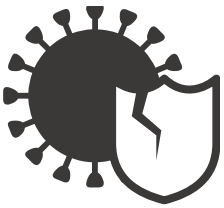
ADB
JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH
VIEW-hub by IVAC https://view-hub.org/covid-19
FACT SHEET
October 2022

How Effective Are COVID-19 mRNA Vaccines Against Omicron?

Vaccine effectiveness is how well a vaccine works in the real world (not just in clinical trial settings)

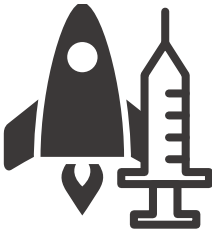
Key Facts



COVID-19 mRNA vaccines are highly effective BUT are less effective against Omicron than other variants

After the primary mRNA vaccination series:

- Protection against Omicron symptomatic disease (disease of any severity) drops quickly
- Protection against severe disease is better than that for symptomatic disease and declines some over many months



After a booster shot (3rd dose) of mRNA vaccine:

- Protection against Omicron symptomatic disease improves substantially but then drops quickly
- Protection against Omicron severe disease improves to >80% on average and declines some over many months.

COVID mRNA vaccines are safe and severe adverse reactions are rare:

- Myocarditis has been detected after mRNA vaccination in rare cases mostly in boys 12-15 years
- Bell's Palsy is possibly associated with mRNA vaccines.

Evidence in this brief was provided by VIEW-hub, a publicly available resource made possible by support from the Coalition for Epidemic Preparedness Innovations (CEPI) and the World Health Organization.

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COVID-19 mRNA Vaccine Effectiveness Against Omicron

How Effective Are mRNA Vaccines in the General Population?

		Severe Disease/ Hospitalization	Symptomatic Disease	Infection
mRNA primary series				
BioNTech-Pfizer		46-75%$_6$	37-66%$_5$	26-49%$_3$
Moderna		51-87%$_2$	43-76%$_2$	24-48%$_4$
mRNA primary series + mRNA booster				
BioNTech-Pfizer	+ BioNTech-Pfizer	80-91%$_8$	35-77%$_5$	43-58%$_4$
BioNTech-Pfizer	+ Moderna	87-94%$_3$	60-74%$_2$	*No data*
Moderna	+ Moderna	82-99%$_4$	52-68%$_2$	46-72%$_5$
Moderna	+ BioNTech-Pfizer	*No data*	66%$_1$	*No data*
non-mRNA vaccine primary + mRNA booster				
AstraZeneca	+ BioNTech-Pfizer	82-90%$_3$	43-63%$_2$	*No data*
AstraZeneca	+ Moderna	91-95%$_3$	55-71%$_2$	*No data*
Sinovac	+ BioNTech-Pfizer	86-89%$_2$	57-64%$_2$	*No data*

Note: values represent the range of peak VE estimates against Omicron BA.1 found across all included studies evaluating VE within 3 months of final dose among the general population. Subscript represents the number of estimates included in range.

How Effective Are mRNA Vaccines Against Omicron In Special Populations?

CHILDREN: VE of BioNTech-Pfizer was between 51-78% against symptomatic disease and 76-84% against hospitalization. A 3rd dose of BioNTech-Pfizer gave additional protection against symptomatic disease (VE 62-87%) and infection (VE 80%). No studies have evaluated VE of Moderna in children.

