

# Draft public health considerations related to the implementation of COVID-19 vaccine requirements for the federal workforce

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The Government of Canada (GOC) announced on August 13th its intent to require COVID-19 vaccination as early as the end of September across the federal public service. In addition, as soon as possible in the Fall and no later than the end of October, the GOC will require employees in the federally regulated air, rail, and marine transportation sectors to be vaccinated. The vaccination requirement will also extend to certain travellers. This includes all commercial air travellers, passengers on interprovincial trains, and passengers on large marine vessels with overnight accommodations, such as cruise ships. Further, the GOC expects that Crown Corporations and other employers in the federally regulated sector will also require vaccination for their employees. The government will work with these employers to ensure this result<sup>1</sup>. As The GOC is currently exploring options for implementing these COVID-19 vaccine requirements, the Public Health Agency of Canada (PHAC) has been asked to provide scientific and public health evidence or considerations of relevance.

The COVID-19 pandemic has had an unprecedented impact on the health of Canadians. Reducing the direct health impacts of COVID-19 and maintaining health care capacity with various public health measures (closures, physical distancing and masking) has been extremely challenging and has affected a larger range of health outcomes across populations in Canada.<sup>2</sup> COVID-19 vaccines are a critical tool<sup>3</sup> that will help bring an end to the crisis phase of the pandemic, resume societal functioning and achieve widespread immunity in a safe way.

This document highlights key evidence in the areas of epidemiology, vaccine science and immunization programs related to COVID-19 vaccine requirements. The strength of the evidence presented is qualitatively labelled as strong, medium or weak.

Summary of key points:

- The fourth wave of COVID-19 has started in Canada and will most likely be driven by the Delta variant. The majority of cases, hospitalisations and fatal outcomes are occurring among unvaccinated people. The Delta variant is much more contagious than other SARS-CoV2 viruses that have circulated in Canada; it spreads faster and increases risk of hospitalizations. SARS-CoV2 is known to be more transmissible in indoor crowded spaces, including workplaces.

<sup>1</sup> News release: <https://www.newswire.ca/news-releases/government-of-canada-to-require-vaccination-of-federal-workforce-and-federally-regulated-transportation-sector-818056331.html>

<sup>2</sup> [From risk to resilience: An equity approach to COVID-19 – The Chief Public Health Officer of Canada's Report on the State of Public Health in Canada 2020 - Canada.ca](https://www.canada.ca/en/public-health/services/reports-publications/2020-2021-report-on-the-state-of-public-health-in-canada.html)

<sup>3</sup> <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines>

- Most recent modelling and forecasting studies indicate that with the current vaccination coverage levels, although very good, the health care capacity could be exceeded during this wave. To minimize this possibility, 80% or more of all eligible age groups would need to be fully vaccinated. However, overall 2-dose coverage for the eligible general population in Canada is 71.3% and much lower in the younger age groups (51% in the 18-29 year olds) as of mid-August 2021. Increasing the coverage rate in the 18 to 39 year old group is a priority, as they are the group with the most cases at this time. However, a strong resurgence of cases may not necessarily be associated with a sharp increase in hospitalizations given high Canadian vaccine coverage in older age groups (who are more likely to be hospitalized compared to younger age groups).
- COVID-19 vaccines are very effective (including against the Delta variant) the benefits outweigh any safety risks. It is strongly recommended that all eligible Canadians receive a full course of vaccines as soon as possible. Before we had vaccines, public health measures that were implemented to “flatten the curves” were effective to preserve hospital capacity and save lives, but with some important limits. Closings and physical distancing have major impacts on other health issues, children, the economy and societal functioning and are not sustainable in the long term. Vaccines are a critical tool to resume societal functioning and achieve widespread immunity in a safe way. Indeed, once the vaccination campaign started for priority groups, deaths and severe outcomes in the most vulnerable, including the elderly, have sharply declined.
- Vaccine uptake has plateaued and other countries are facing this challenge. To stimulate uptake, an increasing number of countries as well as provinces and territories are implementing or contemplating vaccine mandates or passports for specific sectors. The impact of these policies on vaccine uptake will be better known as they roll out.
- For non COVID-19 vaccines, vaccine mandates exist and they can be effective to increase uptake. This strategy is mostly effective for individuals that are complacent or not prioritizing vaccination in their day to day life. Other strategies that are more dialogue based are effective to motivate vaccine hesitant individuals. Combinations of strategies are most effective to optimize uptake.
- While COVID-19 vaccines are very effective, particularly against severe outcomes, no vaccine works perfectly, and there is a percentage of the population who are vaccinated that will become infected. The currently available vaccines are somewhat less effective against infection and symptomatic disease for the Delta variant compared to the ancestral and Alpha strains. Therefore, until widespread immunity is attained in the Canadian population, some additional public health measures such as masking and reductions in contacts will still be needed at times, especially in crowded indoor settings. These measures are also needed to protect people who do not respond as well to vaccines, have contraindications and cannot receive them or who are not vaccinated. These considerations are likely to have implications for occupational health.

#### Epidemiology (strong level of evidence unless indicated otherwise)

- The fourth wave of COVID-19 has started in Canada and it will be different than previous waves because it is occurring in the context of the significant uptake in vaccination. While incidence rates remain low after the end of the third wave, rates are starting to increase in British Columbia, Alberta, Saskatchewan, Ontario, Quebec, and New Brunswick, following the relaxation of public health measures. Incidence is highest, and increasing most rapidly, in the 20-39 year age group,

which constitute an important proportion of the workforce. The  $R_t$  in Canada is now above 1.0, indicating that transmission will continue to increase in the following weeks<sup>4</sup>.

