Australian Technical Advisory Group on Immunisation (ATAGI)

Preliminary advice on general principles to guide the prioritisation of target populations in a COVID-19 vaccination program in Australia

Purpose and scope of this advice

This preliminary advice focuses on one specific aspect of the overall planning for an Australian COVID-19 vaccine program: principles for identifying and defining priority groups for COVID-19 vaccination in Australia. The advice is aimed at supporting planning by the Australian Government in the development of a strategy for the procurement of COVID-19 vaccines and program delivery.

As knowledge relating to COVID-19 disease and candidate vaccines is evolving, available data do not yet enable definitive statements on immunity and protection following SARS-CoV-2 infection or vaccination across a wide range of scenarios and population groups. ATAGI plans to iteratively expand on this advice as more data, especially regarding characteristics of the candidate vaccines available for use in Australia, become available.

Overarching goal of the COVID-19 vaccination program in Australia

The Australian COVID-19 vaccination program has the overarching goal of protecting all people in Australia from the harm caused by the novel coronavirus SARS-CoV-2.

Specific aims of the COVID-19 vaccination program

An Australian COVID-19 vaccination program should seek to achieve the following aims, noting they are interrelated

- Reduce COVID-19 related harm by preventing serious illness and death, and where possible, disease transmission
- Ensure equity of vaccine access and uptake, especially for groups likely to experience a disproportionate burden of disease
- Promote public and health professional trust in the utility of COVID-19 vaccines and their implementation to the Australian community
- Ensure COVID-19 Vaccines are listed within the national immunisation program
- Maintain functioning of health care and other essential services to preserve health, social and economic security

The overarching goal and specific aims of the COVID-19 vaccination program are guided by key ethical principles, as outlined in the WHO SAGE Values Framework[1]. These include but are not limited to well-being, respect, equity, reciprocity and legitimacy.

Background

Unprecedented resources are being expended with the aim of rapidly developing safe and effective vaccines against COVID-19. As of 11 November 2020, 47 vaccine candidates are in clinical trials in humans including 11 in phase 3 trials. Six vaccine candidates are undergoing human clinical studies in Australia. The Australian Government has agreements for the supply of four candidate vaccines, with two being manufactured in Australia, and has joined the COVAX Facility[2]. No vaccines have been fully licensed yet for prevention of COVID-19 in Australia by the Therapeutic Goods Administration (TGA).

When vaccines are available, supplies will initially be limited and priority groups for vaccination will need to be identified. Deciding upon which groups to prioritise is difficult and contentious. Different candidate vaccines will vary in their efficacy to prevent or modify clinical endpoint outcomes, safety profile, and suitability for different age groups or people with underlying medical conditions. Even if they prove to be effective in preventing disease, some vaccines may not prevent acquisition or ongoing transmission of the virus, making herd immunity an

1. WHO SAGE values framework for the allocation and prioritization of COVID-19 vaccination, 14 September 2020 (link here)
2. Coronavirus (COVID-19) – Information about the COVAX Facility, 5 November 2020 (link here)

unachievable program goal. Determining strategic uses of vaccines and their allocation to priority groups at this time is not possible in the absence of such relevant empirical data about mechanisms of action, although the principles for prioritisation can be established.

The decisions about prioritisation should take into account the following considerations and should be flexible and revisable in the light of new evidence:

- Disease epidemiology
- Safety characteristics and adverse event profile of available vaccines
- Groups likely to experience a disproportionate burden of disease
- Efficacy, effectiveness, immunogenicity and mechanism of action of available vaccines (i.e. ability to prevent acquisition, reduce viral shedding and transmission, and/or reduce severe clinical outcomes of infection)
- Regulatory, programmatic and operational considerations (e.g. vaccine supply and delivery)
- Public and health worker confidence and acceptability
- Social and economic impact
- Relevant ethical considerations

Deciding potential population groups for vaccine prioritisation

Prioritisation should be based on evidence and will be influenced by the prevailing epidemiology when specific vaccines become available. In line with the principles explicated above, there are however some groups who should be prioritised (unless strong reasons against this emerge).

The most important group for prioritisation are key workers (particularly health and aged care workers). This is because they are doing work of critical importance and societal benefit. Frontline health workers are also at increased risk of infection and it is to everyone's benefit that they continue to work. Furthermore, nosocomial transmission impacts patients at highest risk of COVID-19 complications.

As evidence becomes available about a vaccine's impact on at-risk populations, priorities can be set about which sub-groups to focus on. Evidence of population subgroup efficacy from early clinical trials may be limited or not available at all which should not unnecessarily preclude an equitable approach to vaccine allocation. However, there is no point in prioritising a group (even if at increased risk) if a vaccine is shown to be completely ineffective in that group.

