake	• 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 • Countries have used strategies (or are recommending the use of strategies) to tailor information for culturally and linguistically diverse groups and at-risk populations • Countries continue to develop and use different modalities and culturally sensitive communication strategies to engage with the public and stakeholders about COVID-19 vaccines

	• One single study indicated that effective public-health communication strategies should be tailored to counter vaccine misinformation **Jurisdictional scan** • Efforts have been made in a few countries to increase vaccine uptake, such as publicizing vaccination endorsements from political and religious leaders (Israel) and creating cash prize incentives for residents who choose to get vaccinated (Nunavut)	• A medium-quality rapid review indicated that 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, 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 *Content of messaging* • One guideline developed using a robust process 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 high-quality rapid review indicates that messages that provide information about virus risks, vaccine benefits and safety, and address vaccine misunderstandings could improve vaccine uptake • 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 • 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	**Evidence documents** *With what second-dose provisions* • A guideline from the WHO indicates that there is no evidence for the need of a booster dose after the two-dose vaccine or about the interchangeability of Moderna mRNA-1273 vaccine with other mRNA vaccines *With what safety monitoring requirements* • A guideline from the allergy centres in Germany provides guidance on allergological risk assessment regarding COVID-19 vaccination **Jurisdictional scan** • Resources provided for health professionals involved in vaccine roll-outs in the countries assessed range from accredited training modules (Australia) to 24/7 call centres to provide guidance and vaccine shipment information (Israel) • Canadian provinces continue to extend intervals between the first and second doses to compensate for vaccine-supply shortages • Vaccination scheduling systems are being implemented in several provinces (Saskatchewan, Prince Edward Island, New Brunswick)	*With what explicit effort to leverage existing health-system arrangements* • A European CDC guideline developed using a robust process recommends using pre-existing vaccination structures and delivery services in the models for the roll-out of COVID-19 vaccines • A low-quality rapid review noted that leveraging community-based teaching methods and community partnerships for greater vaccination uptake by hard-to-reach populations • Another low-quality rapid review provided a framework for operationalizing programs to increase vaccine coverage, including increasing vaccinator capacity and training, and synergistically re-integrating immunization services • A 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 *Where* • 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 highlighted the benefits of vaccination requirements for childcare, school, and college attendance • Another medium-quality full systematic review found that using an immunization information system was effective for increasing vaccination rates • A 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	• 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) • 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 • Most countries, including Canada, are continuing to expand their vaccination sites and increase the vaccination workforce in order to administer vaccines as efficiently as possible

		• 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 *By whom* • A 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 • A low-quality rapid review discussed the recruitment of individuals with or without medical backgrounds and training approaches • One guideline from Public Health England, developed using some type of evidence synthesis and/or expert opinion, recommends changes to the Human Medicines Regulations to permit non-registered healthcare professionals to administer the COVID-19 vaccine with assigned training *With what partnerships to reach early populations of focus* • One low-quality rapid review discussed setting up familiar and accessible vaccination sites, community-based teaching methods and community partnerships for hard-to-reach populations • Another rapid review also focused on efforts through culturally specific education campaigns and engagement of stakeholders and community partners • One medium-quality full systematic review discussed the education of clinicians and parents to reduce vaccination pain, fear and distress *With what second-dose provisions* • 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 *With what safety monitoring requirements* • One low-quality rapid review proposed several considerations for safety monitoring, including	• In response to the vaccine-supply shortage in Canada, provinces have chosen to either set aside second doses for eligible residents in order to maintain the recommended vaccination interval, or administer first doses to as many residents as possible while extending the second-dose vaccination interval

		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	
Surveillance, monitoring and evaluation, and reporting	**Evidence documents** *Documenting adverse events and follow-up* • A guideline from the allergy centres in Germany states that reports of severe allergic reactions regarding COVID-19 vaccination can be made using an online questionnaire **Jurisdictional scan** • Data from surveillance efforts in Israel have identified reductions in confirmed COVID-19 cases and hospitalizations among those who have been vaccinated	*Documenting vaccine status* • One WHO guideline that was developed using a robust process, 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 *Documenting adverse events and follow-up* • A guideline states that the U.K. will identify 'safety signals' related to adverse events from COVID-19 vaccination, and has established a surveillance mechanism for vaccination in pregnancy *Identifying sources of vaccine hesitancy* • A low-quality rapid review (not yet publicly available) identified a series of associated factors that can influence the willingness to receive a COVID-19 vaccine • Two protocols for reviews that are underway aim to explore the hesitancy rate for COVID-19 vaccination and factors associated with COVID-19 vaccine uptake; and one protocol focuses on the barriers to vaccine acceptance in racial and ethnic minorities • A single study found that previous vaccine history could be an indicator to best predict COVID-19 vaccine acceptance *Infrastructure to enable surveillance, monitoring and evaluation* • A guideline from the European CDC that was developed using a robust process recommends using electronic immunization registries to help monitor vaccine safety, efficacy, coverage and acceptance • A guideline states that the U.K. will link the Second Generation Surveillance System and the National Immunisation Management System to monitor vaccine effectiveness	• 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 • Some countries will monitor adverse reactions through pre-existing mechanisms • Countries have continued to adapt national immunization systems to monitor and evaluate COVID-19 vaccinations