- The B.1.617.2 (Delta) variant is now well established in Canada and will likely be the dominant strain of the fourth wave. Most recent modelling and forecasting studies indicate that with the current vaccination coverage levels, and predicted increases in contacts as reopening continues, the health care capacity could be exceeded<sup>5</sup> (medium level of evidence). This highlights the importance of continuing efforts to increase vaccine uptake in Canada, with at least 80% of the all eligible age groups fully vaccinated, given that the Delta variant is much more contagious than previous strains/variants circulating in Canada and a complete two-dose series of COVID-19 vaccine provides substantial protection against the variant<sup>28</sup>.
- The majority of SARS-CoV-2 cases in Canada are in unvaccinated people. Since December 14, 2020, when the vaccination program began, 89.4% (n=554,523) of all cases were unvaccinated; An additional 5.4% (n=32,845) were cases not yet protected from vaccination (within 14 days from the first dose) and 4.7% (n=29,279) were partially vaccinated. Only 0.6% (n=3,457) of cases were fully vaccinated. Among unvaccinated cases 10.7% (n=55,706) were asymptomatic, while 14.9% (n=4,041) of partially vaccinated cases were asymptomatic and 28.1% (n=891) of fully vaccinated cases were asymptomatic<sup>6</sup>.
- Being unvaccinated has become an important risk factor for hospitalization. Since May 1, 2021 the COVID-19 hospitalization rates among unvaccinated populations are considerably higher than the hospitalization rates for both partially and fully vaccinated populations (see Figure 1 in the Annex)
- Although mortality rates are currently low for all populations, mortality rates in unvaccinated populations are higher than those that are partially and fully vaccinated.

Delta variant (strong level of evidence)

- Genetic variations of viruses are common and expected. A variant of concern or VOC may be more contagious, cause more severe illness or impact tests, treatments or vaccines<sup>7</sup>.

<sup>4</sup> <https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html>

<sup>5</sup> <https://www.canada.ca/content/dam/phac-aspc/documents/services/diseases-maladies/coronavirus-disease-covid-19/epidemiological-economic-research-data/update-covid-19-canada-epidemiology-modelling-20210730-en.pdf>

<sup>6</sup> <https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html#a9>

<sup>7</sup> <https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/> (consulted August 12<sup>th</sup>)

- Four Variants of Concern (VOCs) have been detected in Canada, the Delta variant is the most contagious variant observed to date, spreading an estimated 50% faster than the Alpha variant<sup>8 9 10</sup>
- The number of cases with the Delta variant has increased more than 6-fold from early June to mid-July and is the main strain detected in most affected provinces and territories. Unvaccinated cases of Delta are over two times more likely to be hospitalized compared to unvaccinated Alpha cases<sup>11</sup>.
- A higher proportion of partially and fully vaccinated cases with Delta are hospitalized compared to other VOCs and non-VOCs (see Figure 2 in the Annex).
- Presently, those who are unvaccinated are at greatest risk of infection and severe outcomes. Spread in areas with low vaccination coverage presents an ongoing risk for emergence of, and replacement by, new variants.

#### Vaccine coverage (strong evidence unless indicated otherwise)

- Overall 2-dose coverage for the eligible general population in Canada is 71.3%<sup>12</sup>, although lower coverage is observed for 18-29 year olds (51.3%)<sup>13</sup>
- To minimize the impact of the fourth wave driven by Delta variant, modelling indicates that over 80% of all eligible age groups need to be fully vaccinated. Increasing the 2-dose coverage rate at 80% in the 18-39 year olds is of particular relevance to achieve this objective (medium level evidence based on modelling).
- COVID-19 vaccination coverage throughout the Federal Public Service is currently unknown but knowledge of some key sociodemographic characteristics such as geographical location and age group<sup>14</sup> permit inferences for vaccination coverage. For example, the average age for a Federal Public Service employee is just over 43 years old and 2-dose coverage for this particular age group in the general Canadian population is 67.5%. Furthermore, only 8% of Federal Public Service employees are in the age group (60-69 year olds) for which 2-dose coverage (83.5%) is the highest. In conclusion, 2-dose coverage for Federal Public Service employees could range from 51.3% to 73.1%, however this group may differ from the general population in some demographic characteristics such as income, education level or gender distribution that are associated with higher levels of vaccination.

<sup>8</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/993879/Variants\\_of\\_Concern\\_VOC\\_Technical\\_Briefing\\_15.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/993879/Variants_of_Concern_VOC_Technical_Briefing_15.pdf)

<sup>9</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1001359/Variants\\_of\\_Concern\\_VOC\\_Technical\\_Briefing\\_16.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001359/Variants_of_Concern_VOC_Technical_Briefing_16.pdf)

<sup>10</sup> <https://www.gov.uk/government/publications/investigation-of-sars-cov-2-variants-of-concern-variant-risk-assessments>

<sup>11</sup> Detailed case information received by PHAC from provinces and territories

<sup>12</sup> Little, N. (2021) [COVID-19 Tracker Canada](#); Saskatchewan PHU; Statistic Canada – Population estimates 2021,

<sup>13</sup> [COVID-19 vaccination coverage in Canada - Canada.ca](#) (Table 2, consulted August 12)

<sup>14</sup> <https://www.tbs-sct.gc.ca/ems-sgd/edb-bdd/index-eng.html#orgs/gov/gov/infograph/people>

## Vaccine Science

NACI and Health Canada (HC) have different roles when it comes to vaccines. HC, as Canada's regulator, evaluates data from clinical trials, determining if the vaccine is safe and efficacious and if it should be authorized for use in Canada. Authorization is based on specific schedules and conditions that took place in clinical trials, as submitted by the manufacturer. HC does not dictate the practice of medicine or make recommendations on how vaccines should be used in different age groups and sub-populations for Public Health impact.

