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Canada

Themed Edition – Global Immunization

# Vaccine Confidence InfoBulletin

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Providing credible and timely information on vaccines to health care providers and public health decision makers to support vaccine confidence. Thank you for being a trusted source of vaccine information for individuals and communities across Canada.

## In this issue



## Trending topics

### Global monkeypox virus (MPXV) outbreak

The monkeypox virus (MPXV) is an *Orthopoxvirus*, related to variola, the virus that causes smallpox. It is a zoonotic disease endemic to certain areas of Africa where periodic outbreaks occur, generally due to crossover from contact with infected animals. Recently, MPXV outbreaks have been reported in multiple countries where MPXV is not endemic, such as Spain, Portugal, United Kingdom, U.S. and Canada. Canada first declared cases of MPXV on May 19, 2022 and continues to experience an outbreak with 235 confirmed cases as of June 24, 2022 [1].

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## …Trending topics continued

Evidence and details continue to emerge regarding the 2022 MPXV virus outbreaks internationally and in the Canadian context, including symptoms, modes of transmission and groups at high risk for severe outcomes. While there is no well-established treatment for MPXV, the infection is typically self-limited.

MPXV is not exclusive to any group or setting. While all cases to date in Canada are male and the majority have reported having sexual contact with men, anyone can get infected and spread MPXV if they come into close contact with someone who has the virus.

Previous vaccination for smallpox may provide some cross-protection against MPXV, however, global smallpox vaccination programs ended in 1980 when smallpox was declared eradicated. Imvamune®, a live attenuated non-replicating *orthopoxvirus* vaccine, is authorized by Health Canada for immunization against smallpox, MPXV and other pox viruses in adults 18 years of age and older who are at high risk of exposure. While the evidence is limited, Imvamune® may provide some protection against MPXV and is available for targeted immunization strategies across Canada.

On June 10, 2022, in the context of the rapidly evolving MPXV outbreak, the National Advisory Committee on Immunization (NACI) provided options for the use of the Imvamune® vaccine in Canada for post-exposure prophylaxis against MPXV. Post-exposure prophylaxis is when a medical intervention is taken to prevent disease after a possible exposure. In developing these options, NACI reviewed data on the current status of the MPXV outbreak and evidence on the safety and protection offered by the Imvamune® vaccine.

For post-exposure prophylaxis, NACI recommends that a single dose of the Imvamune® vaccine may be offered to individuals with high-risk exposures to a probable or confirmed case of MPXV, or within a setting where transmission is happening. This dose should be offered as soon as possible, ideally within 4 days of exposure, but may be considered up to 14 days since the last exposure. A second dose may be offered after 28 days if an assessment indicates an ongoing risk of exposure. Post-exposure prophylaxis should not be offered to people who have confirmed or probable MPXV infection. High risk exposures are outlined by the Public Health Agency of Canada (PHAC) on the Canada.ca webpage: Monkeypox: Public health management of cases and contacts in Canada, under the Risk assessment of contacts section.

People with a history of myocarditis and/or pericarditis linked to a previous dose of an *orthopoxvirus* vaccine should discuss the benefits and risks of receiving Imvamune® with their health care provider.

Other *orthopoxvirus* vaccines (e.g., 1st or 2nd generation smallpox vaccines) may have a risk of myocarditis and/or pericarditis, however, the risk of myocarditis and/or pericarditis with Imvamune® is unknown.

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## ...Trending topics continued

Given the known rare risk of myocarditis and/or pericarditis with mRNA COVID-19 vaccines, NACI recommends that Imvamune® be offered at least 4 weeks before or after receiving an mRNA COVID-19 vaccine, if possible, to help identify which vaccine myocarditis and/or pericarditis is linked to, should it occur. However, protection from MPXV should be prioritized and prior mRNA vaccination should not delay the receipt of Imvamune®.