Table 2: 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	*Guidelines developed using a robust process (e.g., GRADE)* • 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): o regulatory preparedness o planning and coordination o costing and funding o identification of target populations o vaccine-delivery strategies o preparation of supply chain and management of healthcare waste o human-resource management and training o vaccine acceptance and uptake (demand) o vaccine-safety monitoring, management of adverse effects following immunization (AEFI) and injection safety o immunization monitoring systems o COVID-19 surveillance o 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) *Single studies that provide additional insight* • 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) • A study found that timely contracting for a large amount of vaccines relative to Israel's population, and the rapid mobilization of special government funding for vaccine purchase could contribute to the success of Israel's vaccine roll-out in its initial phase (published 26 January 2021)
• Delivery to country	*Single studies that provide additional insight* • 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)	*Guidelines developed using a robust process (e.g., GRADE)* • 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) *Single studies that provide additional insight* • A study found that the rapid mobilization of special government funding for vaccine distribution, a centralized national system of government, and well-developed infrastructure for implementing prompt responses to large-scale national emergencies are contributors to the success of Israel's vaccine roll-out in its initial phase (published 26 January 2021)
• Storage and handling within country (e.g., cold-chain requirements and related supplies such as liquid nitrogen)	*Single studies that provide additional insight* • A study found that a creative technical response that addressed the demanding cold storage requirements of the Pfizer-BioNTech COVID-19 vaccine was one of the factors contributing to Israel's successful early vaccine roll-out (published 26 January 2021)
Allocating vaccines and ancillary supplies equitably	

• Approaches to developing and adjusting allocation rules (e.g., citizen- and stakeholder-engagement processes)	*Guidelines developed using a robust process (e.g., GRADE)* • 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) *Single studies that provide additional insight* • A large-scale online public opinion survey in 13 countries (Australia, Brazil, Canada, Chile, China, Colombia, France, India, Italy, Spain, Uganda, U.K. and U.S.) examined the preferences and opinions regarding the allocation of COVID-19 vaccines and found that: o Public respondents prioritized people based on factors that were directly related to contracting COVID-19 or developing severe symptoms, such as age, vulnerability and risk of transmission o Prioritization was identified for factors related to socio-economic status, such as low-income groups and other non-health related essential workers (Pre-print – last edited 2 February 2021) • A study found that the use of simple, clear and easily implementable criteria for determining who had priority for receiving vaccines in the early phases of the distribution process contributed to Israel's successful early vaccine roll-out (published 26 January 2021)
• 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) o Front-line healthcare workers o Residents in long-term care homes and other congregate-care settings o People at increased risk of severe COVID-19 (e.g., older and/or frail adults, those with chronic health conditions) o 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) o Children (school aged) o Migrant workers	*Guidelines developed using a robust process (e.g., GRADE)* • The order of priority of COVID-19 vaccinations in the guideline from the Department of Health and Social Care in the U.K. are as follows: o Residents in a care home for older adults and their carers o All those 80 years of age and over and frontline health and social care workers o All those 75 years of age or over o All those 70 years of age and over and clinically extremely vulnerable individuals o All those 65 years of age and over o All individuals aged 16 years to 64 years with underlying health conditions which put them at higher risk of serious disease and mortality o All those 60 years of age and over o All those 55 years of age and over o 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

