CTS Information and Guidance for Respiratory Health Care Professionals on COVID 19 Vaccination

Introduction

This Canadian Thoracic Society (CTS) document aims to provide guidance and relevant information for respiratory health care professionals on COVID-19 vaccination in Canada. Due to limited data, there are areas of uncertainty which have prompted the CTS, and several other national and international Specialty Societies, to provide advice on vaccination based on available evidence and expertise. We highlight this important information in this paper. A Frequently Asked Questions (FAQ) section of this document seeks to address some of the concerns that may arise in discussion with patients who are immunocompromised, treated with biologic therapy or long-term steroids, pre- or post-transplant, etc. We plan to update this guidance as new information becomes available and recommend periodically checking the Canadian Thoracic Society website (https://cts-sct.ca/covid-19/) for updates.

In Canada, there is a gap in the knowledge about the rate of vaccination in patients with respiratory diseases. However, it is clear from Canadian studies[1-6] that address vaccine uptake that the vaccination rates for seasonal influenza and for pneumococcal infection are below the ideal level of 80%.[7] A recommendation or contact (visit) with a health care professional was identified in several studies[2,8,9] as an important predictor influencing an individual's decision to be vaccinated. The study by Bourbeau et al.[2] found that COPD patients in Quebec and Ontario who had regular contact with their physician had vaccination rates of 80% for seasonal influenza, as reported by their primary care doctors. In the Boerner et al. study,[8] participants mentioned a physician recommendation along with trust in their physicians as a significant factor in their vaccination decision.

Therefore, the role of physicians, respiratory health care professionals and educators as advocates for vaccination along with consistent messaging on COVID-19 vaccination will likely be effective in improving vaccination rates in this vulnerable population.

Which COVID-19 vaccine is the best?

Vaccination is the single most effective way to reduce deaths and severe illness from COVID-19. **Vaccines aren't a silver bullet, especially as the pandemic is ongoing. They must be combined with other public health measures to decrease risk of virus transmission including: frequent hand washing or use of alcohol-based hand sanitizers, wearing face masks, and physical distancing should continue to be observed.** This is especially important in those with chronic medical conditions. No matter which COVID-19 vaccine becomes available to you first, you can feel confident in its ability to protect you, as long as you continue being cautious until positive cases, hospitalizations, and deaths are significantly reduced nationwide. Manufacturers are working toward developing vaccines that provide greater protection against new SARS-CoV-2 variants. For a vaccine to be sold in Canada, it has to be authorized by Health Canada. Health Canada's Biologic and Radiopharmaceutical Drugs Directorate reviews the data in the vaccine submission. A notice of compliance and a drug identification number are then issued after the review is complete, and only if the benefits of the vaccine outweigh any identified risks. After a vaccine is authorized, the manufacturer or health care professionals will continue to generate post-market data for adverse effects and/or new data changing the uses or supporting additional uses of the vaccine.

Drugs and COVID-19 vaccines authorized or in progress by Health Canada

- List of authorized drugs, vaccines and expanded indications for COVID-19
- Pfizer-BioNTech COVID-19 vaccine: What you should know

- Moderna COVID-19 vaccine: What you should know
- Oxford-AstraZeneca COVID-19 vaccine: What you should know
- Janssen COVID-19 vaccine: What you should know

Summary of efficacy and safety vaccines approved by Health Canada (see summary table on Page 7)

Pfizer-BioNTech and Moderna COVID-19 vaccines:
The first 2 COVID-19 vaccines to receive Health Canada approval for use (Pfizer-BioNTech[10] and Moderna[11]) **have shown over 94 to 95% efficacy** for preventing symptomatic and severe disease. The duration of follow up has been limited to 2-4 months.

Oxford-AstraZeneca COVID-19 vaccine:
The approval for use of the (Oxford-AstraZeneca)[12]COVID-19 vaccine in Canada has shown an effectiveness of about 63 to 76% in preventing symptomatic COVID-19 disease beginning 2 weeks after the second dose. For the vaccine to work best, 2 doses are required: a first dose and then a second dose 4 to 12 weeks later. The median duration of follow-up was 105 days post-Dose 1 and 62 days post-Dose 2. Additional research is needed to understand longer-term potential protection after a single dose.

Janssen COVID-19 vaccine:
The Janssen[13,14] COVID-19 vaccine is a one dose vaccine with 66% effective in preventing symptomatic COVID-19 disease beginning 2 weeks after vaccination. In study COV3001, up to a cut-off date of January 22, 2021, 54.6% of individuals had follow-up duration of 8 weeks. The median follow-up duration for all individuals was 58 days.