When developing recommendations, NACI assesses how to use vaccine for greatest benefit. To inform its recommendations, NACI reviews the most up-to-date data from clinical trials and real world use; COVID-19 epidemiology and risks for population subgroups; vaccine supply in Canada; ethical and equity considerations. It is not uncommon for NACI to provide recommendations that are broader/narrower than the conditions of use approved by HC regulator. NACI's guidance is advisory in nature - immunization program planning and delivery is a provincial/territorial (PT) responsibility and is based on their unique needs and circumstances, including public health considerations, local epidemiology, healthcare system capacity and vaccine management logistics.

Based on its review, NACI strongly recommends that all eligible Canadians be vaccinated with a full series of a COVID-19 vaccine, with a preference for the mRNA vaccines<sup>15</sup>. The PHAC has continuously recommended that all eligible Canadians be vaccinated as soon as possible as vaccination is a key measure to protect themselves and their communities from the consequences of COVID-19 and to increase opportunities to return to a more normal situation, including easing of measures put in place to limit transmission, increasing social contacts, and resumption of economic activity<sup>16</sup>.

## Vaccine efficacy and effectiveness

Evidence indicates that vaccines are very effective at preventing severe illness, hospitalization and death from COVID-19, including against Alpha and Delta variants of concern. Recent reports in Canada indicate that less than 1% of those who were fully vaccinated have become sick with COVID-19. In addition, people who are fully vaccinated with a COVID-19 vaccine are less likely to have symptomatic COVID-19 disease or asymptomatic SARS-CoV-2 infection compared to unvaccinated individuals. mRNA vaccines (Pfizer-BioNTech and Moderna) appear to have higher vaccine effectiveness against symptomatic COVID-19 and asymptomatic SARS-CoV-2 infection than viral vector vaccines (AstraZeneca).

## COVID-19 vaccines have high efficacy (strong evidence)

- In clinical trials, the estimated efficacy against symptomatic illness after a complete vaccine series was:

<sup>15</sup> <https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/recommendations-use-covid-19-vaccines.html>

<sup>16</sup> <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/awareness-resources/vaccinated-against-covid-19-public-health-measures.html>

- 94% with Pfizer-BioNTech in individuals 16 years of age and older and 95% in individuals 65 years of age and older<sup>17,18</sup>;
- 94% with Moderna in individuals 18 years of age and older and 86% in individuals 65 years of age and older<sup>19</sup>; and
- 62% with AstraZeneca in individuals 18-64 years of age<sup>20</sup>.

COVID-19 vaccines have high effectiveness (strong evidence unless indicated otherwise)

- In field studies, complete series of vaccines authorized in Canada have shown that they were 66% to 97% effective at preventing symptomatic infections, hospitalizations and deaths. The effectiveness of mRNA vaccines, which have been mostly used in Canada, is generally in the higher levels of that bracket (see Table 1 in Annex for details).
- Provincial data for health care workers in Québec showed that mRNA vaccines were 94.2% effective against symptomatic disease after 2 doses and 97.9% effective against hospitalization after one dose. The two dose hospitalization vaccine effectiveness is not able to be estimated as there were no hospitalizations after the 2<sup>nd</sup> dose. The effectiveness was reduced by about 15% for variants of concerns (90% Alpha at the time of the study)<sup>21</sup>.
- Some people with severe chronic conditions, particularly severe immunosuppression and end stage kidney disease appear to have a reduced immune response to the currently available vaccines<sup>22,23</sup>. A third dose may overcome the lack of response in some but not all of these individuals. Other measures are also needed to protect them including in the workplace<sup>24</sup> (medium to strong evidence). Some guidance has also been issued for people with other chronic conditions (ex: cardiovascular, pulmonary, diabetes) in the workplace that do not rely solely on vaccination status as it is deemed insufficient for appropriate protection by some experts<sup>25</sup>. It is likely that people who do not respond as well to COVID-19 vaccines, cannot be vaccinated because of a contraindication or have high risk of complications from COVID-19 would benefit from reducing their exposure to unvaccinated individuals in the workplace, or in other words, from working in a setting with a very high vaccine coverage rate.
- COVID-19 variants are expected to continue to evolve and there is a possibility that an emerging strain could evade immunity conferred by currently available vaccines. PHAC continues to actively

<sup>17</sup> Polack FP, Thomas SJ, Kitchin N, Absalon J, Gurtman A, Lockhart S et al. Safety and efficacy of the BNT162b2 mRNA Covid-19 Vaccine. *N Engl J Med*. 2020 Dec 31;383(27):2603,2615. doi: 10.1056/NEJMoa2034577.

