

## **Vaccination**

Over the last 200 years vaccination has been one of the most effective public health strategies. It was first used against smallpox, a highly infectious disease with a mortality rate between 20 – 60%. Largely because of vaccination, this disease which once ravaged the world has now been eliminated. There will be some older members, including myself, who have smallpox vaccination scars. Small pox vaccination was once a requirement for international travel. That younger, well travelled, members don't have them is testimony to powerful impact of vaccination.

Vaccination has been extraordinarily effective in reducing the incidence of polio, diphtheria, whooping cough, measles, tetanus, hepatitis B and human papilloma virus (cause of cervical cancer).

It is well documented that parental decisions to refuse vaccinations have led to outbreaks of a number of these diseases, particularly measles, in some communities.

There are some microbes for which we do not have vaccines – hepatitis C, HIV to name a couple.

Fortunately, several vaccines have been developed for the coronavirus which is the cause of COVID 19.

## **The Vaccines**

As of 30 Dec 2021, the vaccines which are approved for use in Australia are

Astra Zeneca

Pfizer

Moderna

Pfizer and Moderna are mRNA vaccines. The mRNA vaccines contain genetic instructions to neighboring cells to make spike proteins, while AZ is a vaccine which is delivered by a non-infectious modified adenoviral vector.

## **How do vaccines work**

Vaccines stimulate the immune system to create antibodies against surface components of the invading virus.

## **Vaccine efficacy versus vaccine effectiveness**

Efficacy is a measure determined in the clinical trial environment. In simple terms there two populations in a trial which are matched in age distribution, gender distribution, preexisting disease status and other factors. Certain subjects will be excluded from the trial. For

example, exclusions may include limited life expectancy, immunosuppression, and recent COVID infection. The only difference is that in the included subjects, one study population gets the vaccination, and the other doesn't. Efficacy is measured by the number of subjects who get the disease in the vaccinated cohort compared to the unvaccinated. If the study population is 200,000, with 100,000 in each arm, then if 5,000 in the unvaccinated population get the disease, compared to 1,000 in the vaccinated arm it can be said that the vaccine has an efficacy of 80%.

Demonstrated efficacy in clinical studies is a determinant in regulatory approval for release to the general population. This is the setting where effectiveness is determined.

Effectiveness may be measured by different outcomes to the clinical trials which determine efficacy. For example, ICU admissions in the vaccinated versus the non-vaccinated, risk of viral transmission by the vaccinated compared to the non-vaccinated, and death rates in the vaccinated and non-vaccinated populations.

## **Full Vaccination**

Full vaccination status is determined by the current advice from ATAGI (Australian Technical Advisory Group on Immunisation). As of 30 Dec. 2021 this requires two doses of an approved vaccine plus supplementary doses. The timing of these supplementary doses depends on the presence or not of immunosuppression and the time of the second dose. It would seem likely that additional doses beyond a third will be recommended.

## **Viral transmission from a fully vaccinated individual**

Fully vaccinated individuals are less likely to contract COVID 19 than the non-vaccinated. An infected vaccinated individual may transmit the virus to other individuals, both vaccinated and unvaccinated (breakthrough infections). Nasal viral loads decline more rapidly in an infected vaccinated individual than a non-vaccinated individual. This data supports the proposition that infected vaccinated individuals are less likely to cause breakthrough infections than the unvaccinated.

## **Vaccine Safety**

Adverse event reporting has identified some rare, but severe and occasionally fatal side effects. For the AZ vaccine the main event has been a blood clotting disorder – thrombosis with thrombocytopenia syndrome. UK data suggests that this occurs in about 15 per 1 million doses.

Inflammation of the heart muscle (myocarditis) has been found in about 60 per million after Pfizer. This is usually mild and reversible.

Unlike TTS, which has a clear link to AZ, myocarditis may have other causalities (other viruses, pharmaceuticals, autoimmune diseases, sarcoidosis), and a significant number of cases are unlikely to be caused by the Pfizer vaccine.

## Individual autonomy

Autonomy is the concept that an individual can make decisions using self-determined parameters without unwanted outside influence.

This is fine when it has no, or minimal impact, on the community. However, when there are meaningful impacts, the community may make “rules”. The Club already has them. “Clean your room before you go”, “Don’t smoke inside the Club” & “Don’t drive the OSV unless you have a licence” etc. Society has them. “Obey the road rules”, “Don’t jump the lift queue”

So, autonomy needs to be tempered with reasonable “living together” conditions. A reasonable view is that people who share communal facilities take steps to reduce harm to others in those facilities.

## Vaccination Certificates

Digital vaccination certificates are recorded in the Medicare smartphone app.

## Conclusions

1. In general, vaccines are highly effective in reducing the incidence and severity of disease
2. COVID vaccinations limit the acquisition and severity of infection.
3. There is evolving evidence that vaccines limit the transmissibility of infection from vaccinated individuals

## References

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- [Thrombosis with thrombocytopenia syndrome \(TTS\) | healthdirect](#)
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- [Comirnaty \(Pfizer\), Spikevax \(Moderna\) and cardiac inflammation | Australian Government Department of Health](#)
- [Business rules in NSW | NSW Government](#)

