Scientific Advisory Group

COVID-19 Scientific Advisory Group Evidence Summary and Recommendations

Likelihood of Transmission of COVID-19 infection after COVID-19 Vaccination

Updated October 21, 2021

The AHS Scientific Advisory Group is a contributing member of COVID-END, the COVID-19 Evidence Network to support Decision-making.

This document summarizes the COVID-END report on the likelihood of transmission of COVID-19 infection after COVID-19 vaccination, prepared by the University of Calgary Health Technology Assessment Unit on March 2, 2021 and updated for a second time on September 24, 2021, develops key messages and recommendations grounded in the Alberta healthcare system context.

Alberta Health Services

Physical distancing works

Lay Summary

- This document summarizes the updated COVID-19 Evidence Network to support Decision-making report on the likelihood of transmission of COVID-19 infection after COVID-19 vaccination, and adds some relevant information for decision makers in Alberta.

Why this is important:

- In order to spread COVID, a person has to be infected by COVID; then enough viruses in their body need to be manufactured before they can infect others.
- COVID-19 vaccine studies show that vaccinated people are well protected from infection. They are 20 times less likely to get COVID-19 illness.
- If they do get infected, vaccinated people have much less virus in their system for shorter time periods, so they are much less likely to be hospitalized or die.
- Because vaccinated people rarely get infected by COVID-19 and have less virus in their body if they do, they are unlikely to transmit COVID-19 to others, but studies have not yet clarified exactly how often vaccinated patients do transmit COVID-19. Information about the new Delta variant is particularly limited.
- It is important to better understand this reduction of transmission from vaccinated people (or exactly how much higher transmission is from unvaccinated people) because this will guide future public health recommendations.

Key Messages

- Reported vaccine protection estimates will be constantly updated as trials and assessments are done at different times, in different places, and with different main virus variants of concern (VOC). All of the vaccines in use in Canada have been highly protective against severe COVID-19 infection.
- In the studies in this review, the risk of catching the virus (and either getting sick or just carrying the virus without symptoms) was found to be much lower in vaccinated people than in unvaccinated people. Some studies have shown that the small proportion of vaccinated people who test positive appear to have lower amounts of virus, for a shorter time; people who test positive after vaccination appear to be less likely to transmit to others than unvaccinated people who test positive. Whether this is different for VOCs is still being studied (the Delta VOC may be associated with higher viral loads).
- Studies of households where one member is vaccinated and the others are unvaccinated show that the unvaccinated person's risk of COVID-19 is lower (starting from two weeks after the first dose of their housemate, and was reduced even further after their housemate's second dose of vaccine).
- While the available evidence suggests there is reduction in transmission by vaccinated persons, some of the evidence is indirect; as more evidence becomes available the effect on transmission will be clearer

Conclusion

Studies so far show that COVID-19 vaccination reduces the risk of the vaccinated person spreading COVID-19, by preventing infection in most but not all recipients, and if they test positive, they seem to be less likely to spread infection to their close contacts. While the data we have suggests that vaccines can reduce the transmission of the COVID-19 Delta variant as well, more studies are needed on the more highly transmissible variants. Although studies suggest that it is overall rare for vaccinated people to spread COVID-19 infection, it is possible. Vaccinated people should still follow public health measures in place (which are based on active virus spread in communities) and if they develop COVID symptoms, should be tested and isolate as recommended by public health authorities.

Authorship and Contributions

Name	Contribution
Rachael Erdmann (Update)	Drafting updated key messages, tables, and post-meeting revisions
Jamie Boyd (Original document)	Extraction of key messages from COVID-END review; content writer, post-meeting revisions
Lynora Saxinger	Content writer and primary scientific reviewer (original document) Primary scientific reviewer, co writer (update)
Alexander Doroshenko, Elizabeth MacKay, Robyn Harrison, Uma Chandran, Marcia Johnson	Secondary scientific reviewers- content revision (original document)
Braden Manns & Scott Klarenbach	Scientific Advisory Group chairs (oversight and leadership responsibility)
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The AHS Scientific Advisory Group is a contributing member of COVID-END, the COVID-19 Evidence Network to support Decision-making. This document summarizes the COVID-END report (prepared by the University of Calgary Health Technology Assessment Unit) on likelihood of transmission of COVID-19 infection after COVID-19 vaccination; findings are used to develop key messages and recommendations grounded in the Alberta healthcare system context.

The COVID-END report can be accessed here

Topic: Likelihood of Transmission of COVID-19 Infection after COVID-19 Vaccination [Full Review Updated Sept 24, 2021]

Can people who have started or finished a COVID-19 vaccine series develop asymptomatic COVID-19 infection and transmit the virus to other individuals? If so, how large is the risk, in comparison to unvaccinated people?

Context

- The scope of this brief was focused on summarizing the updated evidence collected by the COVID-END team regarding the effectiveness and efficacy of the approved COVID-19 vaccines to prevent transmission and asymptomatic disease following vaccination. This review is expected to be updated in an iterative fashion as evidence emerges: the most recent version of these data can be accessed here.

Key Messages for Alberta

- Twenty-four new studies were included in this update for a total of 45 studies reviewed to assess evidence around post-vaccination transmission of COVID-19. It is noted that many of the new studies reviewed have not yet been peer reviewed (preprint releases).