○ 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) ○ People at significant risk for severe allergic reaction	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 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) • A U.S. CDC guideline updates the interim vaccine allocation recommendations: ○ Phase 1a: healthcare personnel and long-term care facility residents ○ Phase 1b: persons aged≥75 years and non-healthcare front-line essential workers ○ Phase 1c: persons aged 65-74 years, persons aged 16-64 years with high-risk medical conditions, and essential workers not included in Phase 1b ○ Phase 2: All other persons aged ≥16 years not already recommended for vaccination (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention; last update 1 January 2021) • A guideline from the WHO provides the recommendations for specific populations on the use of Moderna mRNA-1273 vaccine against COVID-19, including: ○ Vaccinations to some groups for whom there is limited or no evidence, including lactating women, persons living with HIV, and people with a history of Bell's palsy (unless there is a contraindication to vaccination) ○ Risk-benefit assessments for other groups for whom there is limited or no evidence, including extremely frail older adults, those over the age of 95, individuals who are immunocompromised or have autoimmune conditions ○ Delayed vaccination for individuals who currently or previously had SARS-CoV-2 infection, or received antibody therapy ○ Not using the mRNA-1273 vaccine for pregnant women (unless the benefit is deemed to outweigh the risk), children and adolescents under the age of 18 years (World Health Organization's Strategic Advisory Group of Experts (SAGE); last update 25 January 2021)

	Rapid reviews • Most U.S. medical centers endorse the U.S societies' recommendations for shared decision-making and will offer vaccination to women who are pregnant or breastfeeding, however, organizations in the U.K. consider pregnancy and breastfeeding to be contraindications to COVID-19 vaccination (date of literature search not reported - published 24 December 2020; AMSTAR rating 1/9) *Guidance developed using some type of evidence synthesis and/or expert opinion* • 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) • COVID-19 vaccines should be offered to pregnant or lactating individuals when they meet criteria for receipt of the vaccine based on prioritization groups outlined by the Advisory Committee on Immunization Practices (The American College of Obstetricians and Gynecologists; last update 27 January 2021) • COVID-19 vaccines should be administered to patients with allergies who do not have a history of allergic reactions to vaccine components (The European Academy of Allergy and Clinical Immunology; published 16 January 2021) *Single studies that provide additional insight* • 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)	*Guidelines developed using a robust process (e.g., GRADE)* • 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) *Rapid reviews*

	• 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) *Single studies that provide additional insight* • 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
	Guidelines developed using a robust process (e.g., GRADE)
	• 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
	• A guideline from the WHO updates the risk communication and community-engagement (RCCE) strategy to cover COVID-19 related events (such as vaccines distribution and administration challenges) from December 2020 to May 2021, and proposes the following four objectives to support people-centred and community-led approaches to improve trust, social cohesion, and reduce negative impacts of COVID-19:
	  ○ Be community-led (reduce stigma, coordinate the management of the infodemic)
	  ○ Be data-driven (enhance social-media monitoring, advocate for community priorities)

	○ Reinforce capacity and local solutions (facilitate capacity needs assessments) ○ Be collaborative (include joint assessments and monitoring) (World Health Organization; last updated 23 December 2020) *Full systematic reviews* • 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) *Rapid review* • 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) • A rapid review focuses on understanding how the public responds to vaccination messages during a pandemic and proposes that future messaging campaigns should ensure that communication is clear about vaccine eligibility and availability, and that target groups are involved (literature last searched May 2020; AMSTAR rating 8/10) *Guidance developed using some type of evidence synthesis and/or expert opinion* • A conversation between the pregnant patients and their clinical teams may assist with decisions regarding the use of vaccines approved under Emergency Use Authorization for the prevention of COVID-19 by pregnant patients, but the conversation should not be required prior to vaccination (The American College of Obstetricians and Gynecologists; last update 27 January 2021) *Single studies that provide additional insight* • 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) • A cross-sectional online survey of 2,650 people showed that the majority of respondents (86%) are using traditional media to obtain information on the COVID-19 vaccine (pre-pint, last edited 20 January 2021) • A national cross-sectional survey on COVID-19 vaccine uptake of 1,058 healthcare workers showed that only 33.3% had either registered or received the vaccine within three weeks of its availability in Saudi Arabia, and public-health communication efforts targeted towards healthcare workers should be scaled up to enhance vaccine confidence and acceptance (pre-pint, last edited 1 February 2021) • A cross-sectional longitudinal study of 9,000 respondents showed that there is a reduction in COVID-19 vaccine hesitancy that is attributable to an increased willingness for vaccination upon news of a variant strain, and a 15% increase in vaccine acceptance was found during a critical period of 50 days of case escalation that lead to a government-mandated lockdown in the U.K. (pre-pint, last edited 1 February 2021) • A study exploring exposure to online misinformation around COVID-19 vaccines and its effects on intent to get vaccinated in the U.K. and the U.S. showed that intent to get vaccinated was lower relative to those who had received factual information (published 5 February 2021) • A study aiming to explore Chinese adults' attitudes and intention to get the COVID-19 vaccine showed that components of persuasive messaging such as message framing, outcome uncertainty and number formats had no significant effects on vaccination attitudes and intention, and that age, education and situational factors were more positively correlated with attitudes and intention (published 27 January 2021)