<sup>18</sup> French RW, Klein NP, Kitchin N, Gurtman A, Absalon J, Lockhart S et al. Safety, immunogenicity, and efficacy of the BNT162b2 Covid-19 Vaccine in adolescents. *N Engl J Med*. 2021 May 27. doi: 10.1056/NEJMoa2107456.

<sup>19</sup> Moderna. Vaccines and Related Biological Products Advisory Committee Meeting December 17, 2020. FDA Briefing Document. Moderna COVID-19 Vaccine [Internet].; 2020 Dec [cited 2020 Dec 23]. <https://www.fda.gov/media/144434/download>.

<sup>20</sup> Voysey M, Clemens SAC, Madhi SA, Weckx LY, Folegatti PM, Aley PK 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. *Lancet*. 2021 Jan 9;397(10269):99,111. doi: 10.1016/S0140-6736(20)32661-1.

<sup>21</sup> <https://www.inspq.qc.ca/publications/3145-efficacite-vaccin-covid-19-travailleurs-sante>

<sup>22</sup> Chodick et al. *Clinical Infectious Diseases*, ciab438, <https://doi.org/10.1093/cid/ciab438>

<sup>23</sup> Khan et al. *Gastroenterology* (2021). [https://www.gastrojournal.org/article/S0016-5085\(21\)03066-3/pdf](https://www.gastrojournal.org/article/S0016-5085(21)03066-3/pdf)

<sup>24</sup> <https://www.inspq.qc.ca/publications/2914-protection-travailleurs-immunosupprimees-covid19>

<sup>25</sup> <https://www.inspq.qc.ca/publications/2967-protection-travailleurs-maladies-chroniques-covid-19>

monitor the evolution of variants, and evaluates key attributes such as ability for immune or vaccine escape.

Vaccines are effective against the Delta variant (medium level of evidence):

- Two doses of both mRNA COVID-19 vaccines are highly effective in preventing Delta hospitalization and death (over 90%), but vaccine effectiveness was lower against symptomatic disease/asymptomatic infection than against severe outcomes. When vaccine effectiveness against the Delta variant of two doses of Pfizer-BioNTech and Moderna was compared, it was generally lower for Pfizer-BioNTech than Moderna for both symptomatic disease/asymptomatic infection and severe disease, but more notably for symptomatic disease/asymptomatic infection. Two-dose vaccine effectiveness against symptomatic disease/asymptomatic infection for AstraZeneca against Delta is generally lower than for mRNA vaccines, but protection against severe disease was high. One-dose Delta vaccine effectiveness for all vaccines was substantially lower than two-dose vaccine effectiveness against symptomatic disease/asymptomatic infection, but one dose vaccine effectiveness was higher against severe disease than against symptomatic disease/asymptomatic infection.<sup>26 27 28 29 30 31 32</sup>
- A Canadian study showed that vaccine effectiveness against symptomatic infection caused by Delta after the first dose was higher for Moderna (72%) than Pfizer (56%) and AstraZeneca (67%). Data also showed that a second dose increased vaccine effectiveness for all three products: Moderna (100%), Pfizer (87%) and AstraZeneca (100%).<sup>33</sup>

Vaccines have significantly reduced outbreaks

Prior to vaccination rollout, there were high numbers of outbreaks in all settings (acute care, long-term care, workplaces, etc.). The number of outbreaks in Canada decreased from January to February 2021; however, it was followed by an increase from March to April 2021 probably associated with reopening and transition to a dominance of the more contagious Alpha variant in many parts of Canada. The initial phase of the vaccination campaign prioritized residents of long term care facilities followed by the elderly in strata of decreasing age across the country. The impact of vaccination on the frequency of outbreaks in dwellings for the elderly, and the reduction of death rates and hospitalizations has been striking compared to the impact of other tools used prior to vaccination (mostly relying on closures and

<sup>26</sup> Tang P, Rubayet Hasan M, Hiam Chemaitelly H et al. Al BNT162b2 and mRNA-1273 COVID-19 vaccine effectiveness against the Delta (B.1.617.2) variant in Qatar. medRxiv 2021.08.11.21261885; doi: <https://doi.org/10.1101/2021.08.11.21261885>

<sup>27</sup> Stowe et al., 2021 pre-print

<sup>28</sup> Lopez Bernal J, Andrews N, Gower C, et al. Effectiveness of Covid-19 Vaccines against the B.1.617.2 (Delta) Variant. *N Engl J Med*. July 2021;NEJMoa2108891. doi:10.1056/NEJMoa2108891

<sup>29</sup> Sheikh A, McMenamin J, Taylor B, Robertson C. SARS-CoV-2 Delta VOC in Scotland: demographics, risk of hospital admission, and vaccine effectiveness. *Lancet*. June 2021. doi:10.1016/S0140-6736(21)01358-1

<sup>30</sup> Public Health England (PHE) press release. Vaccines highly effective against hospitalisation from Delta variant. Available at: <https://www.gov.uk/government/news/vaccines-highly-effective-against-hospitalisation-from-delta-variant>

<sup>31</sup> Israel Ministry of Health press release. Data Compiled by the Vaccine Operation's Supervising Committee Published 22 July 2021. Available at: <https://www.gov.il/en/departments/news/22072021-03>.