Vaccine Characteristics:
- Emerging data suggests that all authorized COVID-19 vaccines offer protection against hospitalization and likely also death from COVID-19.
- Results from clinical trials of mRNA vaccines suggest superior efficacy against symptomatic COVID-19 disease compared to the viral vector vaccines.
- There is evidence that both the Pfizer-BioNTech and AstraZeneca vaccines protect against the B.1.1.7 SARS-CoV-2 variant. In studies in South Africa, the Janssen vaccine was shown to offer protection against the B.1.351 SARS-CoV-2 variant, while the AstraZeneca vaccine was shown not to offer protection against that variant of concern. In studies in Brazil, the Janssen vaccine was shown to offer protection against the P.2 variant.
- Early evidence suggests that the Pfizer-BioNTech vaccine has moderate to high effectiveness against asymptomatic infection, with some evidence of protection available for Moderna and Janssen as well. Early evidence suggests that the AstraZeneca vaccine may not be efficacious against asymptomatic infections.

Side Effects and Adverse Events:
Local and systemic side effects are in keeping with known side effects associated with vaccines and are usually self-limited. Long-term side effects are highly unlikely. Regarding anaphylaxis, Moderna has reported 2.5 cases per million *(as of Jan 10, 2021: MMWR January 29, 2021/670 (4): 125-129)* and Pfizer 11 cases per million *(as of Dec 23, 2020: MMWR: January 15, 2021/ 70 (2): 46-51)*. The majority of cases involved patients with documented/known allergies or allergic reaction, and 1/3 to 1/2 had previous history of anaphylaxis.
Severe adverse events, excluding those related to confirmed COVID-19, were reported by 0.4% (n=83) of individuals who received the Janssen COVID-19 Vaccine (N= 21,895) and 0.4% (n=96) of individuals who received placebo (N= 21,888).

Blood clots associated with low levels of platelets following immunization of Oxford-AstraZeneca COVID-19 vaccine:
Rare but serious cases of blood clots, including cerebral venous sinus thrombosis, associated with thrombocytopenia were reported in Europe following post-licensure use of AstraZeneca COVID-19 vaccine, usually between 4 and 28 days after receipt of vaccine. This adverse event is being referred to as Vaccine-Induced Immune Thrombotic Thrombocytopenia (VITT). The exact mechanism by which the AstraZeneca vaccine may trigger VITT is still under investigation. The case fatality rate typically ranges between 20 and 40%.

After a thorough, independent assessment of the currently available scientific data, Health Canada has concluded that these very rare events may be linked to use of the vaccine. This is in line with the findings of other regulators. As a result, the Department has updated warnings on the label for the AstraZeneca COVID-19 vaccine and COVISHIELD vaccine to inform Canadians and healthcare professions of these possible side effects and to provide information about the signs and symptoms and when to seek prompt medical attention following vaccination. For more information, please read the Health Canada alert issued on April 14, 2021: https://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2021/75389a-eng.php

Recommendations on priority populations of COVID-19 vaccines in Canada

The evidence on COVID-19 and COVID-19 vaccines is rapidly evolving. To date, the National Advisory Committee on Immunization (NACI) has developed the evidence-informed guidance related to the prioritization of key populations in the context of limited vaccine supply to inform the planning of provincial and territorial publicly funded COVID-19 immunization programs.

For more details visit: https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/guidance-prioritization-key-populations-covid-19-vaccination.html?hq_e=el&hq_m=2177670&hq_l=1&hq_v=d47528d599#a3

Refer to data on COVID-19 vaccination coverage and doses administered in various key populations in jurisdictions across Canada.

Prioritization of Canadians with lung disease in the vaccination rollout

The COVID-19 Respiratory Roundtable led by the CTS issued a joint statement in January urging the federal, provincial and territorial governments to prioritize people living with lung disease who are at higher risk for more serious COVID-19 complications in the vaccination rollout.

In February, NACI released recommendations on the prioritization of key populations for COVID-19 immunization which includes chronic lung disease as a risk factor for poor outcome. PDF document *(People who are at risk of more severe disease or outcomes from COVID-19)*

NACI recommendations on the use of COVID-19 vaccines[19] (updated recommendations May 3, 2021)

These recommendations apply only to COVID-19 vaccines currently authorized for use in Canada (Pfizer-BioNTech COVID-19 vaccine; Moderna COVID-19 vaccine; Oxford-AstraZeneca COVID-19 vaccine; and Janssen COVID-19 vaccine). In considering these recommendations and for the purposes of publicly funded program implementation, provinces and territories may consider local programmatic factors (e.g., logistical and operational contexts, resources) and local epidemiology (e.g., transmission of SARS-CoV-2 VOC).

NACI recommendations are now worded as "should" (strong) or "may" (discretionary).

- A **strong recommendation** applies to most populations/individuals and should be followed unless a clear and compelling rationale for an alternative approach.
- A **discretionary recommendation** may be offered for some population/individuals in some circumstances.

