EVIDENCE BRIEF

Considerations for Public Health Measures for Individuals with Partial Vaccination for SARS-CoV-2

Date: 04/15/2021

Key Messages

- Effectiveness of the first dose of a two-dose vaccination schedule of vaccines available in Canada to prevent symptomatic or asymptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection ranges between 60-80% at approximately 21-28 days after first dose; however, data indicate that the current viral vector vaccine in Canada (i.e., AstraZeneca) has less first-dose effectiveness than mRNA vaccines (i.e., Pfizer-BioNTech and Moderna).

- Clear messaging is required for the public to understand that the protective effects of the first dose of the vaccines takes weeks to develop and is neither immediate nor the same as being fully vaccinated. Further, an individual’s risk factors for severe SARS-CoV-2 infection (e.g., age, immunocompromise) can impact vaccine effectiveness. Nonetheless, widespread coverage with a first dose would be sufficient to lower case rates in the population thereby allowing reductions in population level measures rather than individual level measures.

- No jurisdictions with total population vaccination programs using vaccines approved in Canada have indicated that societal public health measures can be relaxed for partially vaccinated individuals.

- Relaxing public health measures for partially vaccinated individuals is not advisable; current public health measures should remain for partially vaccinated individuals. Focus should be turned to rapidly deploying vaccine to have high first-dose coverage in the population, including reducing health inequities related to accessing first dose vaccination in the communities with the highest rates of SARS-CoV-2 that are also more likely to be of low socioeconomic status.

Issue and Research Question

This evidence brief explores whether or not it would be advisable to loosen public health measures recommended for individuals after a single dose of a two-dose vaccination schedule (also termed partially vaccinated individuals or series initiation) for SARS-CoV-2. This evidence brief does not address recommendations that are specific to health care workers who are partially vaccinated, or case/contact measures for individuals who are partially vaccinated.
Currently in Ontario, there is a low proportion of partially and fully vaccinated individuals. Incentives to receive the first dose of a vaccine given the long period between vaccine doses will be called upon by the public. However, any incentives must be based on available evidence and expert opinion such that the pandemic is controlled and moves towards a return to a new normal with respect to public health measures. Moreover, at this time there are no recommendations for public health measures affecting fully vaccinated individuals in the general community in Ontario at this time.

Methods

The National Advisory Committee on Immunization (NACI) has released a summary and review of vaccine intervals in Canada in the context of limited vaccine supply. The review is recent to late March 2021. The NACI report has been reviewed and briefly summarized alongside evidence from previous reports from Public Health Ontario (PHO), with a focus on the points relevant to considerations for public health measures for individuals who have been partially vaccinated (received the first of a two-dose vaccination schedule) against SARS-CoV-2.

Main Findings

Vaccine Effectiveness after a First Dose of Vaccine

Vaccine efficacy to prevent symptomatic disease from clinical trial data with Pfizer-BioNTech and Moderna 14 days after the first dose and up until the second dose (typically either 21 or 28 days post-first dose) is estimated to be 92%. For AstraZeneca, the efficacy to prevent symptomatic disease from clinical trial data between 22 and 90 days after the first dose was reported to be 76%.

Real-world vaccine effectiveness (VE) data are predominantly from non-peer reviewed preprint publications using different study designs, dose intervals, study populations, outcomes measured (e.g., laboratory confirmed versus hospitalizations or deaths), and outcome dates (e.g., date of symptom onset, specimen collection). Results reported for each vaccine, mostly pertaining to mRNA vaccines, varied considerably.

The following summary of real-world VE is for vaccines intended to be given as a 2-dose regimen that have been approved by Health Canada as of April 8, 2021 (Pfizer-BioNTech COVID-19 vaccine [BNT162b2], Moderna COVID-19 vaccine [mRNA-1273], Oxford University/AstraZeneca [AZD1222/ChAdOx1-S]) and is based on the PHO’s COVID-19 Real-World Vaccine Effectiveness – What We Know So Far document and the NACI Statement on Extended dose intervals for COVID-19 vaccines. There is currently limited VE data on specific populations who are at increased risk of severe outcomes from COVID-19 and who may have a suboptimal immune response. While emerging data has helped to identify special populations (e.g., transplant patients, individuals with malignant hematological disorders or solid tumors on active therapy) as potentially having a lower response to a first dose of vaccine, a comprehensive list of other groups that may experience decreased response from a single dose has not yet been identified due to lack of data. Therefore, it is important to note that the following summary of VE after a first dose of vaccine pertains to the general, community-dwelling population.