Some populations may be at increased risk of severe MPXV disease, including people who are immunocompromised, people who are pregnant and young children. Data on the use of Imvamune® in these populations are limited. An individual benefit-risk analysis should be conducted by a health care provider when offering the vaccine. Recommendations to consider Imvamune® for children under 18 years of age are off-label and should follow an individual benefit-risk analysis conducted by a health care provider.

It is important to obtain informed consent when offering the Imvamune® vaccine for MPXV. The limited data available on MPXV infection and disease, as well as the limited data available on the safety and efficacy of Imvamune®, should be discussed along with potential benefits and risks.

Provinces and territories continue to closely monitor and investigate outbreak dynamics in their jurisdictions and will determine how to best use the Imvamune® vaccine, informed by this NACI advice, in their communities.

NACI and PHAC continue to monitor the evolving data on the MPXV outbreak. The situation is rapidly evolving and there may be additional considerations in the coming weeks.

**Key resources related to Monkeypox virus (MPXV)**

Information about MPXV for health care professionals

Imvamune® information sheets, consent forms, and after care sheets

World Health Organization (WHO) MPXV page with updates on the global outbreak

Unrelated to the current MPXV outbreak, NACI has also provided guidance on the use of Imvamune® for pre-exposure prophylaxis in routine laboratory research settings where replicating o*rthopoxviruses* are studied.

For the full NACI rapid response, including supporting evidence and rationale, please see NACI Rapid Response: Interim guidance on the use of Imvamune® in the context of monkeypox outbreaks in Canada.

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# Featured article

## Global measles outbreak

### The resurgence of the measles virus globally

Measles, also called Rubeola, is a vaccine-preventable disease that occurs worldwide and remains one of the most important causes of morbidity and mortality in children despite the availability of a safe and efficacious vaccine. A global increase in measles cases was noted in the first quarter of 2022, which may be linked to pandemic related disruptions to routine vaccinations and the diversion of resources from routine immunizations, increasing inequalities in access to vaccines [2].


Reported worldwide measles cases **increased by 79%** in the first two months of 2022, compared to the same period in 2021, as the WHO [World Health Organization] and the United Nations Children's Fund [UNICEF] warn **conditions ripe for serious outbreaks of vaccine-preventable illnesses** [2].

Measles is one of the most highly contagious and fast-moving vaccine-preventable diseases in the world. It is transmitted through direct contact with infectious droplets or by airborne spread. The virus first infects the respiratory tract then spreads throughout the body. Risks associated with measles include: ear infections, blindness, pneumonia, encephalitis, pregnancy complications and death [3].

Widespread vaccination during the past few decades has averted approximately 21.1 million deaths [4]. Since the emergence of the COVID-19 pandemic, the WHO and UNICEF have reported that 23 million children have missed routine immunizations [5].

While recognizing that the impact of the pandemic and the preventative measures that were in place (e.g., universal masking, lockdowns, and physical distancing) may have added additional layers of prevention for those who are under-vaccinated, it is clear that as these restrictions relax, exposure risk is likely to significantly increase and may lead to outbreaks such as those seen in Somalia, Yemen, Afghanistan, Nigeria, and Ethiopia [2].

In an effort to fill the vaccination gap, the WHO is encouraging mass measles immunization campaigns in countries with low vaccine coverage. In addition, the WHO is also recommending high-quality, case-based surveillance as a critical strategy for outbreak control, early detection, and confirmation of measles cases to ensure timely and proper case management [6]. Ultimately, this comprehensive approach aims to reduce morbidity and mortality and enable the implementation of appropriate and sustainable public health strategies to control further transmission.