Rec #1 -NACI preferentially recommends that a complete series with an mRNA COVID-19 vaccine should be offered to individuals in the authorized age group without contraindications to the vaccine. If an mRNA vaccine is contraindicated, another authorized COVID-19 vaccine should be offered. **(Strong NACI Recommendation)**

June 1, 2021 – Interchangeability of authorized COVID-19 vaccines in a vaccines series[19] **when the first dose is**:

mRNA COVID-19 vaccine

NACI recommends that, if readily available, the same mRNA COVID-19 vaccine product should be offered for the subsequent dose in a vaccine series started with an mRNA COVID-19 vaccine. However, when the same mRNA COVID-19 vaccine product is not readily available, or is unknown, another mRNA COVID-19 vaccine product recommended for use in that age group can be considered interchangeable and should be offered to complete the vaccine series. The previous dose should be counted, and the series need not be restarted.
(Strong NACI Recommendation)

AstraZeneca COVID-19 vaccine

NACI recommends that either AstraZeneca COVID-19 vaccine or an mRNA COVID-19 vaccine product may be offered for the subsequent dose in a vaccine series started with an AstraZeneca COVID-19 vaccine. The previous dose should be counted, and the series need not be restarted. The recommendation to offer mRNA as the second dose is based on expert opinion and on the following elements:

- The risk of VITT after the first and second doses of the AstraZeneca vaccine
- The possibility of increased short-term reactogenicity with a mixed schedule
- Emerging data on immunogenicity of a mixed schedule of the AstraZeneca followed by the Pfizer-BioNTech vaccine

(Discretionary NACI Recommendation)

Rec #2 -NACI recommends that a complete series with a viral vector COVID-19 vaccine may be offered to individuals 30 years of age and older without contraindications ONLY if the individual prefers an earlier vaccine rather than to wait for an mRNA vaccine AND all of the following conditions apply:

a. The benefit-risk analysis* determines that the benefit of earlier vaccination with the viral vector COVID-19 vaccine outweighs the risk of COVID-19 while waiting for an mRNA COVID-19 vaccine; and
b. The benefits, relative risk* and consequences of VITT and COVID-19 for the individual are clearly outlined, factoring in the anticipated waiting time to receive an mRNA vaccine as well as other effective personal public health measures to mitigate risk of COVID-19, and the individual makes an informed decision based on an understanding about these risks and benefits; and
c. There will be substantial delay to receive an mRNA vaccine.

Note: Provinces and territories should adapt the age limit based on their local epidemiology.
(Discretionary NACI Recommendation)

Rec #3 - Based on emerging evidence of the protection provided by the first dose of a two-dose series for COVID-19 vaccines currently authorized in Canada, NACI recommends that in the context of limited COVID-19 vaccine supply and ongoing pandemic disease, jurisdictions should maximize the number of individuals benefiting from the first dose of vaccine by extending the second dose of COVID-19 vaccine up to four months after the first. Second doses should be offered as soon as possible after all eligible populations have been

offered first doses, with priority given to those at highest risk of severe illness and death from COVID-19 disease. Vaccinated people (with one or two doses) should continue to follow recommended public health measures. NACI will continue to monitor the evidence on effectiveness of an extended dose interval and will adjust recommendations as needed. (Strong NACI Recommendation)

Rec #4 - NACI recommends that all individuals should continue to practice recommended public health measures for prevention and control of SARS-CoV-2 infection and transmission regardless of vaccination with COVID-19 vaccine, at this time. **(Strong NACI Recommendation)**

PHAC Webinar: NACI Recommendations on Extended Dose Intervals for COVID-19 Vaccines webinar on May 5, 2021 – link to recording: https://nccid.ca/webcast/recommendations-of-the-national-advisory-committee-on-immunization-naci-on-extended-dose-intervals-for-covid-19-vaccines/

Rec #5 - NACI recommends that a complete series with a COVID-19 vaccine may be offered to individuals in the authorized age group without contraindications to the vaccine who have had previously PCR-confirmed SARS-CoV-2 infection. In the context of limited vaccine supply, initial doses may be prioritized for those who have not had a previously PCR-confirmed SARS-CoV-2 infection. **(Discretionary NACI Recommendation)**

The NACI recommendations may change as more evidence on safety and/or effectiveness in these populations becomes available. The complete list of NACI recommendations are available at: https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/recommendations-use-covid-19-vaccines.html#a7

Refer to Table 5 - Management options for types of COVID-19 vaccines authorized for use in Canada for a summary of evidence, rationale and factors for jurisdictions to consider when implementing COVID-19 immunization programs.

Recommendations on the use of COVID-19 vaccines in those who are immunosuppressed, have an autoimmune condition, are pregnant or are breastfeeding

Additional evidence is now available from real world use of COVID-19 vaccines, primarily mRNA vaccines, in these populations. In May 2021, NACI reviewed safety data, as well as COVID-19 risks for these groups. International real world data showed that COVID-19 vaccines are safe in these populations. As such, NACI recommendations for those who are immunosuppressed, have an autoimmune condition, are pregnant or are breastfeeding are now the same as the recommendations for the general adult population.