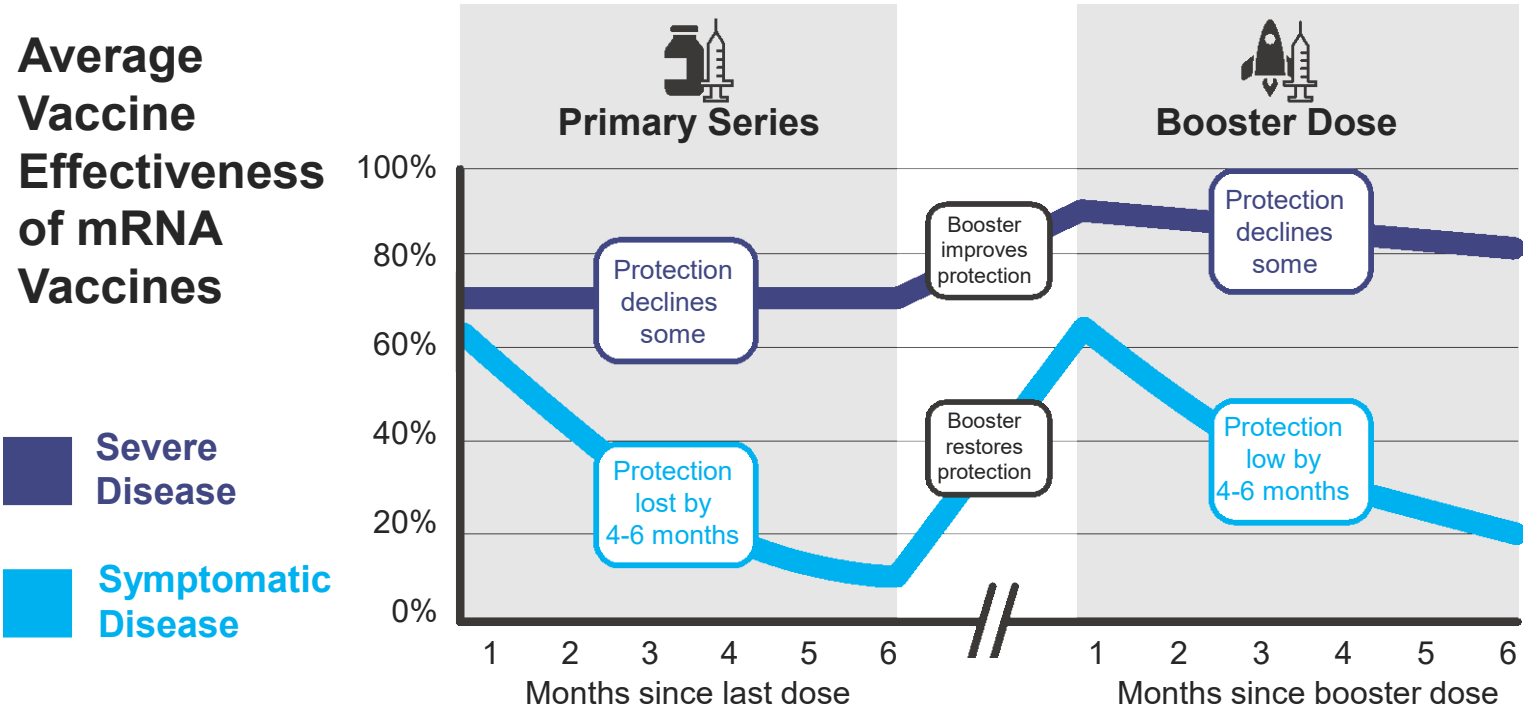
PREGNANT WOMEN: There are NO data on VE against Omicron in pregnant women. VE of mRNA vaccines for the Wuhan strain and Alpha variant in pregnant women was similar to that of the general population.

OLDER ADULTS: For people aged ≥65 years, VE of 2 doses of mRNA vaccines was 79-91% against Omicron severe disease which increased to 90-96% after a third dose of mRNA vaccine.

HEALTH WORKERS: For 2 doses of BioNTech-Pfizer vaccine, VE against hospitalization among healthcare workers was 70% (1 study); VE of 3 doses of BioNTech-Pfizer vaccine was 75% against Omicron symptomatic disease (1 study).

IMMUNOCOMPROMISED: VE of 2 doses of mRNA vaccine against was reduced among immunocompromised persons for Omicron infection, symptomatic disease and severe disease compared to the general population; a 3rd dose improved VE to >60% against both symptomatic and severe disease.