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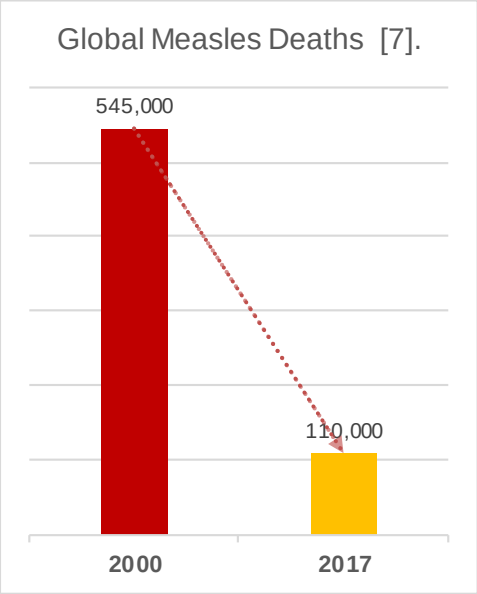
### Vaccine effectiveness against disease

Before the introduction of the measles vaccine in 1963 and subsequent widespread vaccination, major measles epidemics occurred approximately every 2 to 3 years with a yearly estimate of 2.6 million deaths globally [3]. Fortunately, global measles mortality was reduced by 80% between 2000 and 2017, from 545,000 deaths to 110,000. As a result of mass measles vaccination an estimated 21.1 million deaths were prevented during this 18-year period [7]. The efficacy of a single dose of measles-containing vaccine given at 12 or 15 months of age is estimated to be 85% to 95%. With a second dose, efficacy in children approaches 100%. However, measles outbreaks continue to occur in populations with high immunization coverage rates as the high infectivity of measles requires at least 95% of the population to be immunized to create herd immunity.




Apart from immunizations, another source of protection in young infants includes passive immunity through placental antibody transfer, which has been shown to last until about 9 months of age [8]. See the science spotlight (page 8) in the May 2022 issue of the Vaccine Confidence InfoBulletin for more information on vaccine-induced passive immunity from human milk and trans placental antibody transfer during pregnancy.

For more information on measles vaccination, see the Canadian Immunization Guide (CIG) chapter on measles.

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# Mis/disinformation monitor alert

Presenting credible sources to debunk mis and disinformation.

## Misinformation regarding acute severe hepatitis in children

Beginning in early April 2022, the WHO reported an increase in cases of acute severe hepatitis in children of unknown origin in multiple countries [9].

As of June 22, 2022, there are thirteen cases of acute severe hepatitis in children in Canada meeting the national case definition in Alberta (3), Manitoba (3), Ontario (4) and Quebec (3) [9].

**Misinformation** is information that is false or misleading, but presented as fact, regardless of intention.

**Disinformation** is information which is intentionally created and circulated to deceive or mislead.

- The children, who are between 1 and 13 years old, became sick between November 3, 2021 and May 11, 2022.
- All children were hospitalized.
- Two children have required a liver transplant.
- No deaths have been reported.

### What misinformation has circulated?

Social media posts circulating online have suggested a link between the hepatitis cases and COVID-19 vaccination [11]. However, according to the current data from the WHO, hypotheses related to side effects from the COVID-19 vaccines are currently not supported as most of the affected children did not receive a COVID-19 vaccination [9].

### What is causing these illnesses?

At this time, the cause of illness is not known and an active investigation continues in multiple countries. Adenovirus, a common virus that typically causes cold or flu-like illness or gastroenteritis, is currently one of the possible causes being explored. Investigators continue to consider other possible causes and contributing factors such as exposure to toxins or other infections.

### What is Canada doing?

PHAC is working closely with provincial, territorial, and international partners to further investigate any reported cases of acute severe hepatitis in children not caused by known hepatitis viruses.

For updates, visit the "Acute severe hepatitis in children" Canada.ca webpage as the investigation evolves.