Updated recommendation[19] **May 28, 2021:** NACI preferentially recommends that a complete two-dose vaccine series with an mRNA COVID-19 vaccine (Pfizer-BioNTech, Moderna) should be offered to individuals in the authorized age group, including those who are immunosuppressed, have an autoimmune condition, are pregnant or are breastfeeding. If they are not able to receive an mRNA vaccine, for example because of an allergy, another authorized COVID-19 vaccine should be offered.

Individuals who are immunosuppressed from disease or treatment should be informed that they may have a reduced immune response to any authorized COVID-19 vaccine series.

Individuals who are immunosuppressed, have an autoimmune condition, or who are pregnant, or breastfeeding should be informed of the latest evidence on the safety of mRNA COVID-19 vaccines in order to make informed decisions.

Contraindications

The **Health Canada approved COVID-19 vaccines are contraindicated in individuals with a history of anaphylaxis after previous administration of the vaccine.** Vaccine is also contraindicated in persons with proven immediate or anaphylactic hypersensitivity to any component of the vaccine or its packaging. Clinical trials of the authorized COVID-19 vaccines excluded individuals with a history of severe adverse reaction associated with a vaccine and/or severe allergic reaction (e.g., anaphylaxis) to any component of the vaccine. **Individuals with a history of severe allergic reaction to a component of the COVID-19 vaccine should not receive the COVID-19 vaccine.**

Patients should be screened prior to receipt of each vaccine dose. Here's an example of a pre-vaccination checklist for COVID-19 vaccines from the Centers for Disease Control and Prevention : https://www.cdc.gov/vaccines/covid-19/downloads/pre-vaccination-screening-form.pdf

For a comprehensive list of components in the vaccine and packaging, please consult the product leaflet or information contained within the product monograph available through Health Canada's Drug Product Database.

Advice for specific populations

Children under 16 years of age

The Pfizer-BioNTech COVID-19 vaccine is currently approved by Health Canada for individuals who are 12 years of age and older (strong recommendation). The Moderna, Oxford-AstraZeneca, and Janssen COVID-19 vaccines are approved for 18 years of age and older. The authorized age group for vaccination may differ by province based on their local epidemiology. The COVID-19 vaccine(s) should not be offered to individuals who are not in the authorized age group. There are ongoing clinical trials on vaccine efficacy and safety in children aged 6 months and older and more data will be available in the coming months.

Advice for pregnant and breastfeeding women

Updated recommendation[19] **May 28, 2021:** NACI preferentially recommends that a complete two-dose vaccine series with an mRNA COVID-19 vaccine (Pfizer-BioNTech, Moderna) should be offered to individuals in the authorized age group, who are pregnant or are breastfeeding.
Also consult the advice on the Society of Obstetricians and Gynaecologists of Canada (SOGC) website here:

- SOGC Statement on COVID-19 Vaccination in Pregnancy

Advice for organ transplant recipients

Data from a recent prospective cohort study suggest that a substantial proportion of transplant recipients likely remain at risk for COVID-19 after 2 doses of mRNA vaccine.[20] Patients should continue to observe public health guidelines and other preventive measures to decrease risk of virus transmission.
Also read the advice from the Canadian Society of Transplantation website here:

- National Transplant Consensus Guidance on COVID-19 Vaccine (revised on May 18, 2021)

Advice for high-risk rheumatology patients

Please see the advice from the Canadian Rheumatology Association (CRA) website here:

- CRA Recommendation on Covid-19 Vaccination in Persons with Autoimmune Rheumatic Disease

Advice for individuals with alpha-1 antitrypsin deficiency

- What Alphas need to know by Dr. Ken Chapman – January 2021

Side by side comparison of COVID-19 Vaccines approved in Canada (as of May 5, 2021)

Vaccine	Type	Dose	Age	Efficacy one dose 'Symptomatic disease' Mild	Efficacy two dose 'Symptomatic disease' Mild	Severe**	Side effects	Storage	Variant
Pfizer-BioNTech	mRNA	2◆ 21 days apart	12 (+)	92% Recalculation, from 14 days after dose 1 until dose 2	94% ≥14 days after vaccination (95% in ≥65 yrs of age 7 or more days after dose 2)	100%	Chills, headache, pain, tiredness, and/or redness and swelling at the injection site, all of which generally resolve within a day or two Anaphylactic reaction+	2-8°C at the point of use for up to 1 month	Lab data suggest effectiveness against UK South-African and limited data re: P.1 and P.2 Brazil variants
Moderna	mRNA	2◆ 28 days apart	18 (+)	92% FDA data – for those that only received one dose more than 14 days from that dose	94% ≥14 days after vaccination(86% in those of ≥65 yrs of age)	100%	Similar to the Pfizer vaccine Anaphylactic reaction+	At 2°C up to 30 days -25° to -15°C up to 6 months	Similar to the Pfizer vaccine
Oxford-Astra-Zeneca&	Adenovirus based (virus vector)	2◆ 4 to 12 weeks apart	30 (+)	76% From 22 days to 90 days after dose 1	63 to 76% ≥15 days after vaccination (18 to 64 yrs of age)	85%	Tenderness, pain, warmth, redness, itching, swelling or bruising at the injection site, all of which generally resolve within a day or two. && - adverse event Vaccine-Induced Prothrombotic Immune Thrombocytopenia (VIPIT) under investigation	At 2° to 8° C for at least 6 months	Seems to work better against the mutation that emerged in the UK than the one that emerged in South Africa.
Janssen (Johnson & Johnson)	Adenovirus based (virus vector)	1	18 (+)	66% ≥28 days after single dose		76.7% and 85.4% at ≥14 days and ≥28 days post-vaccination	Fatigue, fever headache, injection site pain, or myalgia (pain in a muscle or group of muscles), all of which generally resolve within a day or two.#	At 2°C and 8°C for at least 3 months	Vaccine's effectiveness (FDA) B.1.1.7 variant of 64% overall and 82% against severe disease in South Africa (B.1.351 variant) Brazil P.2 Variant - 68% efficacious against moderate to severe/critical COVID-19

