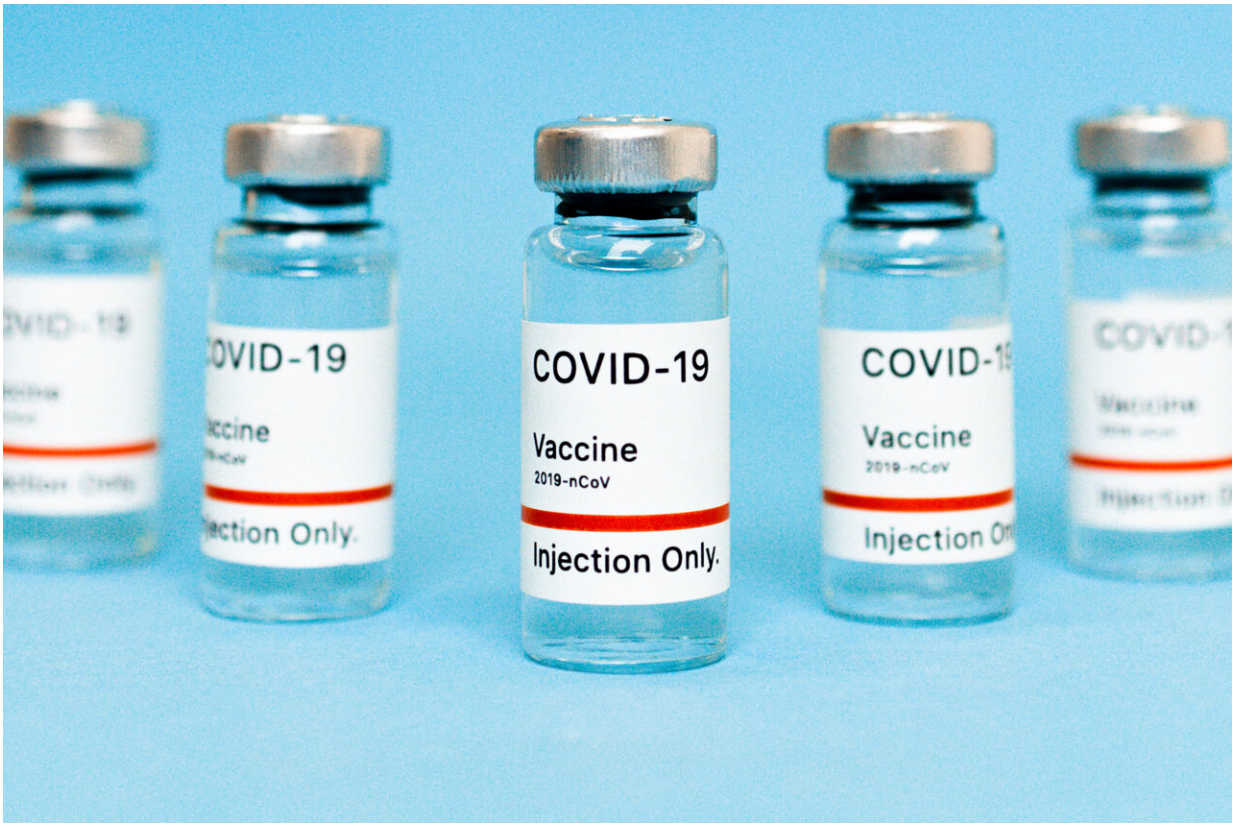
How well do COVID vaccines work in the real world?

July 2 2021, by David Henry and Paul Glasziou



Credit: Maksim Goncharenok from Pexels

Many Australians will be weighing up whether to be vaccinated with the AstraZeneca vaccine, which is widely available, or to wait for Pfizer later in the year.

There are many factors to consider. One is how well these COVID-19 vaccines work in the "real world" of those getting vaccines now.

Real-world data data can tell us how well vaccines protect against currently circulating variants—including the Delta variant, which is dominant in the UK and the subject of lockdowns in Australia. Though less reliable than clinical trials, real-world data can tell us how well vaccines work in some parts of the population excluded from clinical trials. They can also tell us whether we can effectively mix vaccines and what the main side-effects are, almost in real time.

You might be surprised by the results.

Where did these data come from?

Results of the crucial randomised clinical trials, which led to COVID vaccines being approved around the world, led to extraordinary media coverage. The vaccines have since become household names. But those trials were only the beginning.