Viral transmission from fully or partially vaccinated individuals

- Six studies were included in the synthesis regarding household transmission of COVID-19 – two from the previous update and 4 identified in the current search. Taken together, the evidence shows that Pfizer-BioNTech (PfBNT), Moderna, AstraZeneca (AZ) and Janssen (J&J) vaccines can significantly reduce household transmission of wild-type or the B.1.1.7 (Alpha) COVID-19 strain after 14 days of vaccination by at least 63%.
- In most studies of household linked cases, most index cases were unvaccinated. In the small proportion of households with vaccinated index cases, the secondary attack rate was much lower (e.g. 11% versus 31%, a 70% reduction (de Gier). This suggests that that vaccinated individuals who experience breakthrough infections have lower levels of secondary transmission within their household.

Asymptomatic infection in vaccinated individuals

- A small proportion of people who are partially or fully vaccinated have been documented to have detectable SARS-CoV-2 virus by RT-PCR at various time points after their vaccine first dose. There is rapidly evolving data in this area, and readers are requested to refer to the most recent posted version of the COVID-END report.
- Twenty studies reported on RT-PCR Ct values as a possible indicator of amount of virus present, eleven of which were new. The AZ, PfBnT, and Moderna vaccines were found to be significantly associated with higher cycle threshold (Ct) values which suggests lower viral loads in people testing positive after vaccination. More evidence is required to

provide a clearer indication of the correlation between higher Ct values and reduced subsequent transmission.

- The available vaccines have been shown effective for reducing asymptomatic infections caused by wild-type SARS-CoV-2. With respect to B.1.617.2 (Delta) infection, one study (Tang et al) found that a full dose of PfBNT from the 14th day onward from the date of vaccination was found to reduce asymptomatic infection by 35.9% (95% CI: 11.1-53.9) against the Delta variant and that a full-dose of Moderna had 80.2% vaccine effectiveness (95% CI: 54.2-92.6) against asymptomatic carriage of the Delta strain 14 days after full vaccination.
- Some studies have found decreased viral load (or increased Ct values) in people testing positive with B.1.617.2 after vaccination. Given the recent emergence of the Delta variant, there is insufficient evidence to make a definitive conclusion about the impact of vaccine related reduction in risk of asymptomatic B.1.617.2 (Delta) infection, viral load or increased Ct values in people testing positive after vaccination.
- It is not possible to directly compare findings across studies because of variations in the assessment of symptom status, study design, and setting of the trials particularly with respect to degree of circulation of variants of concern (VOC).

Overall vaccine effectiveness against asymptomatic infection in the community and in HCWs

- For wild-type SARS-CoV-2 overall first dose protection, mRNA vaccines are most effective from approximately 3 weeks after the first dose (61%-97% effective against asymptomatic, 94% against symptomatic) and the effectiveness of dose 1 of nonreplicating adenovirus vaccine against combined asymptomatic and symptomatic SARS-CoV-2 detection increases from about 46.3% at 3 weeks to 67-80% at 3 months. No evidence was identified in the update to suggest that this effectiveness data has substantially changed.
- The B.1.617.2 (Delta) variant has been shown to be more transmissible, and early data suggests there may not be a significant difference between the viral load in breakthrough test positive vaccinated individuals compared to unvaccinated people but the clinical significance and reason for this observation is not yet clear. Further research is needed to evaluate post-vaccination infectivity and transmission for the variants of concern especially the B.1.617.2 (Delta) variant.

Research Gaps

- The research gaps identified in the previous iterations of this report remain. These include a lack of evidence regarding how common truly asymptomatic test positivity among vaccinated persons is, and risk of transmission among these individuals, and the paucity of high quality, direct epidemiologic evidence of reduced forward transmission.
- Many of the included observational studies are reported to be at risk of bias (most notably, timing bias and selection bias). Readers are referred to Tables 4 and 5 in the full COVID-END report for details (pgs. 35-37) and the Catalogue of Bias published by the Oxford Centre for Evidence Based Medicine.
- These findings pertain mainly to non Delta COVID-19 transmission with evolving data on the B.1.617.2 (Delta) strain. Although some data on the effectiveness of the PfBNT vaccine against B.1617.2 (Delta) asymptomatic infection is included, no studies on vaccine effectiveness against forward transmission of the B.1.617.2 (Delta) strain were found.

Committee Discussion

The committee supported the new pared-down format of the COVID-END summary for Alberta. Readers are referred to the full COVID-END report for more detailed examination of the evidence for the recommendations included here. Members suggested additional discussion of research gaps and the strength of evidence.

Further, linking the recommendations to specific “current” public health measures, without the context of a full report, was felt to be undesirable as public health measures evolve in response to both the evolving understanding of SARS-CoV-2 transmission, and other societal factors. The detailed recommendations from previous iterations of the summary have not materially changed; however, the committee suggested development of higher-level recommendations for this three-page summary.

Recommendations for Alberta

1. AHS and Alberta Health should continue to encourage Albertans who have not yet received their first or second doses to get vaccinated without delay. Vaccination remains the most effective way to prevent illness and mortality arising from COVID-19 and achieve overall reduction of community transmission in concern with public health measures. The evidence in this review in total confirms there is a reduced risk of transmission from vaccinated persons.

2. Due to the lack of available evidence regarding Delta variant breakthrough infection and transmission, and the potential for additional variants with higher transmission potential in the future, all vaccinated and unvaccinated individuals are currently advised to abide by recommended public health measures. These may include, but are not limited to, masking, hand hygiene, physical distancing, and social gathering restrictions.

3. We recommend ongoing analysis of existing Population and Public Health data collected on positive SARS-CoV-2 tests occurring after vaccination, identification of variant strain infections, outbreak data, and epidemiologic contact tracing data with laboratory data to prospectively monitor for evidence of forward transmitting infection from vaccinated persons in Alberta.