Data implicating a particular age or population group as a major source of transmission of COVID-19 are currently lacking. The vast majority of the Australian population remains susceptible to the virus (i.e. non-immune) due to low rates of SARS-CoV-2 infection in Australia to date. Therefore, any strategy focused on reducing the risk of community transmission (should this be achievable with available vaccines) will likely require target levels of uptake to be achieved across a broad age range of the population.

Possible priority population groups

Those who have an increased risk, of developing severe disease or dying from COVID-19

- **Older people**
  Increasing age is the clearest risk factor associated with a high risk of COVID-19 morbidity and mortality. Risk of COVID-19 disease and mortality is also likely compounded by the presence of underlying co-morbidities, which increase with advancing age. Other factors associated with older age, such as residence in an aged-care facility may also increase risk, noting the occurrence of multiple serious outbreaks in these settings. Any age-threshold based COVID-19 vaccination programme would have to be informed by age-specific disease and mortality rates in the population, as well as vaccine efficacy and safety in older adults. The recommended age threshold may need to vary with time and local epidemiology, and within different population groups, such as Aboriginal Torres Strait Islander people, due to other concurrent risk factors.

- **People with pre-existing underlying select medical conditions**

  People with certain underlying pre-existing medical conditions are reported to be at increased risk of severe outcomes with COVID-19 compared with healthy individuals of the same age. These at-risk medical conditions include, but are not limited to, immunocompromised, multiple comorbidities, chronic lung disease, diabetes, cardiovascular disease and severe obesity. The Department of Health has compiled a list of at-risk population groups for COVID-19 for risk communication in public messaging[3]; prioritisation of these groups for vaccination would need to be informed by evidence on relative risk of severe outcomes, and information on vaccine efficacy and safety, as available.

- **Aboriginal and Torres Strait Islander people**

  Aboriginal and Torres Strait Islander peoples have an increased risk of acquiring and developing serious outcomes from communicable diseases due to multiple factors including a high prevalence of underlying chronic health conditions and greater likelihood of living in communities where crowded-living conditions exist, increasing the risk for transmission[4]. Aboriginal and Torres Strait Islander people in remote locations would have particularly higher risk of serious outcomes if infected with SARS-CoV-2 due to their high rates of comorbidities combined with poorer access to medical services. While the impact of COVID-19 to date on Aboriginal and Torres Strait Islander peoples has been mitigated by existing control measures (especially restriction of movement into communities, social distancing etc.), First Nations populations have borne a disproportionate burden of this disease. They therefore constitute a priority group for COVID-19 vaccination. Although children, including Aboriginal and Torres Strait Islander children, are less likely to develop severe COVID-19 compared with adults, close contact within communities and households may also warrant their inclusion as a priority group for vaccination, if a suitable vaccine was available.

Additionally, there are other groups observed to have increased risk of adverse outcomes following COVID-19 particularly in international data. These groups include communities of low socio-economic status and those belonging to culturally and linguistically diverse backgrounds.

Those who are at increased risk of exposure and hence of being infected with and transmitting SARS-CoV-2 to others at risk of severe disease or are in a setting with high transmission potential

- **Health and aged care workers**

  These individuals (medical, nursing, residential aged care, disability care and other allied health staff) are at high risk of COVID-19 due to frequent exposure to persons and settings that could transmit SARS-CoV-2. Among health care workers certain groups such as ICU and emergency department staff are at a higher risk of COVID-19. Health and aged care workers have a higher likelihood of transmitting the virus to medically vulnerable and susceptible individuals via contact in their workplace, such as hospitals and aged care facilities. Primary health care staff (e.g. general practitioners) as well as frontline healthcare workers (ambulance staff, paramedics etc.) also have increased risk of disease acquisition and transmission. Protection of the health workforce is essential to ensure access to appropriate care of individuals with COVID-19 and other medical needs. Immunisation of health care workers is likely to improve public confidence in vaccines.

- **Other care worker**s

  This group would include other occupations with a care role for vulnerable populations and in potentially high transmission settings (e.g. group residential care workers, disability care workers or others). Specific groups will have to be defined through reviewing disease and infection transmission risk and local epidemiology.

3. Advice for people at risk of coronavirus (COVID-19)
4. Coronavirus (COVID-19) advice for Aboriginal and Torres Strait Islander people and remote communities

- **People in other settings where the risk of virus transmission is increased**

  Workers or residents in other settings (not captured above) that have increased risk of disease acquisition and transmission within those settings. These would include correctional and detention facilities, sea and airports and others such as meat processing plants where disease clusters have occurred.

Depending on the mechanism of vaccine action, protection may extend beyond the immunised individual to reduce onward transmission in these settings.

