COVID-END
COVID-19 Evidence Network to support Decision-making ... in Canada

There is a rapidly growing body of research evidence about the effectiveness of COVID-19 vaccines against variants of concern

Iorio A, Little J, Linkins L, Abdelkader W, Bennett D, Lavis JN. COVID-19 living evidence synthesis #6 (version 6.29): What is the efficacy and effectiveness of available COVID-19 vaccines in general and specifically for variants of concern? Hamilton: Health Information Research Unit, 2 February 2022.

Why is the evidence on this topic being summarized?

- All viruses evolve over time. When a virus multiplies in the human body, it sometimes changes a little bit. These changes are called "mutations." A virus with one or more new mutations is referred to as a "variant" of the original virus.
- A variant of concern is a variant for which there is evidence of an increased risk of spread, more severe disease (for example, causing more hospitalizations or deaths), lower capacity of antibodies generated during previous infection or vaccination to block it, reduced success of treatments or vaccines, or failure of diagnostic tests to detect the virus.
- It is important to understand how COVID-19 variants of concern affect the virus' behaviour, including their impact on the how well vaccines work among the adult population.
- Another living evidence synthesis examines the effectiveness of COVID-19 vaccines among children and adolescents (plain-language summary available here).

What question did we want to answer?

- What is the protection provided by available COVID-19 vaccines against variants of concern?

How have we done this living evidence synthesis?

- We conducted a broad search in several databases and websites to retrieve studies evaluating the effectiveness of COVID-19 vaccines, including the COVID-END Inventory of Best Syntheses.
- We examined the studies reporting data on how well vaccines work against variants of concern (for example, whether the vaccines prevent infection, severe disease, death, and prevent transmission).

How up to date is this living evidence synthesis?

- This living evidence synthesis was last updated on 2 February 2022.

What are the main results of our living evidence synthesis?

- We appraised a total of 379 studies, 132 of which were deemed eligible for our synthesis.
- We critically appraised the studies and determined the level of certainty of the body of evidence (table 1). The color indicates the level of certainty based on the evidence.

Table 1. Levels of certainty based on the best evidence available

High-certainty evidence	Moderate-certainty evidence	Low-certainty evidence
Our confidence in the body of evidence is high. The studies were well done with low risk of bias*. The studies revealed consistent findings.	Our confidence in the body of evidence is moderate. The studies were done with low to moderate risk of bias* but revealed only partially consistent findings. We will become more confident if new studies have the same findings.	Our confidence in the body of evidence is low. There are aspects of the studies that led us to believe the results may not be the same in future studies (low to serious risk of bias* with inconsistent findings).

*Features of the study (such as who was selected for the study, how the study was designed, and how the date was reported) that could lead to misleading results.

In table 2 below, we present what is known about the effectiveness of vaccines up to 30 days after last dose.

Table 2. Vaccine effectiveness (2 doses unless otherwise stated) up to 30 days after last dose

Outcome (and vaccine)	Variants of concern			
	Alpha	Beta	Gamma	Delta
Any infection				
Pfizer	78 to 95%		93%	42 to 91%
Moderna	86 to 100%	96%	95%	52 to 91%
AstraZeneca	62 to 79%		90%	45 to 73%
Johnson & Johnson				3 to 71%*
Sinovac			66%	74%
AstraZeneca followed by Pfizer or Moderna	82 to 91%		96%	88%
Symptomatic infection (reported when data on 'any infection' is limited)				
Pfizer		84 to 88%	84 to 88%	63 to 94%
Moderna			88%	87%
AstraZeneca		10%	65%	61 to 92%
Johnson & Johnson				51%
Novavax	86%	43%**		
Sinovac				59%
Covaxin				50%
AstraZeneca followed by Pfizer or Moderna				67 to 79%
Transmission				
Pfizer	70 to 82%		31 to 63% (unvaccinated contact) 10 to 40% (vaccinated contact)	
Moderna	88%		62 to 77%	
AstraZeneca	58 to 63%		36%	
Johnson & Johnson	77%*			
AstraZeneca followed by Pfizer or Moderna			86%	
Severe disease (may include death in some studies)				
Pfizer	92 to 100%			82 to 98%

Moderna	96%	96%		93 to 100%
AstraZeneca			76%	
Johnson & Johnson		82%		
Sinovac				46 to 89%
Death				
Pfizer	91%			90%
AstraZeneca				91%
Sinovac			86%	77%

In table 3 below, we present what is known about vaccine effectiveness against Omicron, which is currently the most dominant variant.

Table 3. Vaccine effectiveness against Omicron

Outcome (and vaccine)	Number of doses	Time since last dose (days)	Effectiveness
Infection			
Pfizer	2	7 to 59	6 to 55%
	2	164	-76.5%
	3	7 to 30	34 to 55%
Moderna	2	14 to 90	30 to 37%
	2	164	-39%
	3	7 to 30	59 to 64%
Symptomatic infection			
Pfizer	2	14 to 63	88%
		175	34%
	3	14	75.5%
AstraZeneca	2	175	6%
AstraZeneca followed by Pfizer or Moderna	2 doses of AstraZeneca and 1 dose of Pfizer or Moderna	14	71.4%
Transmission			
No evidence available			
Severe disease (may include death in some studies)			
No evidence available			
Death			
No evidence available			

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