Recognizing differences between specific vaccines and populations studied, overall VE is good 21-28 days after the first dose of vaccine. Real-world studies have reported VE of 60 to 80% for preventing SARS-CoV-2 infection (asymptomatic and symptomatic COVID-19 disease) 3-4 weeks after receiving a single dose of Pfizer, Moderna or AstraZeneca vaccine; this increases to greater than 85% after a second
Considerations for Public Health Measures for Individuals with Partial Vaccination for SARS-CoV-2

dose. The VE for preventing severe disease and COVID-19-related hospitalization is 70 to 90% after the first dose of vaccine and the VE for reducing deaths attributable to COVID-19 is 70 to 85% after the first dose. After a second dose, VE for prevention of severe disease and hospitalization increases with most estimates of VE being greater than 90%. Please see COVID-19 Real-World Vaccine Effectiveness – What We Know So Far for further detail including study characteristics.

The VE for preventing asymptomatic infection is particularly important given the challenges of preventing asymptomatic transmission with other public health measures. Data from Israel indicate that VE for preventing asymptomatic infection is 29%, 14 to 20 days after the first dose, and 52%, 21 to 27 days, after the first dose, increasing to 90%, 7 days after the second dose which is likely a first dose effect given timing. However it is important to note that this was in the context of a rapid decline in cases amidst deployment of a national vaccine campaign and in the absence of systematic asymptomatic testing. A US retrospective cohort study of asymptomatic patients undergoing screening before surgical and medical procedures found a VE of 79% more than 10 days after the first dose (before the second dose) and a VE of 80% after the second dose. However the VE after the second dose was estimated starting at 0 days after the second dose, which also likely represents a first dose effect.

Emerging data demonstrates that vaccination is associated with reduced spread in individuals and populations, regions, or facilities with higher rates of vaccination or those that were vaccinated earlier than others. However, these estimates are for individuals receiving at least one dose of vaccine and includes individuals that have received 2 doses.

- In an observational study in Israel, breakthrough infections occurring 12-37 days after individuals received the first dose of the Pfizer vaccine had significantly reduced viral loads at the time of testing, potentially decreasing viral shedding and contagiousness of the disease.

- An analysis of early statewide vaccination efforts in the US found that vaccination was effective in reducing daily COVID-19 case growth rates by 0.124, 0.347, 0.345, 0.464, 0.490, and 0.756 percentage point declines, respectively, in the 1-5, 6-10, 11-15, 16-20, 21-25, and 26 or more days after the start of vaccination (i.e., administration date of first COVID-19 vaccine dose).

- A separate analysis of vaccination rates and COVID-19 incidence found that the cumulative county-level vaccination rate in the US (percentage of the county population who have received at least one dose) was significantly associated with a corresponding decline in COVID-19 incidence; that is, higher vaccination rates translated to a decreased county-level COVID-19 incidence.

- In Israel, where COVID-19 cases and hospitalizations started to decline after implementation of a national vaccine campaign that prioritized vaccination of older individuals, an analysis between early-vaccinated cities and late-vaccinated cities found a larger and earlier decrease in the number of COVID-19 cases and hospitalizations of older individuals (> 60 years) in earlier compared to later-vaccinated cities. While a concurrent lockdown could have also influenced results, the study authors noted that these same downward trends in older individuals were not observed during previous lockdowns in which measures of clinical outcomes had similar dynamics across age groups. At the time of the study, 68.7% of individuals over 16 years had received the first dose and 48% had received the second dose of vaccine.
Extended Dose Intervals for COVID-19 Vaccines in Canada

The NACI recommendation to allow for an extended interval between first and second doses of vaccine aims to minimize death and disease at a population level by immunizing as many individuals, as quickly as possible in the context of a limited supply. This recommendation was informed by modelling developed by the Public Health Agency of Canada (PHAC) which compared the impact of different vaccination strategies under real-world effectiveness conditions. Results showed that longer intervals of up to 6 months between the first and second dose prevented more hospitalizations and deaths. Conditions under which extended dose intervals led to worse outcomes included VE of less than 65% for preventing death after the first dose or protection waning to 0% by month 3 before the scheduled second dose at 6 months. Achieving the benefits of the extended dose interval strategy greatly depends on accelerated, widespread first dose vaccine coverage in individuals 20-74 years old since older adults were prioritized for early vaccination.

Jurisdictional Responses to Public Health Measures Based on the Two-dose Vaccination Schedule for SARS-CoV-2

In brief, Canada, England, Scotland, Denmark, United States, and Israel all do not have public health measures specific to individuals who are partially vaccinated (i.e., single dose in a two-dose vaccine schedule) even though some of these countries have high vaccine coverage.