** Efficacy "symptomatic SEVERE COVID-19" may be defined differently from one study to the other. For example, for the RCTs of the vaccines AZ or Janssen, severe COVID-19 included hospital admission and death but not specifically for the RCTs of the vaccines of Pfizer and Moderna.

◆ Based on emerging evidence of the protection provided by the first dose of a two dose series for COVID-19 vaccines currently authorized in Canada, NACI recommends that in the context of limited COVID-19 vaccine supply jurisdictions should maximize the number of individuals benefiting from the first dose of vaccine by extending the second dose of COVID-19 vaccine up to four months after the first.

+During December 14, 2020 through January 18, 2021, a total of 9 943 247 doses of the Pfizer-BioNTech vaccine and 7 581 429 doses of the Moderna vaccine were reported administered in the US (CDC unpublished data, February 2021). CDC identified 66 case reports received by VAERS that met Brighton Collaboration case definition criteria for anaphylaxis (levels 1, 2 or 3): 47 following Pfizer-BioNTech vaccine, for a reporting rate of 4.7 cases/million doses administered, and 19 following Moderna vaccine, for a reporting rate of 2.5 cases/million doses administered. **Twenty-one (32%) of the 66 case reports noted a prior episode of anaphylaxis from other exposures.** 7 patients were admitted to ICU; 7 of those intubated received epinephrine, 6 received corticosteroids, and 5 received antihistamines; facial, tongue, or laryngeal angioedema was present in 4 of these patients; and hospitalization ranged from 1 to 3 days. No deaths from anaphylaxis after vaccination with either product were reported.

&Similar to the Janssen's vaccine, this is a carrier vaccine, made from a modified version of a harmless adenovirus. The analysis also showed the potential for the vaccine to reduce asymptomatic transmission of the virus by as much as 67%.

&& Rare cases of serious blood clots, including cerebral venous sinus thrombosis, associated with thrombocytopenia have been recently reported in Europe following post-licensure use of Oxford-AstraZeneca COVID-19 vaccine – more information at: https://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2021/75389a-eng.php

Milder side effect than the Pfizer and Moderna vaccines. Only one case of anaphylactic reaction reported. It will take time to come up with a firm estimate of how frequently this side effect occurs.

Advice for individuals with taking treatment for tuberculosis (TB) disease or latent TB infection
http://www.bccdc.ca/health-info/diseases-conditions/covid-19/priority-populations/tuberculosis-and-covid-19
Nearly everyone will be able to safely receive the COVID-19 vaccine, although a very small number of people may need to avoid vaccination due to severe allergies to parts of the vaccine.

- If you are taking treatment for TB disease or latent TB infection, it is safe to receive the COVID-19 vaccine when it is offered to you.
- If you are not tolerating your TB treatment, you should wait until your treatment is stable before receiving the COVID-19 vaccine. It is not a safety concern, but it is important to separate the side effects of your TB treatment from a potential side effect of the COVID-19 vaccine.

NOTE re: Drug interactions[19]
Tuberculin skin testing (TST) or interferon gamma release assay (IGRA)
There is a theoretical risk that mRNA or viral vector vaccines may temporarily affect cell-mediated immunity, resulting in false-negative TST or IGRA test results. If tuberculin skin testing or an IGRA test is required, it should be administered and read before immunization or delayed for at least 4 weeks after vaccination. Vaccination with COVID-19 vaccines may take place at any time after all steps of tuberculin skin testing have been completed.

In cases where an opportunity to perform the TST or IGRA test might be missed, the testing should not be delayed since these are theoretical considerations. However, re-testing (at least 4 weeks post immunization) of individuals with negative results for whom there is high suspicion of TB infection may be prudent in order to avoid missing cases due to potentially false-negative results.