• 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)
	Full systematic reviews
	• 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

○ 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)	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) • 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) *Rapid reviews* • 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) • A rapid review indicates that messages delivered in mixed-media campaigns in communities and hospitals could improve vaccine uptake (literature last searched May 2020; AMSTAR rating 8/10) *Guidance developed using some type of evidence synthesis and/or expert opinion* • A conversation between the pregnant patients and their clinical teams may assist with decisions regarding the use of vaccines approved under Emergency Use Authorization for the prevention of COVID-19 by pregnant patients (The American College of Obstetricians and Gynecologists; last update 27 January 2021) *Single studies that provide additional insight* • 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) • 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) • A cross-sectional online survey of 2,650 people showed that the use of traditional media sources (both local and national television, national newspaper sources) was found to increase the likelihood of vaccination, and there is an opportunity for social-media platforms to consider how to contribute positively to vaccine hesitancy since those who are less likely to get the vaccine are exclusively using social media as their source of information (pre-pint, last edited 20 January 2021) • A study found that a well-tailored outreach effort to encourage the population to sign up for vaccinations contributed to Israel's successful early vaccine roll-out (published 26 January 2021)

• 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
	Guidelines developed using a robust process (e.g., GRADE)
	• 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)
	Rapid reviews
	• 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 is contains, its effects and safety, and the background for its recommendation easily accessible; provide transparent, timely, consistent, accessible

○ 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	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) • Messages found to improve vaccine uptake include those that provide information about virus risks and vaccine safety, address vaccine misunderstandings, and offer vaccination reminders (including vaccination clinic details), and future vaccination-messaging campaigns should ensure the communication is clear about vaccine benefits, eligibility and availability (literature last searched May 2020; AMSTAR rating 8/10) *Guidance developed using some type of evidence synthesis and/or expert opinion* • The recommendations from the *Working Group on Readying Populations for COVID-19 Vaccine* 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) • A conversation between the pregnant patients and their clinical teams could include the level of activity of the virus in the community, the potential efficacy of the vaccine, the risk and potential severity of maternal disease and the effects of disease on the fetus and newborn, the safety of the vaccine for the pregnant patient and the fetus, and other prevention measures such as hand washing, physical distancing, and wearing a mask (The American College of Obstetricians and Gynecologists; last update 27 January 2021) *Single studies that provide additional insight* • 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) • A study found that the exposure to misinformation had reduced the respondents' intent to accept a vaccine relative to exposure to factually correct information, and that effective public-health communication strategies should be tailored to counter vaccine misinformation (published 5 February 2021)
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)	*Guidelines developed using a robust process (e.g., GRADE)* • 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) *Rapid review* • 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) *Guidance developed using some type of evidence synthesis and/or expert opinion* • The recommendations from the *Working Group on Readying Populations for COVID-19 Vaccine* 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) *Single studies that provide additional insight* • A study found a number of long-standing health-system features contributing to Israel's successful early vaccine roll-out: organizational, IT and logistical capacities of Israel's community-based healthcare providers; the availability of a cadre of well-trained, salaried, community-based nurses who are directly employed by those providers; a tradition of effective cooperation between government, health plans,

	hospitals, and emergency care providers – particularly during national emergencies; and support tools and decision-making frameworks to support vaccination campaigns (published 26 January 2021)

• 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)
	Full systematic reviews
	• 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)
	Rapid reviews
	• 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)
	Guidance developed using some type of evidence synthesis and/or expert opinion
	• Vaccination of pregnant individuals with a COVID-19 mRNA vaccine may occur in any clinical setting and non-clinical community-based vaccination sites such as schools, community centres, and other mass-vaccination locations, and pregnancy testing should not be a requirement prior to vaccination (The American College of Obstetricians and Gynecologists; last update 27 January 2021)
	Single studies that provide additional insight
	• 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	*Rapid reviews* • 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)