How Does Vaccine Effectiveness of mRNA Vaccines Against Omicron Change Over Time?



Vaccine Effectiveness (VE) against SEVERE DISEASE:

protection DECLINES SOME over time

- **After the primary series (2 doses) of mRNA vaccines**, average VE against Omicron was ~72% which declined moderately over 6 months.
- **After a booster dose of mRNA vaccine following a primary series with mRNA or AstraZeneca or Sinovac vaccines,** average VE improved to ~87% which declined to ~70% by 6 months

Vaccine Effectiveness (VE) against SYMPTOMATIC DISEASE and INFECTION:

protection WANES rapidly

- **After the primary series (2 doses) of mRNA vaccines,** average VE against Omicron symptomatic disease declined on average by 49 percentage points over 6 months.
- **After a booster dose of mRNA vaccine following a primary series with mRNA or AstraZeneca or Sinovac vaccines** VE against symptomatic disease was restored back to peak levels initially, but VE then declined at a substantial, though somewhat slower, rate than seen post primary series.
- VE against infection shows similar patterns as symptomatic disease

Does two booster doses of an mRNA Vaccine Improve Protection Against Omicron?

COMPARED TO UNVACCINATED PERSONS

- VE of 4 doses of mRNA vaccines against Omicron severe disease, symptomatic disease, and infection ranged from 80-88%, 59-73%, and 49-52%, respectively among residents of a long-term care facilities and persons ≥ 50 years.

COMPARED TO PERSONS WHO HAD 3 DOSES OF mRNA VACCINES

- 4 doses may only lead to small absolute improvements in protection compared to those who had 3 doses.
- For long-term care residents and people aged ≥ 60 years, 4 doses of mRNA vaccines had to following protection against death (74-78%), severe disease (40-89%), symptomatic disease (31-61%), and infection due to Omicron (19-81%) when compared to 3 doses
- Among health workers, VE was 31-46% against Omicron symptomatic disease and and 11-44% against infection for 4 doses compared to 3 doses.
- ** For more information on interpreting relative VE, see the WHO Weekly Epidemiologic Update from 29 June 2022

What We Don't Know About the Effectiveness of mRNA Vaccines

mRNA vaccines are by far the most studied COVID-19 vaccines, but more evidence on OMICRON is needed for:

- LONG TERM PROTECTION AGAINST SEVERE DISEASE: We're not sure how long primary series and booster dose vaccination provide protection against severe disease due to Omicron beyond 6 months and 4 months
- PROTECTION AGAINST DEATH: Evidence on mRNA VE against death is limited. VE of 2 doses over ~1 year ranged from 60-90% (2 studies); VE was >90% with an mRNA booster dose following either 2 doses of mRNA vaccine or 2 doses of Sinovac (2 studies).
- BOOSTER DOSE PROTECTION IN CHILDREN: VE of BioNTech-Pfizer against symptomatic disease in children was 62-87% (4 studies); however, no evidence is available for severe disease.
- VULNERABLE POPULATIONS: Few studies have assessed VE against severe outcomes among vulnerable populations. VE against hospitalization up to 12-16 months after the primary series vaccination was 52-85% (3 studies); VE against hospitalization within 3 months of a booster mRNA dose was 80% (1 study).
- VE IN LOW- AND LOW-MIDDLE INCOME COUNTRIES: We don't know how well mRNA vaccines are performing in these settings.
- PROTECTION AGAINST TRANSMISSION: We don't know how well mRNA vaccines prevent onward transmission of Omicron. However, studies that grouped all types of vaccines together, found VE against Omicron transmission to be <25% for primary series vaccination (2 studies) and <35% for booster vaccination (2 studies)
- OMICRON SUB-VARIANTS: We don't know how well mRNA vaccines work against Omicron BA.4 and BA.5, currently the most common sub-variants, but laboratory studies suggest protection may be reduced.