<sup>32</sup> Puranik A, Lenehan PJ, Eli Silvert E, Niesen MJM, Corchado-Garcia J, O'Horo JC, Virk A, Swift MD, Halamka J, Badley AD, Venkatakrishnan AJ, Soundararajan V. Comparison of two highly-effective mRNA vaccines for COVID-19 during periods of Alpha and Delta variant prevalence. medRxiv. 2021.08.06.21261707

<sup>33</sup> Nasreen S, He S, Chung H et al. Effectiveness of COVID-19 vaccines against variants of concern, Canada. July 16, 2021. medRxiv. Preprint available: <https://www.medrxiv.org/content/10.1101/2021.06.28.21259420v2>

physical distancing)<sup>34</sup>. Similar outcomes have been reported in other countries with comparable vaccine priority roll out, for example, the United Kingdom. Since May 2021, the number of outbreaks has steadily decreased in Canada. Although vaccination status is not available for all cases linked to outbreaks, the decreasing trend in number of outbreaks appears to align with increased vaccination coverage in the population<sup>35</sup> (medium level of evidence). Workplaces have been a frequent setting for outbreaks, mostly in settings where physical distancing was difficult, working remotely not possible and public health measures challenging to implement. Several workplace settings have succeeded in minimizing transmission with proper infection control measures in place<sup>36</sup>.

Transmission of COVID-19 is reduced by vaccines (medium or weak level of evidence)

COVID-19 vaccines prevent transmission in two ways – by decreasing infection and then potentially by decreasing transmission from vaccinated individuals who become infected. Vaccine effectiveness described above indicate that extent to which infection is prevented. Three studies have demonstrated that infected individuals who are vaccinated are less infectious to their household contacts than unvaccinated individuals (30% lower risk of transmission by vaccinated health care workers to their household contacts in Shah et al.<sup>37</sup>, approximately 40-50% lower risk of spread in Harris et al. where most individuals received only one dose of Pfizer-BioNTech or AstraZeneca,<sup>38</sup> and 58 to 88% lower risk in de Gier et al. where a full course of Pfizer-BioNTech, Moderna, AstraZeneca or Janssen were used in de Gier et al.<sup>39</sup>). These studies were however done prior to the circulation of the Delta variant. Emerging evidence for the Delta variant points to the possibility of high viral loads in some breakthrough cases in fully vaccinated people which can be as high as in unvaccinated people. Preliminary data from the U.S. Centers for Disease Control and Prevention<sup>40</sup> and from Public Health England<sup>41</sup> indicate that levels of virus in fully vaccinated people who become infected with Delta may be similar high compared to levels found in unvaccinated people, and therefore infected vaccinated people may be as likely to transmit the virus as infected unvaccinated people. However, further studies are needed to confirm levels of infectiousness and also the extent of vaccine effectiveness against Delta, which at present appears to be only slightly less than for other variants such as Alpha.

<sup>34</sup> <https://www.canada.ca/content/dam/phac-aspc/documents/services/diseases-maladies/coronavirus-disease-covid-19/epidemiological-economic-research-data/update-covid-19-canada-epidemiology-modelling-20210326-en.pdf>.

<sup>35</sup> Canadian COVID-19 Outbreak Surveillance System (CCOSS) for BC, AB, MB, ON, QC, NS, PE and public information sources for YT, NT, NU, SK, NL, NB)

<sup>36</sup> <https://www.inspq.qc.ca/covid-19/sante-au-travail/eclosions-travail>

<sup>37</sup> V Shah AS, Gribben C, Bishop J, Hanlon P, Caldwell D, Wood R, and others. Effect of vaccination on transmission of COVID-19: an observational study in healthcare workers and their households. medRxiv. 2021:2021.03.11.21253275

<sup>38</sup> Harris RJ, Hall JA, Zaidi A, Andrews NJ, Dunbar JK, Dabrera G. Impact of vaccination on household transmission of SARS-CoV-2 in England Public Health England; 2021

<sup>39</sup> de Gier B et al. Vaccine effectiveness against SARS-CoV-2 transmission and infections among household and other close contacts of confirmed cases, the Netherlands, February to May 2021. Euro Surveill. 2021;26(31):pii=2100640. <https://doi.org/10.2807/1560-7917.ES.2021.26.31.2100640>

<sup>40</sup> <https://www.cdc.gov/mmwr/volumes/70/wr/mm7031e2.htm>

<sup>41</sup> [SARS-CoV-2 variants of concern and variants under investigation \(publishing.service.gov.uk\)](https://www.gov.uk/government/news/sars-cov-2-variants-of-concern-and-variants-under-investigation)



Benefits of the COVID-19 Vaccines largely outweigh their risk (strong level of evidence)

- Canada's independent drug authorization process is known around the world for its high standards and rigorous review process. Decisions are based on scientific and medical evidence. Vaccines authorized for use in Canada meet rigorous safety criteria and are of high quality.
- Once a vaccine is in use, Canada has a comprehensive safety monitoring system (i.e., post-market surveillance), enabling quick identification of vaccination safety issues and change in recommendations as needed. For example, NACI quickly adjusted the recommendations for the AstraZeneca vaccine when rare thrombotic events were detected. As of August 6, 2021, a total of 50,254,577 vaccine doses had been administered in Canada, with adverse events (side effects) reported by 12,006 people. That's about 2 people out of every 10,000 people vaccinated who have reported 1 or more adverse events. Most adverse events are mild and include soreness at the site of injection or a slight fever. Of the 12,006 individual reports, 8,943 were considered non-serious (0.018% of all doses administered) and 3,063 were considered serious (0.006% of all doses administered). These adverse events aren't necessarily related to the vaccine<sup>42</sup>. It is important to note that the benefits of COVID-19 vaccination continue to substantially outweigh the risks.
- Contraindications to COVID-19 are infrequent (e.g. severe allergy to vaccine components) - (strong level of evidence). NACI has also recommended that as precaution, patients who experienced myocarditis and/or pericarditis following first dose of mRNA should defer second dose until more information is available.