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	*Guidelines developed using a robust process (e.g., GRADE)* • A guideline from the WHO provides recommendations on the use of Moderna mRNA-1273 vaccine against COVID-19, including administration, considerations for modifications, co-administration with other vaccines, contraindications, vaccinations for specific populations, prioritizations, and surveillance (World Health Organization's Strategic Advisory Group of Experts (SAGE); last update 25 January 2021)
• By whom (e.g., nurses, public-health workers) and with what changes to remuneration (e.g., increased vaccine-administration fee code)	*Full systematic reviews* • 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) *Rapid reviews* • 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) *Guidance developed using some type of evidence synthesis and/or expert opinion* • 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) *Single studies that provide additional insight* • A study found that the organizational, IT and logistical capacities of Israel's community-based healthcare providers, and the availability of a cadre of well-trained, salaried, community-based nurses who are directly employed by those providers are contributing to Israel's successful early vaccine roll-out (published 26 January 2021)
• With what partnerships to reach early populations of focus (e.g., BIPOC, Indigenous leaders)	*Rapid reviews* • 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)	*Full systematic reviews* • 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 from same or later supply than original dose)	*Guidelines developed using a robust process (e.g., GRADE)* • 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) • A guideline from the WHO indicates that there is no evidence for the need of a booster dose after the two-dose vaccine and interchangeability of Moderna mRNA-1273 vaccine with other mRNA vaccines, and that the second dose should not be administered if anaphylaxis happens after the first dose (World Health Organization's Strategic Advisory Group of Experts (SAGE); last update 25 January 2021)
• 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)	*Guidance developed using some type of evidence synthesis and/or expert opinion*
	• A guideline from the allergy centres in Germany provides guidance on allergological risk assessment for COVID-19 vaccination and suggests a standardized, resource-oriented diagnostic and therapeutic procedure
	  ○ If allergological diagnostic tests for those with previous general reactions are negative, vaccination can be provided under controlled conditions (e.g., with emergency medication available and trained personnel available, and monitoring for at least 30 minutes after vaccination)
	  ○ If allergological diagnostic tests for those with previous general reactions are positive (e.g., if polyethylene glycol is found in the skin test), another vaccine can be considered for vaccination, provided that the vaccine is available (within a reasonable time) (Allergy centres in Germany; last update 26 January 2021)
	Rapid reviews

	• 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; AMSTAR rating 2/9)

• 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)	*Guidelines developed using a robust process (e.g., GRADE)* • 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	*Guidance developed using some type of evidence synthesis and/or expert opinion* • A guideline from the allergy centres in Germany states that reports of severe allergic reactions in the context of COVID-19 vaccination can be made via www.anaphylaxie.net using an online questionnaire (Allergy centres in Germany; last update 26 January 2021) *Guidance developed using some type of evidence synthesis and/or expert opinion* • Public Health England will identify any safety signals of potential adverse events from COVID-19 vaccination by using specified sequential testing methods and by comparing the number of signal reports to the expected number of signals for the specific condition absent of vaccination, and it has established

	vaccination in pregnancy surveillance for COVID-19 vaccination of pregnant women (inadvertently or intentional) that includes collecting background information on the pregnant woman's medical history, and follow-up information 10 weeks post estimated delivery date, and at the baby's first birthday (Public Health England; last update 11 January 2021)
• Identifying sources of vaccine hesitancy	*Guidelines developed using a robust process (e.g., GRADE)* • 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) *Rapid reviews* • 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) *Protocols for reviews that are underway* • Pooled hesitancy rate for COVID-19 vaccine uptake globally (Anticipated completion date 31 March 2021) • Factors associated with the uptake of COVID-19 vaccines among the general population (Anticipated completion date 1 April 2021) • Exploring the barriers to vaccine acceptance in racial and ethnic minorities (Anticipated completion date 28 March 2021) *Single studies that provide additional insight* • 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)	*Guidance developed using some type of evidence synthesis and/or expert opinion* • The effectiveness of COVID-19 vaccines will be monitored by Public Health England against several outcomes ○ The Second Generation Surveillance System (SGSS), which collects routine COVID-19 testing data, will be linked to vaccination data from the National Immunisation Management System (NIMS) to provide a dataset for monitoring vaccine effectiveness against symptomatic disease by sub-group (e.g. age and clinical risk group)

