Clinical Guidance on COVID-19 Vaccines for People with Significant Neuromuscular Conditions Who Require Respiratory Support

This guidance is intended for health-care providers and is based on known evidence as of November 8, 2022.

Background and Context

Patients with neuromuscular conditions with significant respiratory muscle weakness are at increased risk of hospitalization and mortality from COVID-19. This includes individuals with significant diseases of the neurologic system including the brain, spinal cord, motor nerves and muscles who, because of their condition require respiratory support in the form of home ventilation or bilevel positive airway pressure in order to function in daily life.

This includes individuals requiring respiratory support with the following conditions:

- Motor neuron disease
- Muscular dystrophy
- Peripheral neuropathy including Guillain Barre Syndrome, Charcot-Marie Tooth disease, critical illness neuropathy
- Myopathies including congenital myopathies, myofibrillar myopathies, metabolic myopathies, critical illness myopathy
- Other neuromuscular conditions where breathing muscles are severely impacted due to their conditions
- While people with spinal cord injury are not considered to be at increased risk of getting infected with the COVID-19 virus, those with a spinal cord injury requiring ventilatory support have the same risk factors as other conditions requiring respiratory support mentioned above, thus the clinical judgment is that their risks are similarly high.

This guidance is based on a review of the vaccines approved by Health Canada for the prevention of COVID-19 disease caused by the SARS-CoV-2 virus:

- **mRNA vaccines:** tozinameran (COMIRNATY, Pfizer-BioNTech), tozinameran and riltozinameran (COMIRNATY Bivalent original & BA.1, Pfizer-BioNTech), tozinameran and famtozinameran (COMIRNATY Bivalent original & BA.4/BA.4, Pfizer-BioNTech), elasomeran (SPIKEVAX, Moderna), elasomeran and imelasomeran (SPIKEVAX Bivalent original & BA.1, Moderna)
- **Viral vector vaccine:** ChADOx1-S (VAXZEVRIA, AstraZeneca), Ad26.COV2.S (JCVODEN, Janssen)
- **Recombinant protein vaccine:** COVID-19 Vaccine (recombinant protein, adjuvanted) (NUVAXOVID, Novavax)
COVID-19 Vaccines for People with Neuromuscular Conditions Requiring Respiratory Support  
*Updated November 8, 2022*

- **Plant based virus-like particle (VLP) vaccine**: COVID-19 Vaccine ([VLP], recombinant, adjuvanted) (COVIFENZ, Medicago)\(^{13}\)

Currently, anyone in British Columbia (B.C.) who is aged 6 months and older is eligible for COVID-19 immunization. The mRNA vaccine SPIKEVAX (Moderna) and COMIRNATY (Pfizer-BioNTech) have been approved for children 6 months to 11 years of age, with young children getting a smaller dose of the same vaccine used for youth and adults.\(^{14}\) National Advisory Committee on Immunization (NACI) has released their statement for these age groups.\(^{15,16,17}\)

People who receive the mRNA vaccine (COMIRNATY [Pfizer-BioNTech] or SPIKEVAX [Moderna]) for their first dose, will be offered either mRNA vaccine for subsequent doses, with the exception of preferential recommendations based on age and immunosuppression.\(^{18,19}\) B.C. has taken the proactive step to expand booster doses for all individuals 5 years and older, not just those at high risk. However, it is particularly recommended for individuals 5-17 years of age who are at **higher risk of severe illness** due to COVID-19 infection.\(^{20,21}\) All booster doses will be mRNA vaccines.\(^{22}\) For those who are not able, or willing, to receive mRNA vaccines, Novavax is available as an alternative for individuals 18 years of age and older.

**Booster doses:**

As part of the Fall 2022 booster dose program, B.C. is making plans to offer everyone 5 years and older a booster dose. NACI has been clear this approach will provide the best protection in the Fall and Winter when we’re all spending more time inside and respiratory illness is passed around our communities.\(^{23}\)

SPIKEVAX BIVALENT BA.1 (Moderna) (50 mcg) is the preferred product in B.C. for moderately to severely immunosuppressed individuals 12 years and older. SPIKEVAX original (Moderna) (100 mcg) primary series has been associated with a higher seroconversion rate among immunocompromised adult patients compared to COMIRNATY original (Pfizer-BioNTech) (30 mcg). In a general population of adults, booster vaccination with SPIKEVAX original (Moderna) (50 mcg) was also found to be more effective than COMIRNATY original (Pfizer-BioNTech) (30 mcg) during a period of Delta followed by Omicron variant dominance. However, these studies were conducted prior to the emergence of the Omicron BA.4/BA.5 Variant of Concern (VOC), and their applicability to all Omicron sublineages is uncertain.\(^{23}\) Health Canada has recently authorized an adapted version of the SPIKEVAX (Moderna) COVID-19 vaccine that targets the Omicron BA.4/BA.5 subvariants.\(^{24}\)

**Patients who have tested positive for COVID-19:**

Booster doses may be deferred in those who have tested positive for COVID-19 until 3-6 months from symptom onset or, for asymptomatic cases, from the time of the positive test.\(^{25}\) This suggested interval is based on immunological principles and expert opinion. When considering whether or not to administer vaccine doses following the suggested 3–6-month interval, biological and social risk factors for exposure (e.g., local epidemiology, circulation of VOCs, living settings) and severe disease should also be taken into account. As these intervals are to be used as a guide, clinical discretion is advised.