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# Science spotlight

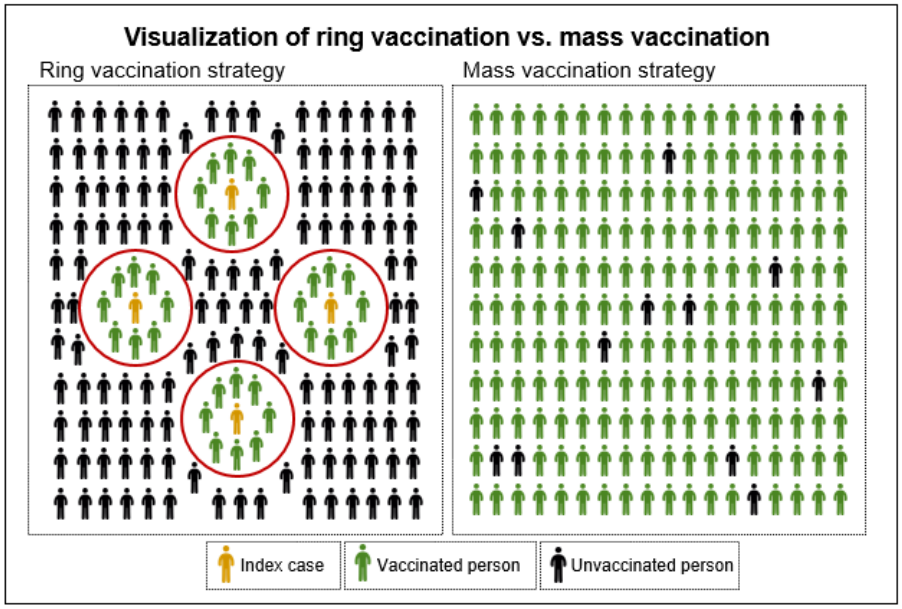
Providing explanations of the science underpinning vaccine guidance and public health response.

## Ring vaccination strategies for outbreak containment

Early containment of infectious disease outbreaks can prevent widespread epidemics that become much more difficult or impossible to contain. A robust and nimble public health response to communicable diseases uses a multipronged approach layering public health interventions to minimize spread. For some infectious diseases for which vaccines that limit transmission are available, a ring vaccination strategy may be an effective containment option.

### What is ring vaccination?

Ring vaccination is a strategy whereby when an index case is identified (someone gets the infectious disease), close contacts who had high risk of exposure are vaccinated, creating an immunological "ring" around the index case to interrupt chains of transmission. Rings can be expanded to include several degrees of contacts-of contacts depending on the disease scenario.




### When have ring vaccination strategies been employed in the past?

Ring vaccination was an instrumental strategy used in the final stages of smallpox eradication in 1979. When much of the world had developed strong herd immunity, primarily through widespread vaccination, public health experts and infectious disease groups employed ring vaccination strategies in targeted regions with endemic smallpox. Tactics included conducting surveillance and contact tracing, identifying known cases, and vaccinating susceptible individuals exposed to known cases.

Ring vaccination strategies have also been successfully used to combat the Ebolavirus. In 2015, a ring vaccination strategy was used in clinical trials for the Ebolavirus vaccine and has subsequently been the primary vaccination strategy for Ebola as mass vaccination has been difficult due to supply and resource challenges in regions where Ebola is present [11].

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Ebolavirus can persist in survivors, and can be found in the semen of infected individuals up to 2 years following infection, suggesting that ring vaccination strategies should consider not only the contacts of active cases but encourage vaccination of the contacts of survivors following their recovery [12].

### When could this strategy be used?

There are many epidemiologic factors that determine the appropriateness of a ring vaccination strategy for the control of an infectious disease. First, the prevalence of the illness and proportion of people who are susceptible to the disease are important. Generally, ring vaccination is most effective in scenarios where robust contact tracing is possible and where a clear case definition is accessible. This is often early in an epidemic when the pathogen is not yet circulating in the community or as the epidemic is waning [14].

Transmission dynamics, such as the mode of transmission, the incubation period, the period of infectivity, and the reproductive number (how many cases are likely to result from a single case), are all important considerations. Infectious diseases with short incubation periods and high rates of infectivity early in the disease process or before the appearance of symptoms are less likely to be well mitigated by ring vaccination, as contacts are more likely to be exposed and possibly infected before the index case is identified and the vaccination strategy enacted. For example, one of the reasons that ring vaccination has been a practical approach for Ebola virus is that the period of infectivity for Ebola is late in the disease process after individuals become symptomatic. This quality of the disease has posed risk within communities practicing important cultural mortuary and burial practices, as transmission from body fluids can occur after death, demonstrating the challenging interface of cultural practices and infectious disease mitigation.