Advice for immunosuppressed individuals including individuals receiving immunosuppressant therapy
Updated recommendation[19] May 28, 2021: NACI preferentially recommends that a complete two-dose vaccine series with an mRNA COVID-19 vaccine (Pfizer-BioNTech, Moderna) should be offered to individuals in the authorized age group, including those who are immunosuppressed. If they are not able to receive an mRNA vaccine, for example because of an allergy, another authorized COVID-19 vaccine should be offered.

- In general, **non-replicating vaccines may be administered to immunocompromised people because the antigens in the vaccine cannot replicate**. However, the magnitude and duration of vaccine-induced immunity are often reduced. It is currently unknown whether immunocompromised individuals will be able to mount an immune response to mRNA vaccines.
- The relative degree of immunodeficiency in individuals who are immunocompromised varies depending on the underlying condition, the progression of disease, and use of medications that suppress immune function. Therefore, the balance of benefits and risks must be made on a case-by-case basis.
- Individuals who are immunosuppressed from disease or treatment should be informed that they may have a reduced immune response to any authorized COVID-19 vaccine series.
- Although inactivated vaccines can be safely administered at any time before, during or after immunosuppression, inactivated vaccines should be administered at least 14 days before initiation of immunosuppressive therapy to optimize immunogenicity. [21]
- Active surveillance in these vaccine recipients is strongly encouraged.
- NACI and CTS will monitor the evidence as it evolves, and update these recommendations as needed.

Advice for individuals treated with a biological therapy for Asthma
The two large randomized controlled trials (RCTs) of the mRNA vaccines published in the NEJM (Pfizer-BioNTech and Moderna), the viral vector-based vaccines (Oxford-AstraZeneca) published in the Lancet and (Janssen – regulatory decision summary) did not include participants on (asthma) biologics. There is no biological rationale as to why anti-IgE, anti-IL5, anti-IL5R or even anti-IL4/13 therapies should place patients at higher risk for

adverse events. Of course, many of these patients **ALSO** have a history of severe allergy & anaphylaxis. The COVID-19 vaccine RCTs generally excluded these patients but, in post-emergency use authorization, the incidence of anaphylaxis has been about 1/100,000 vs. 1/1,000,000 for other vaccines. To our knowledge, none have resulted in fatality, and all have responded well to Epi-Pen and/or brief ER management.

Thus, patients with asthma on a biologic therapy should be advised:

- Risks are as above, but that benefits outweigh these;
- The COVID-19 vaccine should not be administered on the same day as a biologic for asthma.
- Patients with asthma should ideally receive a COVID vaccine 72 hours apart from their regular biologic, to make it easier to tell what injection may have caused a problem if the patient has a reaction.
- Individuals with a history of allergies must advise the staff at the vaccination site.
- Patients be advised to get vaccinated at a site with onsite EMS/physician coverage capable of providing initial treatment of severe allergic reactions and anaphylaxis.
- Patients be advised to have their Epi-Pen – where relevant – with them, current, and visible on the table at the time of receiving the COVID vaccination.

Advice for individuals with an autoimmune condition

Updated recommendation[19] **May 28, 2021:** NACI preferentially recommends that a complete two-dose vaccine series with an mRNA COVID-19 vaccine (Pfizer-BioNTech, Moderna) should be offered to individuals in the authorized age group, including those who have an autoimmune condition. If they are not able to receive an mRNA vaccine, for example because of an allergy, another authorized COVID-19 vaccine should be offered.

Responses to Frequently Asked Questions by Patients

This advice is for health care professionals and we cannot answer individual patient queries. Those looking for further information are advised to speak to their physician, who are best placed to answer specific questions.

1) Can I have a flu vaccination or the pneumococcal vaccination at the same time as a COVID vaccine?

NACI recommends that COVID-19 vaccines should not be given simultaneously with other vaccines (live or inactivated). Currently, no data exist on the simultaneous administration of COVID-19 vaccine with other vaccines. In the absence of evidence, attempts should be made to avoid simultaneous administration to maximize benefits of COVID-19 vaccination while minimizing any risks of harm, including the potential for immune interference or the erroneous attribution of an adverse event following immunization to a particular vaccine. However, if a COVID-19 vaccine is inadvertently administered at the same time as another vaccine, neither dose should be repeated.

In the absence of evidence, it would be prudent to wait for a period of at least 28 days after the administration of the complete two-dose vaccine series of an mRNA COVID-19 vaccine before the administration of another vaccine (except in the case where another vaccine is required for post-exposure prophylaxis) due to the elicitation of an inflammatory cytokine response. [19] It would be prudent to wait for a period of at least 14 days after the administration of another vaccine before administrating a COVID-19 vaccine to prevent erroneous attribution of an adverse event following immunization to a particular vaccine. [19]

Refer to Simultaneous administration with other vaccines[19] and Timing of Vaccine Administration in the Canadian Immunization Guide, Part 1 - Key Immunization Information for additional information on simultaneous administration of other vaccines in general.

2) Which COVID vaccine should I have?