COVID-19 vaccination may be offered to individuals at any time following recovery from SARS-CoV-2 infection.
COVID-19 Vaccines for People with Neuromuscular Conditions Requiring Respiratory Support

Updated November 8, 2022

Intervals between doses:

Individuals requesting a shorter interval between doses should be informed that this actually offers less optimal protection, but their request for an earlier dose should be granted, without need for Medical Health Officer approval, provided the minimum interval between doses has been observed.\(^26\)

The minimum interval between completion of the primary series, or a previous booster dose, and the Fall booster dose is 3 months. This revised minimum interval additionally applies to pregnant people and aligns with NACI’s updated guidance on COVID-19 vaccines for individuals who are pregnant or breastfeeding. The exception to this is JCVODEN (Janssen) for which the minimum interval is 8 weeks between the single dose of JCVODEN (Janssen) and the booster dose.\(^27\)

Other vaccines:

**VAXZEVRIA (AstraZeneca)**\(^10\)

The VAXZEVRIA (AstraZeneca)\(^10\) vaccine program has been stopped in B.C. for first doses, unless there is a contraindication to the mRNA vaccines, or as advised by the Medical Health Officer or an allergist,\(^18\) due to infrequent (1:50,000) but serious Vaccine-Induced Thrombotic Thrombocytopenia (VITT) blood clotting events after the first dose.\(^28\)

The Government of Canada is not securing additional VAXZEVRIA doses.

**JCVODEN (Janssen)**\(^11\)

The JCVODEN\(^11\) one-dose viral vector vaccine is now available in limited supply in B.C. However, mRNA vaccines are preferred over viral vector vaccines due to better effectiveness and immunogenicity of mRNA vaccines and the possible adverse effects specifically associated with viral vector vaccines (e.g., Thrombosis and Thrombocytopenia Syndrome [TTS]). A viral vector COVID-19 vaccine should only be considered when all other authorized COVID-19 vaccines are contraindicated or have been refused, due to the reduced effectiveness and the possible adverse effects associated with viral vector vaccines (e.g., TTS).

**NUVAXOVID (Novavax)**\(^12\)

NUVAXOVID\(^12\) is a different class of vaccination, a protein subunit vaccine that will give British Columbians another option to protect themselves against COVID-19 infection. NUVAXOVID may be offered to individuals for whom COVID-19 mRNA vaccines are contraindicated or have been refused.\(^29\) This vaccine is available to people aged 18 years and older. It is a two-dose vaccine and a limited number of doses will be available in B.C.\(^30\)

**COVIFENZ (Medicago)**\(^13\)

COVIFENZ\(^13\) is a different class of vaccination, a plant-based virus-like particle vaccine that will give British Columbians another option to protect themselves against COVID-19 infection. COVIFENZ is approved for people who are 18 to 64 years of age. It is a two-dose vaccine and a limited number of doses will be available in B.C.\(^13\) This product is not yet available in Canada.
Is COVID-19 immunization recommended for patients with neuromuscular conditions who require respiratory support?

COVID-19 immunization should be encouraged for patients with neuromuscular conditions requiring respiratory support and is not contraindicated, including those who have had COVID-19 infection. This recommendation is based on the following factors:

- Patients with neuromuscular conditions who require respiratory support at baseline are at extremely high risk for morbidity and mortality if they are infected with COVID-19; many would not be able to be extubated if intubation was required.
- Weakness of respiratory muscles in individuals with neuromuscular disorders may result in impaired ability to take a deep breath, impaired cough reflex, and ineffective airway clearance of secretions predisposing to atelectasis and lung infection. Acute respiratory failure may rapidly evolve in patients with chronic respiratory failure secondary to neuromuscular weakness. Risks include prolonged invasive ventilation, deterioration of respiratory or skeletal muscle function or death.

While data specific to the safety and efficacy of COVID-19 vaccines for people with neuromuscular disorders is currently limited, there are data to suggest that the currently available COVID-19 vaccines have efficacy. The authors of this guidance agree that the benefits of vaccine-induced immunity against COVID-19 for this population outweigh any theoretical risks of immunization.