Discussion and Conclusions

Vaccination, including after the first dose of a two-dose vaccine schedule, provides significant protection from symptomatic disease and severe outcomes such as hospitalization and death compared to not being vaccinated against SARS-CoV-2. Therefore, it is expected that widespread coverage of the population with the first dose of vaccine will lower case rates in the population. However, there is no evidence whether a single dose of a two-dose vaccine schedule will either increase or decrease the emergence of VOC.

Those countries that are leading in total population vaccination coverage have not opted to reduce observed public health measure recommendations to partially vaccinated individuals. The rationale for not having different public health measures for partially vaccinated individuals has not been described by the jurisdictions reviewed, although we note that some jurisdictions (i.e., Israel) chose to provide both doses of a two-dose regimen within a shorter interval than Ontario. A literature review on the topic was not performed for this evidence brief.

Implications for Practice

Public health messaging regarding vaccination needs to be transparent about decision-making reasons in order to avoid unintended negative impacts such as public mistrust impacting vaccination uptake or willingness to follow public health measures. Ontario’s vaccine coverage, including proportion of the population having received a first dose, lags behind countries that have been able to follow recommended vaccination schedules and sufficient procurement. At this time, with low proportions of partially vaccinated and fully vaccinated individuals in the Ontario population, and in the context of high disease incidence including VOC, it is not advisable to reduce public health measures for partially vaccinated individuals despite data demonstrating decreased incidence in asymptomatic and symptomatic disease, and data is still needed regarding risk of transmission to others after receiving the
first dose of a vaccine available in Canada. Moreover, VOC for which reduced vaccine efficacy for in vitro studies and effectiveness is documented, will continue to pose a higher risk to the community until there is low circulation of SARS-CoV-2 overall.

Valuable data for vaccines available in Canada that are still needed to better inform decisions regarding public health measures for partially vaccinated individuals includes: real world data of implications from countries with more comprehensive vaccination coverage enacting public health measures for partially vaccinated individuals, effectiveness of partially vaccinated versus fully vaccinated individuals including a time to event analysis (e.g., hazard analysis), what individual level factors influence first-dose vaccine effectiveness, risk of spread from partially vaccinated individuals to unvaccinated individuals, duration of immunity from single dose vaccination, effectiveness of single dose vaccination in subgroups that have not been studied, and what influence that changes to public health measures for partially vaccinated and/or fully vaccinated individuals may have on vaccine uptake for one dose and both doses.

Current data from Forward Sortation Area (first three digits of the postal code) analyses in Toronto show that the areas with the highest burden of disease have the lowest vaccine coverage rates.\textsuperscript{30} News reports have stated that the analyses indicates higher socioeconomic status neighbourhoods in Toronto, based on postal code and census data, have higher vaccine coverage than low socioeconomic neighbourhoods where rates of SARS-CoV-2 and severe outcomes of COVID-19 are higher.\textsuperscript{31,32} Hot spot communities are known to often have higher concentrations of populations who are disproportionately affected by COVID-19 in Ontario due to a number of intersecting equity factors and factors related to the determinants of health. These populations include Black, racialized, lower income and materially deprived communities.\textsuperscript{33} Focusing strategies to vaccinate these populations at risk is already proposed in Phase 2 of Ontario’s vaccination plan.\textsuperscript{33,34}
References


Considerations for Public Health Measures for Individuals with Partial Vaccination for SARS-CoV-2


31. Hune-Brown N. The vaccine rollout is leaving Toronto’s hardest-hit postal codes behind. The Local [Internet], 2021 Apr 06 [cited 2021 Apr 09]. Available from: https://thelocal.to/the-vaccine-rollout-is-leaving-torontos-hardest-hit-postal-codes-behind/


Citation


Disclaimer

This document was developed by Public Health Ontario (PHO). PHO provides scientific and technical advice to Ontario’s government, public health organizations and health care providers. PHO’s work is guided by the current best available evidence at the time of publication.

The application and use of this document is the responsibility of the user. PHO assumes no liability resulting from any such application or use.

This document may be reproduced without permission for non-commercial purposes only and provided that appropriate credit is given to PHO. No changes and/or modifications may be made to this document without express written permission from PHO.

Public Health Ontario

Public Health Ontario is an agency of the Government of Ontario dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, front-line health workers and researchers to the best scientific intelligence and knowledge from around the world.

For more information about PHO, visit publichealthontario.ca.