	○ Routine reporting of vaccine effectiveness against symptomatic disease, hospitalization with COVID-19, and COVID-19 mortality will be conducted by the Royal College of General Practitioners Research and Surveillance Centre (RCGP RSC) in collaboration with academic partners ○ To monitor vaccine effectiveness against infection, the data from a number of studies involving repeat asymptomatic PCR testing or antibody testing of healthcare workers, care-home residents and staff, and the population at large will be evaluated by the PHE on an ongoing basis ○ A sample of cases from these studies will also be recruited to monitor the effect of vaccination on their risk of onward transmission (Public Health England; last update 11 January 2021)
• Infrastructure to enable surveillance, monitoring and evaluation (e.g., patient-held records, electronic health records or reporting systems, online vaccination registries, COVID-19 apps)	*Guidelines developed using a robust process (e.g., GRADE)* • 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) *Guidance developed using some type of evidence synthesis and/or expert opinion* • In the U.K., the Second Generation Surveillance System (SGSS), which collects routine COVID-19 testing data, will be linked to vaccination data from the National Immunisation Management System (NIMS) to provide a dataset for monitoring vaccine effectiveness against symptomatic disease by sub-group (e.g. age and clinical risk group) (Public Health England; last update 11 January 2021)

Table 3: Overview of type and number of documents related to one or more COVID-19 vaccine roll-out elements*

Type of document	Total (n=82)**	Securing and distributing a reliable supply of vaccines and ancillary supplies (n=10)	Allocating vaccines and ancillary supplies equitably (n=21)	Communicating vaccine-allocation plans and the safety and effectiveness of vaccines (n=46)	Administering vaccines in ways that optimize timely uptake (n=27)	Surveillance, monitoring and evaluation, and reporting (n=18)
Guidelines developed using a robust process (e.g., GRADE)	20	4	13	9	4	6
Full systematic reviews	9	0	0	5	5	0
Rapid reviews	15	0	2	6	7	2
Guidelines developed using some type of evidence synthesis and/or expert opinion	10	2	4	3	8	4
Protocols for reviews that are underway	7	0	1	2	0	4
Titles/questions for reviews that are being planned	-	-	-	-	-	-
Single studies that provide additional insight	23	4	7	16	2	0

*The table includes all newly identified evidence documents and all highly relevant evidence documents identified in previous versions of this LEP that continue to be deemed highly relevant.

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

Table 4: 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
	• The use of the Pfizer-BioNTech COVID-19 vaccine was provisionally approved in Australia on 25 January 2021 and priority groups will begin receiving vaccines in February 2021
	• China is investing in its manufacturing capacity to ensure that 1 billion doses of inactivated COVID-19 vaccines can be produced in 2021
	• Germany, the U.K. and the U.S. have repurposed 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 Pfizer-BioNTech vaccine was provisionally approved for use in New Zealand on 3 February 2021 while the Oxford/AstraZeneca vaccine was approved for use in Germany on 29 January 2021
	• Conditional market approval has been granted to China's second self-developed COVID-19 vaccine
	• Countries continue to ramp up their vaccination roll-outs with administered doses ranging from 2.3 million in France as of 9 February 2021 to 31 million in China as of 3 February and 42.4 million doses in the U.S as of 8 February 2021
	• Vaccine repackaging efforts have been made in Israel to improve efficiency of vaccine distribution in communities
	• Australia and New Zealand are making preparations for their vaccine roll-outs
		• 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 will experience vaccine shortages for four weeks, with no Pfizer vaccine being received during the week of 25 January 2021 and vaccine deliveries being cut in half in the short term
		• Moderna vaccine supply has also been delayed and dose shipments in the coming weeks will be lower than expected
		• Provincial vaccination plans have been reconfigured in response to vaccine shortages resulting in prolonged vaccination intervals and temporary cancellations of scheduled first-dose vaccinations
		• Health Canada has approved using six doses from the Pfizer-BioNTech vaccine vials instead of five
		  ○ Canada's order of special syringes to extract the additional dose has increased from 37.5 million to 64 million, with 1 million expected to arrive the week of 8 February 2021
		  ○ In addition to the federal government's efforts, Nova Scotia is independently working to secure its own supply of special syringes
		• As of 9 February 2021, 89.4% of doses delivered to Canada have been administered