**Key considerations for a successful ring vaccination strategy**

**Prevalence and diagnostic capability**
- ✓ Robust contact tracing possible
- ✓ Clear case definition accessible

**Transmission dynamics**
- ✓ Short incubation period
- ✓ Period of infectivity later in the disease process or after the onset of symptoms

**Cultural challenges**
- ✓ Ability to build public trust

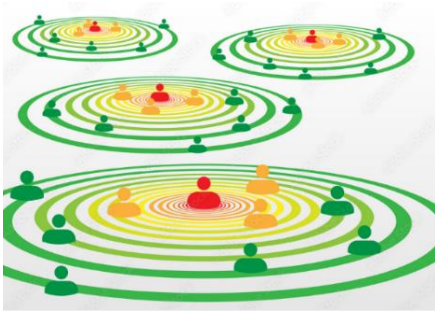
**Vaccine characteristics**
- ✓ Effective at preventing infection
- ✓ Protection mounts quickly

**Logistics and human resources**
- ✓ Local public health infrastructure in place to support case and contact tracing

Vaccine characteristics also play an important role in determining whether ring vaccination is a suitable strategy to minimize spread. First, a vaccine able to prevent infection, with protection mounting quickly following a single dose or a closely spaced vaccine series, are most effectively used in a ring vaccination strategy. Some vaccines may also offer protection from disease or other outcomes following exposure, either to prevent or reduce the severity of infection, commonly referred to as post exposure prophylaxis (PEP).

Vaccines with low effectiveness to prevent infection, while useful for preventing severe disease, are unlikely to mitigate the spread of disease adequately to be useful in a ring vaccination strategy.

A ring vaccination strategy may be an effective strategy to stifle an outbreak, however, ring vaccination itself can be resource intensive, relying on local public health infrastructure to have robust case and contact tracing, as well as enough public trust to ensure that cases are comfortable sharing their contacts with public health workers.



Stigma associated with a given disease can amplify the challenges with this strategy. Targeted vaccination strategies can further entrench social stigma when specific communities are targeted, especially those who have been historically marginalized. Additionally, vaccine storage requirements, trained health care staff, and challenges associated with regional conflict or natural disasters can impact feasibility.

Ultimately**,** the success of ring vaccination strategies is optimized with the use of other public health measures and mitigation strategies as well as good timing and close engagement with affected communities to support access and mitigate any stigma.

Often, when disease transmissibility dynamics and other important factors are known, epidemic modeling can help epidemiologists and public health officials determine what the best combination of strategies might be to manage an epidemic [14]. Public health authorities and experts measure a variety of economic, social, cultural, logistical, epidemiologic, and immunological variables when determining which vaccine strategies to use, and the best options for a given region or outbreak may vary widely.

## In the clinic

Providing current recommendations, resources and vaccination best practices for immunizers.

### Vaccine confidence through social mobilization

Despite global efforts to ensure equitable COVID-19 vaccine access for low-to-middle income countries (LMICs) [15], only 16% of people residing in low-income countries have received at least one dose of a COVID-19 vaccine [16]. With vaccine acceptance linked to social norms, perceived risk of infection, and perceived safety of vaccines [17], it is imperative to prioritize innovative strategies centering on community engagement and cultural inclusivity to maintain public trust and achieve higher uptake of COVID-19 vaccines [18].

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In Practice

## Women lead the way to overcome vaccine hesitancy and boost uptake in Pakistan

In partnership with the WHO's Expanded Programme on Immunization (EPI), which aims to ensure universal access to vaccines for all populations across the life course [19], the Health Department of Pakistan's southern province of Sindh has dispatched **13,000 teams of female community health workers to engage in door-to-door vaccination with underserved communities that are harder to reach** [20]**.**

**Each team includes three female community health workers:**
1. a vaccinator who offers a variety of COVID-19 vaccines to patients;
2. a social mobilizer who utilizes effective communication strategies in addressing vaccine hesitancy and disseminating accurate COVID-19 vaccine messages; and,
3. a data-entry clerk who tracks vaccination information for COVID-19 vaccine surveillance [20].