## Strategies to improve vaccine coverage and vaccine mandates

Vaccine mandates can be effective to increase vaccine coverage (medium to strong level of evidence)

- Vaccine requirements in day cares, schools and colleges/universities can increase vaccine coverage by a mean of 18% according to a systematic review<sup>43</sup>. However, the effectiveness of these requirements is impacted by the ease of obtaining exemptions and the consistency of the enforcement (strong level of evidence) and is less clear when the baseline immunization rate is already high<sup>44</sup>. These policies generally have exemptions and don't require exclusion of the unvaccinated unless there is an outbreak. Ontario, New-Brunswick and British-Columbia have legislation and policies about childhood (non COVID-19) vaccine requirements in daycare or school settings. There is not a clear association between higher coverage rates in children across the various PTs and these vaccine requirements in Canada<sup>45</sup>. Although experience with school or child care vaccination requirements may be extrapolated to workplace settings in the context of COVID-19, at this time there is limited evidence about the effectiveness of these policies to increase uptake in the workplace.

<sup>42</sup> <https://health-infobase.canada.ca/covid-19/vaccine-safety/> (consulted August 11 2021)

<sup>43</sup> [Vaccination: School, College Requirements | The Community Guide](#) (consulted August 11<sup>th</sup>)

<sup>44</sup> <https://www.annualreviews.org/doi/10.1146/annurev-publhealth-090419-102240# i7> (consulted August 11<sup>th</sup>)

<sup>45</sup> [https://www.canada.ca/en/public-health/services/publications/healthy-living/2017-vaccine-uptake-canadian-children-survey.html# Children\\_aged\\_seven](https://www.canada.ca/en/public-health/services/publications/healthy-living/2017-vaccine-uptake-canadian-children-survey.html# Children_aged_seven) (consulted August 11<sup>th</sup>)

- In Québec, a policy for health care workers implemented in some sectors of the health care system requiring vaccination or regular testing has been associated with a rise in vaccine coverage from 50% to 90% for the first dose of COVID-19 vaccines (weak to medium evidence)<sup>46</sup>. British-Columbia has also mandated COVID-19 vaccination for workers of long term care facilities very recently, the impact of these measures will be known in the future.
- Several countries have recently implemented COVID-19 vaccination mandates, either for targeted sectors (HCW, border agents, quarantine officers – New Zealand, Australia, Italy, France and England), vaccine passports for cultural events and various services (France, Israel), or for government employees (United States federal employees, New York and California). France and Québec officials have publicly reported an increase in first dose appointment bookings following announcements of their new policies. The effectiveness of these strategies will be better known as jurisdictions implement and evaluate their policies.
- The scientifically supported approach towards medical exemptions used for travellers entering Canada is to allow exemptions for medical contraindications as per the product monographs of the vaccines authorized for use by Health Canada. The exemptions must be justified in a letter by a licensed physician<sup>47</sup>. Various religious leaders are supportive of COVID-19 immunizations. Exemptions based on religious beliefs do not have a scientific evidence basis. Alignment of the federal workplace policy with the OIC requirements would be very beneficial in terms of consistent messaging and operational considerations.
- Vaccine requirements which do not address underlying reasons for the vaccine hesitancy have the potential to increase vaccine resistance<sup>48</sup>. For COVID-19 vaccines, strong resisters among the general public make up 6-9% of the population. Research has shown that interventions that decrease the freedom of choice can result in reactance<sup>49,50</sup>. Therefore vaccines as a mandatory requirement could entrench some individuals who are hesitant/resistant. A recent study has also shown that effective communications around herd immunity can overcome some of the reactance elicited by mandates<sup>51</sup>.

Other strategies are also effective and needed to increase uptake

- Several measures in addition to vaccine requirements are effective at increasing vaccine uptake (with strong levels of evidence); for example reduced cost, increased access, recalls, home visits, school based clinics, etc.<sup>52</sup>.

<sup>46</sup> <https://www.inspq.qc.ca/covid-19/donnees/vaccination> (Figure 2.2 consulted August 11th)

<sup>47</sup> Updated OIC for Quarantine act once published in the Gazette

<sup>48</sup> <https://www.sciencedirect.com/science/article/pii/S0264410X1831171X?via%3Dihub> (consulted August 11th)

<sup>49</sup> Cornelia Betsch, Robert Böhm, Detrimental effects of introducing partial compulsory vaccination: experimental evidence, *European Journal of Public Health*, Volume 26, Issue 3, June 2016, Pages 378–381, <https://doi.org/10.1093/eurpub/ckv154>

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<sup>51</sup> Philipp Sprengholz, Cornelia Betsch. (May 2020) Herd immunity communication counters detrimental effects of selective vaccination mandates: Experimental evidence, *EClinical Medicine*, <https://doi.org/10.1016/j.eclinm.2020.100352>.