Is COVID-19 immunization efficacious and safe for patients with neuromuscular conditions who require respiratory support?

Patients with neuromuscular disease requiring respiratory support were not specifically included in the COVID-19 vaccine trials; therefore, efficacy in this population is unknown. However, there is no reason to believe the vaccine will be less efficacious in patients with neuromuscular disease requiring respiratory support than in the population studied in the clinical trials. Patients with chronic pulmonary disease comprised 7.8% of patients in the Pfizer-BioNTech vaccine trial and patients with hemiplegia and paraplegia comprised 0.1% of patients in the trial.

The Food and Drug Administration (FDA) have issued a for the Janssen COVID-19 vaccine about the increased risk of developing Guillain-Barré syndrome (GBS) in the 42 days after vaccination. The GBS/CIDP Foundation recommends that patients who have developed their disease within 6 weeks of receiving a COVID-19 vaccination, they should make an informed consent after discussing the risks versus benefits with their healthcare professional about receiving a second dose of vaccine that is of a different type, preferably mRNA, as per the NACI guidance.

Patients with Duchenne’s Muscular Dystrophy (DMD) who require respiratory support and who are receiving deflazacort or prednisone will require additional counseling on efficacy and timing of their vaccine with their treatment, as deflazacort and prednisone are immunosuppressing/immunomodulating. There is limited evidence about the efficacy of the Pfizer BioNTech and Moderna vaccines in people who are immunocompromised due to treatment, as
immunocompromised patients were not included in the trials. It is unknown if the currently available COVID-19 vaccines are efficacious in those who take immunosuppressants compared to those who are not considered immunosuppressed.

- It is possible that, because of their immunosuppression from treatment, these patients will have a blunted immune response to the vaccine. Because of their increased risk to COVID-19, the vaccine is recommended for patients with neuromuscular conditions who are immunocompromised, but these patients should be informed that they may have a diminished immune response to any of the authorized COVID-19 vaccines. As per NACI, safety data in immunocompromised individuals, including those receiving immunosuppressive therapy, were available from observational studies in people who were taking immunosuppressive therapies. The frequency and severity of adverse events following vaccination with an mRNA COVID-19 vaccine were comparable to that of non-immunocompromised individuals in these studies and what was reported in clinical trials. Safety data in these populations following vaccination with a viral vector vaccine is not available.
- Health-care providers caring for DMD patients being treated with deflazacort or prednisone can refer to the clinical guidance for patients with neuromuscular receiving immunosuppressing/immunomodulating therapy.

**Are there any specific contraindications or exceptions for patients with neuromuscular conditions who require respiratory support?**

Individuals who have had a severe allergic reaction to an ingredient of one type of COVID-19 vaccine are still able to receive future doses of the other type of vaccine. BCCDC has a list of the individual components and their purpose in the vaccines. For a complete list of components in the vaccine, consult the vaccine monographs found at: [www.bccdc.ca/health-info/diseases-conditions/covid-19/covid-19-vaccine/vaccines-for-covid-19](http://www.bccdc.ca/health-info/diseases-conditions/covid-19/covid-19-vaccine/vaccines-for-covid-19).

For individuals with a history of anaphylactic reaction to a previous dose of an mRNA COVID-19 vaccine, re-vaccination (i.e., administration of a subsequent dose in the series when indicated) may be offered with the same vaccine or the same mRNA platform if a risk assessment deems that the benefits outweigh the potential risks for the individual and if informed consent is provided. Prior to revaccination, consultation with an allergist or another appropriate physician (e.g., Medical Health Officer) is advised. If re-vaccination is going ahead, vaccine administration should be done in a controlled setting with expertise and equipment to manage anaphylaxis, with an extended period of observation of at least 30 minutes after re-vaccination.

Health Canada continues to monitor any adverse events following immunization through their post-authorization surveillance process.

COVID-19 vaccines can be given concomitantly with, or any time before or after any other live or inactivated vaccine.
Are there specific recommendations or considerations for safe and/or most effective vaccine administration?

Individuals with muscle disease may not have adequate deltoid muscle mass, in which case the anterolateral thigh can be used to administer the vaccine.41

Otherwise, there are no other specific recommendations that pertain to this population unless they have comorbidities requiring special care, such as being treated with immunosuppressive or immunomodulating therapy, in which case health-care providers can refer to clinical guidance for people with autoimmune neuromuscular disorders receiving immunosuppressive/immunomodulating therapy.

References

15. National Advisory Committee on Immunization. Recommendations on the use of the Moderna Spikevax COVID-19 vaccine in children 6 months - 5 years of age. 14 July 2022. Available at: https://www.canada.ca/content/dam/phac-aspc/documents/services/immunization/national-advisory-
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