With community health workers cognizant of the local culture and trusted by community members, this innovative approach recognizes **the power of culturally relevant communication and social mobilization strategies in supporting vaccine confidence amongst LMICs** [21]**.**

Ultimately, this strategy, in combination with increased vaccine supply through COVAX, has enabled **Pakistan to vaccinate more than 80%of adults against COVID-19** since the start of its COVID-19 vaccination campaign in February 2021 [22].

## PHAC COVID-19 Vaccination Tool Kit for Health Care Providers

Download the 3rd edition of the PHAC COVID-19 Vaccination Tool Kit for Health Care Providers.

This tool kit is designed to provide a simple, one-stop destination to locate evidence-informed resources to support constructive dialogue about COVID-19 vaccines authorized for use in Canada.

Within the updated tool kit you will find:

- ✓ Links to the latest guidance on vaccines and boosters
- ✓ Resources to address vaccine hesitancy
- ✓ Information on authorized COVID-19 vaccines and vaccine safety
- ✓ Information sheets, consent forms and aftercare sheets
- ✓ Guidance on vaccination pain and fear of needles
- ✓ Webinars for health care providers on COVID-19 vaccines and vaccine hesitancy
- ✓ Videos, digital tools, social media "shareables" and more!

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# Community spotlight

Putting the spotlight on innovative projects and best practices from communities across Canada.

## Kids Boost Immunity™ (KBI) – Empowering students to think about immunization in a global context by combining learning with the opportunity to donate vaccines

Developed by the Public Health Association of British Columbia (PHABC), with support from the PHAC Immunization Partnership Fund (IPF), KBI is a free online learning platform for teachers and students designed to improve vaccine confidence among youth by raising literacy about why vaccination is important and building critical inquiry.

Created by teachers and health professionals, and based on each province's science, health and social studies curriculum, KBI has over 300 lessons available in English and French focused on grades 4-12 (including sec 1-5 & cégep). Every time a student scores 80% or more on a lesson quiz, KBI donates a life-saving vaccine to UNICEF Canada. Since March of 2018, more than 3.5 million questions have been answered on the KBI platform, with more than 267,000 vaccines earned and donated for children globally.

Do you know a teacher? Encourage them to visit Kids Boost Immunity™ to learn more.

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## PHAC webinars and webcasts for health care providers

PHAC, in collaboration with the Canadian Vaccination Evidence Resource and Exchange Centre (CANVax) and the National Collaborating Centre for Infectious Diseases (NCCID), offers expert-led webinars and webcasts focused on providing health care providers with clinical guidance and information related to key vaccine topics.

**Webcasts** are video resources.

**Webinars** are live events, with an audience and question & answer period. These live events are recorded and later posted for viewing.

### Webinar and webcast watch list

Webinar - Conversations about pediatric vaccines in the context of COVID-19 (60 mins)


**Dr. Cora Constantinescu and Dr. Olivier Drouin** discuss the challenges to vaccine confidence for caregivers of children (17 years and younger), identify strategies for building vaccine confidence among caregivers of children, and discuss the ways in which behavioral science can inform conversations on pediatric vaccines with caregivers of children.

Webinar - Understanding Canada's Vaccine Injury Support Program (45 mins)


**Dr. Jennifer Crichton, Edward Maier and Stéphanie Parisien** provide an overview of Canada's Vaccine Injury Support Program (VISP). Healthcare professionals will be able to utilize the knowledge provided to inform clients and to support claim submissions for those who appear to have suffered from a serious and permanent vaccine injury.

## Contact Vaccine Confidence

Subscribe to receive the PHAC Vaccine Confidence InfoBulletin directly in your inbox. To explore past issues, see archived issues on the CANVax website.

Have questions or feedback to share? Email us: vaccination@phac-aspc.gc.ca

Please note that any medical questions should be directed to your local health care provider and any urgent medical questions should be directed to 911 or your local emergency department.

# Annex

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