The vaccines that are currently approved by Health Canada are effective and safe. However, many more vaccines will be approved over time. We will learn more about differences on the efficacy and safety profile of each of these vaccines. Based on updated knowledge from clinical trials and real life evidence from large population being vaccinated, it is possible that Health Canada makes changes and public health authorities consider making recommendations of preferable use of certain vaccines by age groups or for population with specific medical conditions. Due to suggested superior efficacy, mRNA COVID-19 vaccine is preferentially recommended for individuals in the authorized age group without contraindications, especially in those at highest risk of severe illness and death and highest risk of exposure to COVID-19 who are prioritized for early COVID-19 immunization.

3) Should I receive the vaccine and is the vaccine going to work considering I am immunocompromised?

Non-replicating vaccines may be administered to immunocompromised people because the antigens in the vaccine cannot replicate. However, the magnitude and duration of vaccine-induced immunity are often reduced. It is currently unknown whether immunocompromised individuals will be able to mount an immune response to mRNA vaccines.

4) Should I stop taking any of my medications (such as immunosuppressive medications) to make sure the vaccine works well?

You should not stop any of your medications. Immunocompromised persons, including individuals receiving immunosuppressant therapy, may have a diminished immune response to the vaccine. The Canadian Immunization Guide recommends inactivated vaccines be administered at least 14 days before initiation of immunosuppressive therapy to optimize immunogenicity.

5) I have been suffering from "Long COVID" – does this mean I shouldn't have the vaccine?

A prior SARS-CoV-2 infection may not provide adequate protection for reinfection, therefore, vaccination against COVID-19 is recommended. However, in setting of limited vaccine supply, doses may be prioritized for those who have not had previously PCR-confirmed SARS-CoV-2 infection.

6) What is the rationale for changing the interval between first and second doses?

The NACI statement on vaccine administration and timing of vaccine administration can be found here: https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/recommendations-use-covid-19-vaccines.html#b4

Useful Links

Canadian Thoracic Society

- COVID-19: Information for Healthcare Professionals & the Respiratory Community
- COVID-19 Vaccination Information for health care professionals

AMMI Canada (Association of Medical Microbiology and Infectious Disease Canada)
Educational webinars: https://www.ammi.ca/?ID=183&Language=ENG

American Thoracic Society
COVID-19 vaccination materials for professionals

British Thoracic Society
COVID-19 information for the respiratory community

Canadian Agency for Drugs and Technologies in Health (CADTH)
COVID-19 mRNA Vaccines for People with Cancer

Canadian Cancer Society
Cancer and COVID-19

Canadian Pharmacists Association
COVID-19 information and Resources

Canadian Society of Allergy & Clinical Immunology
https://csaci.ca/covid19-resources/

Canadian Paediatric Society
Online CME module re: Our best shot at beating COVID-19: Overcoming vaccine hesitancy in 2021
The module covers all ages and is accredited for specialists

CANVAX
COVID-19 Vaccine Questions and Answers for Healthcare Providers
COVID-19 resources on immunization

COVID-19 Respiratory Roundtable
Information for people with lung disease: https://cts-sct.ca/wp-content/uploads/2021/02/COVID-19-Respiratory-Roundtable-Website-URLsv2.docx

Immunize Canada
COVID-19 Immunization Information and Q&A

This document was prepared and is updated by members the CTS COVID-19 Task Force:
Dina Brooks (President, CTS), Paul Hernandez (President-Elect, CTS), Anne Van Dam (Director of Knowledge Mobilization, CTS), Janet, Sutherland (Executive Director, CTS), Elizabeth French (Chair, Canadian Respiratory Health Professionals (CRHP)), Jean Bourbeau (Chair, Business Development Committee, CTS), Sze Man Tse (Past-Chair, Pediatric Assembly), Brianna Workman (Manager, Government Policy, IMPACT Public Affairs).

With thanks to the following Chairs of CTS Assemblies, CTS Executive Members other experts: Asthma (Connie Yang), Chest Procedures (Christopher Hergott), COPD (Mohit Bhutani and Gail Dechman), Interstitial Lung Disease (Martin Kolb), Pediatric (Tamizan Kherani), Pulmonary Vascular Disease (Andrew Hirsch), Tuberculosis (Richard Menzies), CTS Executive (Richard Leigh and Mohit Bhutani), and Immunologist (Dawn Bowdish).

References

1. Baron G, Gosselin V, Petit G, et al. Determinants of influenza vaccination among a large adult population in Quebec. *Human Vaccines & Immunotherapeutics*. 2018 14(11): 2722-2727.
2. Bourbeau J, Sebaldt RJ, Day A, et al. Practice patterns in the management of chronic obstructive pulmonary disease in primary practice : The CAGE study. *Can Respir J*. 2008;15(1):13-9.