	○ Australia has now secured 20 million doses of the Pfizer-BioNTech vaccine to be received in 2021, and will invest $1.9 billion to boost its vaccine roll-out ○ Pfizer-BioNTech vaccines are expected to arrive in New Zealand by the end of March 2021 ○ New Zealand is also due to receive doses of the Oxford-AstraZeneca vaccine through the COVAX facility as early as quarter one of 2021, although the vaccine has not been approved for use as yet • China joined COVAX on 3 February 2021 and has offered to provide 10 million COVID-19 vaccines to help meet the demands of developing countries • A national campaign to combat vaccine-related crimes has been launched by the Ministry of Public Security of China	• 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) • All provinces have begun administering COVID-19 doses and have plans for continued shipments of additional doses ○ British Columbia is on track to begin mass immunization clinics in March 2021 ○ Manitoba is targeting to have the capacity to administer 20,000 doses per day by 1 April 2021 ○ Ontario has stated that it has the capacity to administer 40,000 vaccinations per day • The number of total doses administered range from nearly 400,000 in Ontario as of 9 February 2021 and more than 260,000 in Quebec as of 8 February 2021, to 8,828 doses administered in Prince Edward Island as of 6 February 2021
Allocating vaccines and ancillary supplies equitably	• As of 18 January 2021, France has revised its vaccination strategy to include individuals aged 75 years and older living at home and those under the age of 75 who possess a high risk of contracting COVID-19 in Phase 1 • 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 • Israel has begun vaccinating residents 40 years and older (as of 19 Jan 2021), and residents aged 17 and 18 years old who will be writing examinations (as of 23 Jan 2021) • Israel has administered overstock supplies of vaccines to local individuals • New Zealand prepared three different scenarios based on level of transmission present within the	• 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 • Although Canadian provinces continue to follow their vaccination plans and vaccinate priority groups, some adjustments have been made in response to the

	country at the time of roll-out. Priority for vaccination includes border workers, front-line healthcare workers and their close contacts o New Zealand expects to have its border workers and their contacts vaccinated within two to three weeks of its initial vaccinations, and believes that its Olympic athletes will be eligible to be vaccinated in time for the summer Olympic games in Japan in 2021 • 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) • As more vaccines become available, some countries have adjusted their allocation rules: o French authorities have recommended the Pfizer and Moderna vaccines for individuals 65 years and older and those with comorbidities, while the AstraZeneca vaccine will be administered to those 50 to 64 years old and to professionals in the health sector aged 18 to 64 years o Germany's Vaccination Commission recommends that individuals 65 years and younger should be vaccinated with the Oxford/AstraZeneca vaccine	vaccine supply shortages in Canada over the next few weeks • In Manitoba, a Vaccine Implementation Task Force and Vaccine Medical Advisory Table has been established to prepare for large-scale deliveries once vaccine supplies increase • Ontario intends to deliver first doses to all long-term care, retirement, and First Nations elder care home residents by 5 February 2021, and several thousand doses have already been delivered to remote First Nations communities o In response to supply issues, this target was pushed to 10 February 2021 o Operation Remote Immunity is expected to be completed by 30 April 2021 • As of 19 January 2021, Quebec had already reached a target of vaccinating at least 75% of people in priority group 1 • The Chief Public Health Officer of Prince Edward Island announced that clinics will open in late February and early March to expedite the process to immunize high-risk groups such as individuals over the age of 80, community and registered rotational workers, and truck drivers • Saskatchewan plans to open vaccination clinics throughout the province and vaccinate the general population in 10-year age increments during phase 2 of its vaccine roll-out • Prince Edward Island is on track to have all individuals living and working in community-care and long-term care facilities fully vaccinated by 16 February 2021 • In Yukon, mobile vaccination clinics have completed visits to three rural communities as of 4 February 2021 and are working to vaccinate residents in seven new communities

Communicating vaccine-allocation plans and the safety and effectiveness of vaccines	• Countries assessed continue to develop and use different modalities and culturally sensitive communication strategies to engage with the public and stakeholders about COVID-19 vaccines
	  ○ In Israel, endorsements from political and religious leaders encouraged the general population, and religious Orthodox Jewish and Muslim populations to get vaccinated
	• 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)
		  ○ Manitoba has expanded its phone booking program for vaccination appointments and also released an interactive vaccine queue calculator to help residents understand their place in the vaccine priority line
		  ○ The Government of Nova Scotia regularly updates its YouTube channel with information about the pandemic as well as allocation and distribution of vaccines
		  ○ In central Nunavut, residents who choose to get vaccinated will be entered to win cash prizes as an avenue to encourage vaccination rates

