

Vaccinating Essential Workers with the AstraZeneca COVID-19 Vaccine Is Net Beneficial: The Case for Continuing COVID-19 Vaccination of Front-Line Workers in BC Despite the Risk for Thrombocytopenia

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Summary

Recently, the National Advisory Committee on Immunization (NACI) recommended against using the AstraZeneca COVID-19 Vaccine pending further review of the risk for Vaccine-Induced Prothrombotic Immune Thrombocytopenia (VIPIT). Using straightforward calculations and based on current evidence, we propose that even if the risk is found to be causally related to the AstraZeneca vaccine, the benefits of continuing immunization of essential workers with AstraZeneca by far outweighs the risk. We consider the case of British Columbia as an example. The province is expected to received an additional 246700 doses of AstraZeneca vaccine through US and COVAX until April 11th, enough to provide the first dose of vaccine to all unvaccinated front-line workers.

We estimate that if British Columbia continues the front-line worker vaccination program as many as 600 lives could be saved for an expected mortality of only 1 person, even if all essential workers were under 55 and assuming the highest estimated rate of 1 in 100,000 currently reported for VIPID.

Background

Recently, NACI recommended against using AstraZeneca COVID-19 Vaccine for Canadians under the age 55, due to concerns about the incidence of Vaccine-Induced Prothrombotic Immune Thrombocytopenia (VIPIT) based on European reports [1]. On March 18, 2021, the European Medicines Agency estimated the incidence of VIPID at approximately 1 per 1,000,000 people vaccinated with the AstraZeneca vaccine [2]. A higher estimated rate of 1 per 100,000 by the Paul-Ehrlich Institut in Germany was published on March 19th [3]. It was this higher rate reported by the Paul-Ehrlich Institut that led NACI to recommend against using this vaccine in adults under 55 years old [1]. BC had initially slated the astrazeneca vaccine for outbreak control and essential workers vaccination program. on March 29th and following NACI's recommendation, BC paused using the Astrazeneca vaccine for those under 55 and put the essential workers program on hold.

On April 1st, the UK Medicines & Healthcare Products Regulatory Agency updated its own previously reported data to report a total of 22 cerebral venous sinus thrombosis (CVST) and 8 other clot-related events from 18.1 million doses of the AstraZeneca vaccine (1.66 incidents per million).

Canadian provinces are expected to receive 1.5 million doses of the AstraZeneca vaccine through US and another 316,800 doses from the COVAX program between now and April 11th.

British Columbia expects to receive 246,700 doses from these two AstraZeneca deliveries, enough to finish providing the first dose to all remaining essential workers.

The 300,690 doses of Pfizer and 105,900 doses of Moderna vaccines expected within the same timeframe are currently allocated for the priority groups, indigenous population, and age-based vaccination campaign currently vaccinating those in their 70s.

Harm-Benefit Analysis

Assuming that BC allocates all 246,700 doses to essential workers, we can estimate the expected number of deaths due to VIPID, $E(\text{death})_{\text{astrazeneca}}$ as shown below. To err on the side of caution, we assume that each dose of the vaccine is independently associated with the risk for VIPID, and that all recipients are under 55 and as such at higher risk for VIPID. We also assume that there is enough uptake that BC is able to administer all these doses.

$$E(\text{death})_{\text{astrazeneca}} = d \times P(\text{VIPIT}|AZ) \times P(\text{death}|\text{VIPIT})$$

where d is the number of doses administered, $P(\text{VIPIT}|AZ)$ is the risk of VIPIT after receiving each dose, and $P(\text{death}|\text{VIPIT})$ is the case fatality for VIPIT.

To err on the side of caution, we will follow NACI's lead and assume the highest reported rate of VIPIT, which is 1 in 100,000 recipients, so $P(\text{VIPIT}|AZ) = \frac{1}{100,000}$. On the other hand, as reported by NACI, case fatality due to VIPID is currently estimated at 40%, but is likely to decrease as there will be more awareness and better early treatment. Again to err on the side of caution, we'll keep the estimate at 40%, so $P(\text{death}|\text{VIPIT}) = 40\%$

$$\begin{aligned} E(\text{death})_{\text{astrazeneca}} &= d \times \frac{1}{100,000} \times \frac{40}{100} \\ &= 246,700 \times \frac{4}{1,000,000} \\ &\approx 1 \end{aligned}$$

If the second dose of the AstraZeneca vaccine is not associated with increased and renewed risk for VIPIT, given the current evidence our best estimate for the number of death associated with AstraZeneca vaccine would be 1. If, however, we assume that the second dose will pose additional risk of VIPIT, delivering an additional 300,000 doses of the AstraZeneca vaccine will likely double that estimate.

In contrast, compartmental modeling by Mulberry and colleagues at SFU suggests that vaccinating front-line workers can save as many as 600 lives in BC [preprint 4]

References

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