Covid-19 vaccines: Priorities, processes and practicalities

As vaccines become available, new challenges await, including managing delivery systems, tracking outcomes, and winning over those still hesitant about the benefits of vaccination

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With Covid-19 flaring up again in many countries, and safe, effective vaccines likely to become available over the next few months, how do we deploy them wisely and well?

Globaly, the Covid-19 Vaccine Global Access (COVAX) facility is working on vaccine access for all who need it, including low- and middle-income countries. This international collaboration aims to enable equitable distribution of Covid-19 vaccines through global risk-sharing and pooled procurement strategies.

Although there are over 70 vaccines currently in human trials, the situation is still fluid and the development is fraught with candidates dropping out at each phase one and two studies, but standing the test of phase three trials. The final stage prior to regulatory approval, risk-sharing and pooled procurement are countries from backing the wrong horse and wasting billions tied with no vaccines for their people, and allow poorer countries a chance to get access to vaccines.

SAFETY AND EFFECTIVENESS

Each country will have its own considerations regarding when and how to vaccinate its population based upon its circumstances. So, when should Covid-19 vaccines be used within Singapore? And who should get the vaccines first? Do we have enough available here?

Safety and efficacy are our highest priorities, so Covid-19 vaccines should be recommended for use only after they have passed rigorous scrutiny by the health authorities and medical experts. This requires that the risk-benefit be favourable.

The goals of vaccination are to protect people from infections and its severe complications, to protect our communities from the public health impact of outbreaks, and to facilitate the safe reopening of our economy, society and borders.

The highest priorities should generally be to protect healthcare staff and front-line workers, a sensible objective it is ensures that we can keep our essential operations functioning. These goals should be the formulation of the Covid-19 vaccination strategy which should be vaccinated, once vaccination occurs and how vaccines are administered. The standard operating procedures and vaccine protocols should be complete before vaccination.

The prioritisation framework should be consistent with published international plans, as it is similarly anchored on two major dimensions of risk: the risk of getting infected with Covid-19, and the risk of severe complications or death from the virus.

Since healthcare staff and essential front-line workers have high risk exposure, giving them priority conserves our healthcare and essential services capacity. We know as well which segments of our community are at highest risk of serious infection, making them the most vulnerable, should they get infected.

Therefore, such vulnerable individuals, especially older adults and persons with medical conditions, should also be given priority as vaccine supplies become available. Our ultimate goal should be to make everyone residing in Singapore to have the opportunity for vaccination.

With the pandemic raging around the world, we are likely to see some key challenges: Covid-19 vaccine data for its efficacy and safety in specific segments of the population which are less well studied, particularly children and pregnant women.

While such data may take time to accrue, the large number of Covid-19 cases globally will likely give us much-needed data more quickly than in the case of other vaccines. Of note, vaccine manufacturers have made efforts to broaden the diversity of participants in research trials, specifically different ethnicities and older adults.

To date, early data has indicated that vaccine efficacy is high in adults over the age of 66, and that this seems consistent across age, gender and ethnicity.

MANAGING THE VACCINATION PROCESS

As we will be aiming to vaccinate large numbers of Singaporeans over a relatively short space of time, managing the process will be a challenge.

Some of the issues that will actively work on include tracking which has been vaccinated, managing the cold chain because the mRNA Covid-19 vaccines will require storage at low temperatures of up to minus 70 degrees C (cooler than Antarctica's), and organising the flow of people coming for vaccination.

We will also need to be able to monitor vaccinated people for side effects possibly linked to the vaccine, and develop a process to avoid the few who do experience serious vaccine side effects.

There are some important unknowns that remain with vaccinations. The first is how long immunity lasts after vaccination or infection. We refer to this as the durability of immunity. We already know that some recovered cases can have a persistent positive test for a while, but these are generally not considered reinfections. So far, we have not been able to culture live-virus from such individuals locally.

Rare, true reinfections have been reported. But we also see this in light of the fact that over 63 million have been vaccinated, 6.3 million have recovered, and many countries are experiencing repeated waves of Covid-19 transmission. Therefore, if reinfections were truly common, we would expect to have seen more cases by now.

While only time will tell regarding the durability of immunity after a Covid-19 vaccination, it is at least as good as the immunity following infection by the virus. Moreover, decades of experience with other vaccines tells us that some vaccines provide long-lasting protection such as hepatitis A and polio, and others require boosters such as tetanus or pertussis.

The second unknown we will face is knowledge about only with time is whether vaccinated persons can still transmit Covid-19 to others should they get infected and develop a mild illness.

In other words, apart from postive immunity that shields the individual from getting a symptomatic disease, is there any sterilising immunity that prevents the individual from becoming infected at all, therefore, unable to transmit the virus? Because we cannot guarantee this, we will still need masks, maintain our ability to detect cases early, and manage our care safely.

But now we have gained a very powerful capability. Apart from minimising severe infections, if vaccines can help us to reduce the actual reproductive number for infection to fewer than one, outbreaks will be extinguished.

Here, we need only look to the example of measles, which has an intrinsic reproductive number of 1.5, among the highest of any infectious disease. This means one measles case in a totally susceptible population can infect 1.5 persons, and each of those secondary cases could infect a further 1.5 cases each, so that within two transmission cycles, one case could result in 225 cases. For centuries, we were completely helpless against this virus, with thousands of children worldwide dying or going blind from measles complications every year. In 1944, the year before measles vaccination became mandatory in Singapore, there were 2,421 reported cases of measles from deaths from measles here. Vaccination allowed us to eventually control measles outbreaks, and Singapore finally achieved measles elimination in 2018. This does not mean that there will not be cases in Singapore, but rather, that there are no large outbreaks, nor multiple chains of transmision.

VACCINE HESITANCY

It is understandable that there may be some vaccine hesitancy. One must acknowledge that there are some valid concerns, setting aside the wildly misinformed claims being made by anti-vaccine movements.

It is wise to also appreciate why there is a pressing need for medical precaution when looking at the figures—despite over 63 million people worldwide being vaccinated, and more than 1.4 million dead from Covid-19 over a mere 9 months, studies using blood tests for Covid-19 antibodies indicate that less than 10 percent of the population got infected, even in the hardest-hit countries in the world. This translates to at least 90 percent of the population in risk for catching Covid-19.

To achieve herd immunity, at least 60 percent to 70 percent of the population needs to be vaccinated before we could consider the devastation and the cost in terms of human suffering which would occur by allowing the virus to burn unchecked through the population.

Vaccination provides a different path forward for humanity. But for success, we need the courage to step out, to enable Covid-19 vaccination for all who need it, and to engage patiently those who hesitate, addressing their concerns.

The world will continue to be at risk until every person in the world is vaccinated. Even as long as the virus smokers in any country, society and borders are carefully redefined to ensure that vaccines serve as a protective buffer for our population.

A large percentage of our people are vaccinated, imported infections from vaccinated countries and travel will be less likely to spark new Covid-19 outbreaks at cause serious illness. Through vaccination, we can minimise these risks of exploitation spread in group settings.

Vaccines have proved successful in fighting other infectious scourges in human history. Along with other measures, Covid-19 vaccines provide hope that we will now have a powerful tool to contain this pandemic with the tremendous disruptions this pandemic has caused.