<sup>52</sup> [Vaccination Findings Summary Table | The Community Guide](#) (consulted August 11<sup>th</sup>)

- Vaccine hesitancy is a complex issue influenced by multiple factors, which can vary from one person to the next (strong level of evidence)<sup>53</sup>.
- Strategies proven effective to reduce vaccine hesitancy include social mobilisation, mass media or social media interventions, communication tool-based training for HCW, non-financial incentives, and reminder-recall activities (medium level of evidence)<sup>54</sup>, and motivational interviewing (strong level of evidence)<sup>55</sup>.

Public health measures will continue to be useful and needed as population immunity progresses (medium level of evidence)

Public health measures (PHM) and vaccinations reduce the impact of the pandemic through two distinct mechanisms:

- **PHMs:** Decrease the effective transmission rates in the population
- **Vaccines:** Increase the number of people who are non-susceptible to infection or to severe outcomes of infection in the population; may also decrease transmission.

The COVID-19 pandemic has caused significant societal and economic disruption in Canada due to illnesses and deaths, burden on healthcare resources, and widespread implementation of individual and community-based PHMs. The response to the pandemic has been strengthened by the widespread availability and uptake of COVID-19 vaccines, but some individual and community-level precautions should be exercised. Specifically, it will be important to remain diligent around adjusting PHMs, as there are still uncertainties due to:

- The emergence of more transmissible VOCs that are causing surges in cases globally;
- The potential for immune escape, particularly associated with VOCs;
- Community outbreaks in vulnerable populations; and
- Segments of the population that remain unvaccinated because they are either not eligible (e.g., medical contraindications, age limits) or they choose not to be vaccinated<sup>56</sup>.

Overall, vaccines, when paired with other measures such as wearing masks, handwashing, ensuring good ventilation indoors, physically distancing and avoiding crowds, can protect the health and wellbeing of Federal Public Service employees.

<sup>53</sup> <https://www.annualreviews.org/doi/10.1146/annurev-publhealth-090419-102240# i7> (consulted August 11<sup>th</sup>)

<sup>54</sup> [https://www.who.int/immunization/sage/meetings/2014/october/3\\_SAGE\\_WG\\_Strategies\\_addressing\\_vaccine\\_hesitancy\\_2014.pdf](https://www.who.int/immunization/sage/meetings/2014/october/3_SAGE_WG_Strategies_addressing_vaccine_hesitancy_2014.pdf) (consulted August 11<sup>th</sup>)

<sup>55</sup> <https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2020-46/issue-4-april-2-2020/article-6-canva-x-addressing-vaccine-hesitancy.html> (consulted August 11<sup>th</sup>)

<sup>56</sup> Public Health Agency of Canada. *Adjusting Public Health Measures in the context of COVID-19 vaccination*. August 2021. [online] Available from: ([Adjusting public health measures in the context of COVID-19 vaccination - Canada.ca](https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2020-46/issue-4-april-2-2020/article-6-canva-x-addressing-vaccine-hesitancy.html))

Modelling from Canada, the UK, and the US<sup>57,58,59</sup> all suggest that additional measures are still required as vaccine rollout takes place to prevent the spread of SARS-CoV-2; however the rate of severe cases and hospitalizations are expected to decrease as vaccine uptake increases. Additional evidence is expected on these topics as vaccine roll out progresses around the world and reopening continues.

As an example of the potential need to complement vaccination with other measures, following the Delta variant outbreak investigation in a highly vaccinated population (Massachusetts), the CDC revised its masking guidance for vaccinated individuals on July 27 to recommend indoor masking in areas of high or substantial transmission.

PHAC guidance on public health measures (to be published on August 16th), also recommends the use of core measures (stay home when ill, follow local public recommendations on isolation and testing, ensure adequate indoor ventilation, perform regular hand hygiene and respiratory etiquette and clean surfaces or objects) on an ongoing basis even with the current vaccination rates, and the addition of masking and physical distancing when transmission of COVID-19 becomes important. This guidance is based on a 75% 2-dose coverage rate, which is not yet achieved in Canada. These recommendations may change in the context of evolving evidence or new, more transmissible, variants<sup>60</sup>.

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<sup>57</sup> Patel et al. (1 June 2021) Association of Simulated COVID-19 Vaccination and Nonpharmaceutical Intervention With Infections, Hospitalizations, and Mortality. Available from: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2780539>.