3. Vozoris NT, Lougheed MD. Influenza vaccination among Canadians with chronic respiratory disease. *Respir Med*. 2009;103(1):50-8.
4. Krueger P, St. Amant O, Loeb M. Predictors of pneumococcal vaccination among older adults with pneumonia : findings from the Community Acquired Pneumonia Impact Study. *BMC Geriatr*. 2010;10:44.
5. Okapuu JM, Chétrit E, Lefebvre B. How many individuals with asthma need to be vaccinated to prevent one case of invasive pneumococcal disease? *Can J Infect Dis Med Microbiol*. 2014;25(3):147-50.
6. Parkins MD, McNeil SA, Laupland KB. Routine immunization of adults in Canada: Review of the epidemiology of vaccine-preventable diseases and current recommendations for primary prevention. *Can J Infect Dis Med Microbiol*. 2009;20(3):e81-90. 20(3).
7. Public Health Agency of Canada. Vaccination Coverage Goals and Vaccine Preventable Disease Reduction Targets by 2025. Available at: https://www.canada.ca/en/public-health/ services/immunization-vaccine-priorities/ national-immunization-strategy/ vaccination-coverage-goals-vaccinepreventable-diseases-reduction-targets-2025. html. Accessed on February 5, 2021.
8. Boerner F, Keelan J, Winton L, et al. Understanding the interplay of factors informing vaccination behavior in three Canadian provinces. *Human Vaccines & Immunotherapeutics*. 2013;9(7):1477-1484.
9. Polisena J, Chen Y, Manuel D. The proportion of influenza vaccination in Ontario, Canada in 2007/2008 compared with other provinces. *Vaccine*. 2012;30(11):1981–1985.
10. Polack FP, Thomas SJ, Kitchin N, et al. Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. *N Engl J Med.* 2020; 383:2603-2615. DOI: 10.1056/NEJMoa2034577.
11. Baden LR, El Sahly HM, Essink B, et al. Efficacy and Safety of the mRNA-1273 SARS-CoV-2 Vaccine. *N Engl J Med*. 2021; 384:403-416. DOI: 10.1056/NEJMoa2035389.
12. Voysey, M, Costa Clemens SA, Madhi SA, et al. Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *The Lancet*. 2020;397(10269):99-111. DOI:10.1016/S0140-6736(20)32661-1.
13. Sadoff J, Le Gars M, Shukarev G, et al. Interim Results of a Phase 1–2a Trial of Ad26.COV2.S Covid-19 Vaccine. *N Engl J Med.* 2021; 384:1824-1835. DOI: 10.1056/NEJMoa2034201
14. Government of Canada. Regulatory Decision Summary - Janssen COVID-19 Vaccine - Health Canada. Available at: https://covid-vaccine.canada.ca/info/regulatory-decision-summary-detailTwo.html?linkID=RDS00779. Accessed on March 8, 2021.
15. European Medicines Agency (EMA). COVID-19 Vaccine AstraZeneca: benefits still outweigh the risks despite possible link to rare blood clots with low platelets. Amsterdam: EMA; 2021 Mar 18. Available from: https://www.ema.europa.eu/en/news/covid-19-vaccine-astrazeneca-benefits-still-outweigh-risks-despite-possible-link-rare-blood-clots. Accessed on April 6, 2021
16. Paul-Ehrlich-Institut (PEI). Federal Institute for Vaccines and Biomedicine. Suspension vaccination As-traZeneca. Langen, Hesse (Germany): Paul-Ehrlich-Institut; 2021 Mar 16. Available from: https://www.pei.de/EN/service/faq/coronavirus/faq-coronavirus-node.html?cms_tabcounter=3. Accessed on April 6, 2021.
17. Pai M, Grill A, Maltsev A, Miller KJ, Razak F, Schull M, et al. Vaccine-Induced Prothrombotic Immune Thrombocytopenia (VIPIT) following AstraZeneca COVID-19 vaccination. Version 1.0. Ontario COVID-19 Science Advisory Table. 2021 Mar 26. doi: https://doi.org/10.47326/ocsat.2021.02.17.1.0.
18. Paul-Ehrlich-Institut (PEI). Federal Institute for Vaccines and Biomedicine. COVID-19 Vaccine AstraZeneca - Safety assessment result: The vaccine is safe and effective in the fight against COVID-19. Langen, Hesse (Germany): Paul-Ehrlich-Institut; 2021 Mar 19. Available from: https://www.pei.de/EN/newsroom/hp-news/2021/210319-covid-19-vaccine-astrazeneca-safety-assessment-result-vaccine-safe-and-effective.html. Accessed on April 6, 2021.
19. Government of Canada. National Advisory Committee on Immunization (NACI): Statements and publications. Available at: https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci.html. Accessed on March 2 and on March 8, 2021.
20. Boyarsky BJ, Werbel WA, Avery RK, et al. Antibody Response to 2-Dose SARS-CoV-2 mRNA Vaccine Series in Solid Organ Transplant Recipients. *JAMA*. 2021. doi:10.1001/jama.2021.7489
21. Government of Canada. Immunization of immunocompromised persons: Canadian Immunization Guide. Available at: https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-8-immunization-immunocompromised-persons.html#a25. Accessed on February 17, 2021.