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	• 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

	settings such as hospitals, general practice clinics, pharmacies and vaccination centres
	• The Government of Australia is requesting "expressions of interest" from general practices wishing to serve as vaccine administration sites and calling on training providers who can support staff vaccination training
	  ○ Accredited training modules are being created for vaccine providers through a partnership with the Australian College of Nursing and the federal government
	• New Zealand's Ministry of Health is making preparations to begin training health professionals in February 2021 on COVID-19 vaccine administration
	• 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.)
	• In France, pharmacies are expected to become vaccination sites in Phase 3 of the vaccine roll-out plan
	• Israel conducts adverse-events reporting electronically and professionals have access to a 24/7 call centre that provides guidance and vaccine shipment information
		• 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)
		• In response to the vaccine-supply shortage in Canada, provinces have chosen to either set aside second doses for eligible residents in order to maintain the recommended vaccination interval, or administer first doses to as many priority residents as possible while extending the second-dose vaccination interval
		  ○ Quebec's Immunization Committee has recommended that first doses of vaccine be provided to as many people as possible; second doses for those in priority groups 1 and 2 are currently scheduled for March 2021
		  ○ During times of vaccine scarcity in Saskatchewan, the time between first and second doses will be extended so that more people can receive their first dose
		  ○ In New Brunswick, vaccinations for healthcare workers are being postponed to ensure that there are enough vaccines for long-term care residents
		• To increase capacity for administering COVID-19 vaccines, a few provinces (Manitoba, Quebec, New Brunswick) have developed online training to expand the scope of practice for some healthcare professionals while others (Nova Scotia) have called on retired health professionals to assist with administration
		• Provinces and territories are using or planning to use pop-up/on-site vaccination clinics (Manitoba, Ontario, Nova Scotia) and/or mobile clinics

		(Manitoba, Yukon, Northwest Territories) to optimize timely uptake of COVID-19 vaccines o Manitoba now has four vaccination supersites active and plans to introduce several additional sites in the coming weeks o Focused immunization teams continue to visit all personal-care homes in Manitoba to vaccinate residents, and will next focus on long-stay hospital patients, supportive housing facilities, corrections facilities, shelters and transitional housing o Prototype community clinics will be created in Nova Scotia beginning in February 2021 to increase access to vaccinations for vulnerable communities o Mobile vaccine clinics in Yukon are scheduled to visit rural and remote communities a total of three times to ensure that all residents have the opportunity to get vaccinated o As of 25 January 2020, additional clinic dates have been added in Nunavut to increase access to the vaccines • To optimize uptake, several provinces and territories are establishing vaccination sites and strategies to better serve Indigenous populations (Manitoba, Ontario, Yukon, Nova Scotia, Northwest Territories) • Vaccination scheduling systems are being implemented in a few provinces o In Saskatchewan, a scheduling system is being developed for easy online access to vaccine appointments, and a toll-free telephone line will be operational in March 2021 to allow residents to book appointments o Beginning on 4 February 2021, P.E.I residents who are 80 years and older and not living in long-term care facilities can book an appointment online to receive their vaccination while commercial truck drivers and rotational workers

		will receive phone calls from Health P.E.I. to set up appointments o To improve efficiency of vaccinations in New Brunswick, individuals in priority groups are being contacted directly to register for their appointment
Surveillance, monitoring and evaluation, and reporting	• Countries are utilizing national immunization registers and electronic health records to enable surveillance, monitoring and evaluation of COVID-19 vaccinations (Australia, China, Israel, U.K., U.S.) o Through its surveillance efforts, Israel has seen a 41% drop in confirmed COVID-19 and 31% drop in hospitalizations from mid-January to early February in individuals aged 60 years and older • Several countries have developed new or additional systems (Australia, Germany, New Zealand, China, U.S.) or indicators (France) specific for COVID-19 to monitor vaccine roll-out program implementation o Australia developed a monitoring program for COVID-19 through a partnership with Accenture o 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 o 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	• The Public Health Agency of Canada will monitor adverse reactions through several pre-existing mechanisms o Canada Vigilance Program o Canadian Adverse Events Following Immunization Surveillance System o Immunization Monitoring Program ACTive (IMPACT) network o Canadian Immunization Research Network o Canadian Vaccine Safety Network o 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 Colombia, 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 • Manitoba is maintaining a dashboard with key vaccine-distribution metrics available • Residents of New Brunswick and Prince Edward Island are being urged by health officials to download the COVID-19 Alert App to enable tracking of cases and prevent future outbreaks

	○ On 6 February 2021, a mobile application "Health Kit" was developed in China for checking a resident's vaccination status • As of 17 January 2021, Israel's Ministry of Health and Pfizer signed an agreement to share anonymized medical record data between hospitals or health plans and research entities in order to measure vaccine roll-out and immunity	• Patients in Nunavut will be tracked after receiving their first dose of the vaccine to ensure they are notified when they will be receiving the second dose

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