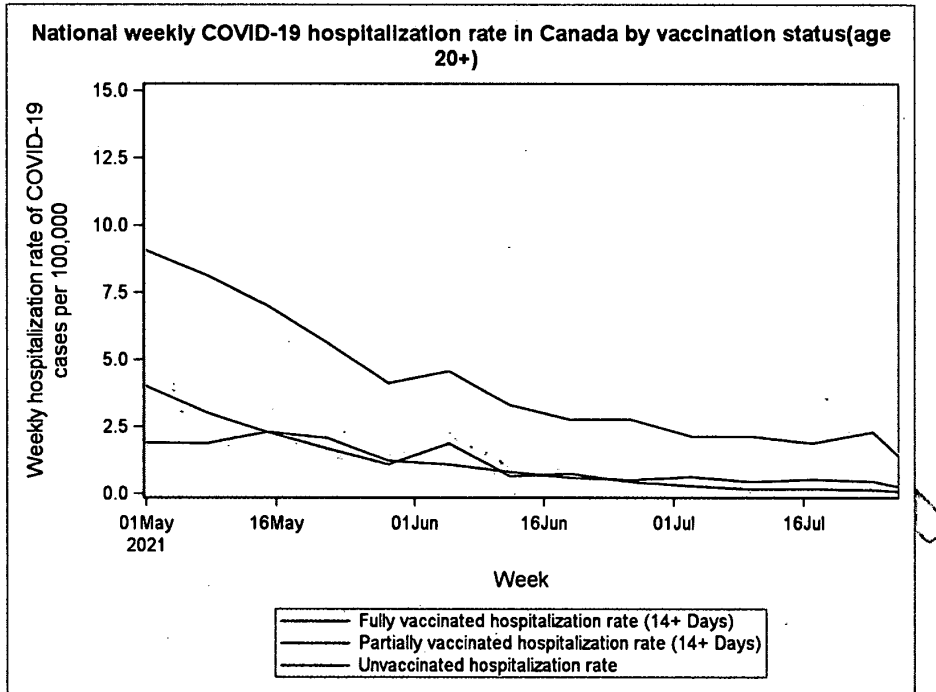
<sup>58</sup> Moore et al. (18 March 2021) Vaccination and non-pharmaceutical interventions for COVID-19: A mathematical modelling study. Available from: [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(21\)00143-2/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(21)00143-2/fulltext).

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## Annex

Figure 1 National weekly COVID-19 hospitalization rate in Canada by vaccination status

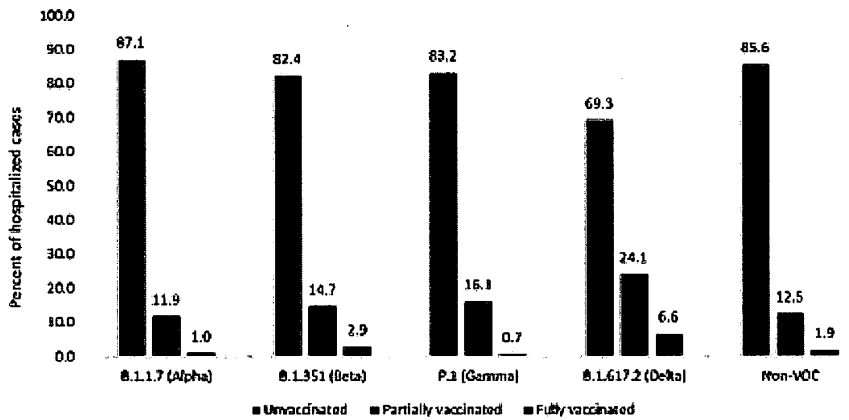


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Figure 2 Delta cases and vaccination status

**B.1.617.2 (Delta) cases have a higher proportion of partially and fully vaccinated cases that are hospitalized compared to other VOCs and Non-VOCs.**



Data as of August 09<sup>th</sup> 2021 for the period of March 15<sup>th</sup> onward, includes sequence and screen positive results; excludes cases from QC, SK due to missing vaccination data.

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**Table 1: Available Vaccines-Surveillance information breakdown**

|                       |  |        | Vaccine   |   |   |
|-----------------------|--|--------|---|---|---|
|                       |  |        | ASTRAZENECA<br>(chimpanzee<br>adenovirus<br>ChAdOx1)  | PFIZER/BIONTECH   | MODERNA   |
| Vaccine EFFECTIVENESS | Infection (symptomatic and asymptomatic) | 2 dose | 66 to 74% <sup>61 62 63 64</sup>  | 63 to 95% <sup>65 66 67 68 12 14</sup>  | 90% <sup>27</sup>   |
|                       | Symptomatic infection                    | 2 dose | 66 to 90% <sup>69</sup>   | ~ 82 to 97% <sup>8 70 71 72 73 74 75</sup>  | ~ 90 to 95% <sup>76 77 29</sup>   |
|                       | Transmission                             | 2 dose | 54% <sup>78 79 80</sup><br>reduction in household of vaccinated health care worker                            | 86-92% <sup>15 16 81 82</sup>   | 90% <sup>23</sup><br>2 weeks after second dose: Pfizer-BioNTech and Moderna vaccine (weekly testing for 13 weeks) |
|                       | B.1.617.2 (DELTA) VOC                    | 2 dose | - 60 to ~69.3% <sup>83 84 10</sup><br>(Symptomatic infection)<br><br>- 92% <sup>85</sup><br>(Hospitalization) | - 39 to 88% <sup>8 9 86 87</sup><br>(Any infection)<br><br>- 75 to 96% <sup>10 11 12</sup><br>(Hospitalization) | - 76% <sup>88</sup><br>(Symptomatic infection)<br><br>- 81% <sup>12</sup><br>(Hospitalization)                    |

<sup>14</sup> Pritchard E, Matthews PC, Stoesser N, Eyre DW, Gethings O, White K-D, and others. Impact of vaccination on SARS-CoV-2 cases in the community: a population-based study using the UK's COVID-19 Infection Survey. *medRxiv*. 2021:2021.04.22.21255913

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<sup>24</sup> Vacunas contra SARS-CoV-2 utilizadas en Chile mantienen altos niveles de efectividad para evitar hospitalización, ingreso a UCI y muerte. 3 August 2021. Available at: <https://www.minsal.cl/vacunas-contra-sars-cov-2-utilizadas-en-chile-mantienen-altos-niveles-de-efectividad-para-evitar-hospitalizacion-ingreso-a-uci-y-muerte/>.

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