Data collected during health-care delivery including medical consultations, hospital admissions, vaccine registers, laboratory tests and death records give us more, and different information about the vaccines.

These are data about millions of individual people, which are de-identified before analysis. Analysed properly, they tell us how well vaccines work, and their side-effects, in the real world.

How well do COVID vaccines protect you from serious disease?

The most important finding from analysing these data is vaccines from AstraZeneca, Pfizer and Moderna appear equivalent in reducing your chance of serious illness from COVID-19. As we show in our recent review, they do this by more than 80%.

These results extend the findings of the randomised trials by showing all ages benefit from the vaccines, and people with underlying chronic diseases experience reduced, but still worthwhile, protection from serious illness.

How about reducing transmission?

The next question is how well these vaccines reduce transmission of the virus from person to person, which the randomised clinical trials were not designed to measure directly.

Researchers in the UK linked data from the vaccination register with laboratory results and residential addresses. They showed a vaccinated household member who then developed COVID-19 was half as likely to transmit the virus to another household member as someone who had not been vaccinated.

> Vaccines reduce transmission of COVID-19, not just stop you from getting really sick and dying. How good! More from RACGP: https://t.co/8rriO4ZXgH
>
> — Tom Baker (@tom_baker) June 23, 2021

However, researchers did not measure the impact of vaccination on transmissibility of the Delta variant in this study as it was conducted before this became dominant in the UK.

How about effectiveness against viral variants?

Researchers in the UK have released estimates of vaccine effectiveness against coronavirus variants.

The most recent report from England found a single dose of the AstraZeneca or Pfizer vaccines provides only modest protection (30-40%) against infection with the Delta variant. Full vaccination with two doses of Pfizer offers greater protection (88%) than two doses of AstraZeneca (67%).

However, the same report found full vaccination with either vaccine provides more than 90% protection against hospitalisation from COVID-19.

A study in Scotland found very similar results.

What about vaccine side effects?

Common side-effects of vaccines are tracked by the Zoe COVID Symptom Study. This allows over four million people, mainly in the UK, to report any side-effects via an app.

Reported side-effects are generally mild (headache and fatigue). About 13% report common side-effects after the first dose of the Pfizer vaccine, 22% after the second dose. With AstraZeneca, it's more than 33% after the first dose. Data from the second AstraZeneca dose were not available for this study.

The Zoe app has not quantified the risk of rare severe complications of vaccination. However, real-world data have provided early estimates of the risk of a blood clot (thrombosis) after receiving the AstraZeneca

vaccine in Norway and Denmark.

The overall rate of a blood clot in the veins anywhere in the body was approximately doubled compared to the general population. This included an extra risk of cerebral venous thrombosis (a type of brain blood clot) of 2.5 out of every 100,000 who received a first vaccination (compared with the general population). Although elevated, this is a very low risk.

The researchers did not have access to appropriate control groups receiving other COVID-19 vaccines to compare the levels of risk. This will likely be a priority in future studies.

How do we know all this?

The science of analysing and interpreting real-world data from vaccine and other treatments has developed over the past 20 years.

In clinical trials randomisation of participants to treatment or control results in very similar comparison groups. This means any differences in trial outcomes should be due to the treatment, not some other factor. Real-world comparisons do not provide this guarantee.

If elderly people, with underlying disease, receive their vaccine early in the rollout, this may create a sicker group of people (or cohort) to follow and analyse. This may make the vaccine appear less-effective than it really is.

Conversely, a more open rollout may lead to more healthy people getting vaccinated. So, the vaccine will appear better (more effective) than it really is.

This complex interplay of biases makes it difficult for researchers to

tease out the true effects of vaccines; hence real-world studies require more sophisticated designs and analyses than randomised trials.

However, it's not so simple. Randomised trials can also be "real world" when they include broad criteria of who to include. While we need more randomised trials, they will never answer all the emerging questions soon enough. That's why real-world data are so powerful in the middle of a pandemic.

Where to next?

Despite some limitations, analyses of real-world data have become increasingly important with the emergence of new, more infectious strains of SARS-CoV-2 as they can provide answers to important questions more quickly than randomised trials.

However, not all governments provide secure access to de-identified population-scale data to allow researchers to do this. So it's essential suitably qualified researchers have this access to perform this important work.

Provided by The Conversation