Those working in services critical to societal functioning

- **Select essential services personnel**
  Other occupation groups that are critical for managing the pandemic response. This would include public health personnel, police, emergency services, defence forces, staff managing quarantine facilities, clinical laboratories, pathology and diagnostic services etc.
- **Other key occupations required for societal functioning**
  For example, people working in supply and distribution of essential goods and services such as food, water, electricity, telecommunication and other critical infrastructure.

Australian Health Protection Principal Committee (AHPPC) Advice to National Cabinet on 30 March 2020 contains a list of work settings and characteristics where essential workers would be considered to be most at risk of acquiring COVID-19 and at higher risk of serious illness if they become unwell. Since that time, a range of risk mitigation measures have been enacted across workplaces nationally that may be augmented by immunisation, particularly in settings where infection spread remains challenging to control. These groups need to be examined in more detail with regard to potential vaccine prioritisation.

Key vaccine characteristics relevant to determining target populations

There are number of vaccine characteristics that will influence decisions regarding vaccine target group selection and prioritisation. Given the large number of candidate vaccines currently in trials, there may be multiple different vaccines available, and timing of availability may vary. Individual vaccine characteristics, evidence and authorisation for their use needs to be matched to individual target groups. Some of the key vaccine characteristics that may influence vaccine choice in relation to selection of target populations for COVID-19 vaccination include:

- **Vaccine composition and indications for use:** Some of the vaccine platforms (technology) used in candidate COVID-19 vaccine development are new and it is not yet clear if they may suit one population group better than others. This would likely be reflected in the licensure of respective vaccines by TGA. For example, for vaccines that use a human adenovirus vector platform, previous individual exposure to the vector virus may interfere with the generation of a protective immune response against SARS-CoV-2. For certain vaccines but not others, efficacy may be poor in older aged persons, and this group may need to be vaccinated with candidates that contain effective adjuvants.
- **Vaccine immunogenicity and efficacy:** The host response to vaccines could vary considerably due to a number of factors. Persons with immunocompromising and other chronic conditions and the elderly may have diminished responses to vaccines and therefore require additional measures to achieve adequate protection, such as extra doses, adjuvants and/or a higher antigen content vaccine. The age groups included in the trials where efficacy data are available may be narrower than the target group considered for vaccination (note: at present, very few trials include people aged above 65 years).
- **Mechanism of action:** Clinical endpoint efficacy may result from different mechanisms of vaccine action – for example, protection may be good against severe disease and death from COVID-19 but poor at preventing infection with the virus and viral shedding, resulting in a low impact on virus transmission (and little or no prospect of achieving 'herd immunity' as a program objective). A vaccine candidate/s might also be available for use before, or in the absence of, phase 3 trial data on key outcomes in specific age or population groups, requiring decisions based on extrapolation of study findings and expert opinion.

- **Dosing schedule:** The number of vaccine doses required to induce sufficient protection will influence the acceptability, as well as program delivery and uptake of vaccines in various target population groups. In an emergency-use situation for pandemic control, short-term efficacy of a single dose of a vaccine/s that requires a multi-dose schedule also needs to be considered, but data may be incomplete. The majority of candidate vaccines are being trialled as two dose schedules.
- **Duration of protection:** The requirement for repeat or booster doses, and in such cases frequency of those doses, would depend on the duration of vaccine-induced protection. Such data are unlikely to be available in time for initial prioritisation decisions. This would be a key consideration for determining the configuration of an ongoing COVID-19 vaccination program.
- **Vaccine safety:** Vaccine safety profiles may vary for individual vaccines and across different population subgroups. Specific factors, such as impact of older age and potential for severe adverse effects after immunisation (AEFI), including immunopathology either following vaccination or upon exposure to SARS-CoV-2 in vaccinated persons, is unclear. There is a need for a robust evaluation of data from phase 3 studies in regulatory submissions, as well as ongoing post-market surveillance for potential enhanced disease and other adverse events in Australia and other countries. For some potential vaccination target populations, such as those with underlying medical conditions, pregnancy and the elderly, safety data may not be available in initial vaccine trials.

Programmatic and other issues impacting on vaccination target group selection and prioritisation

Decisions regarding priority vaccination groups must take into account certain key programmatic and operational factors. It is critical that there is broad 'system readiness' for the introduction of COVID-19 vaccines. More recommendations in this regard will be provided in future guidance from ATAGI; a short summary only is provided below.

If the priority population is already included in the National Immunisation Program or existing vaccination programs for other disease/s (such as healthcare workers' vaccination), COVID-19 vaccination could be more easily integrated into clinical practice. Where essential service workers are to be vaccinated, this could occur in the workplace setting. The level of vaccine uptake that can realistically be achieved, barriers to vaccination and the acceptability of COVID-19 vaccination in intended target groups also needs to be considered. Research is required to provide information to address some of these issues.

Logistics, including cold chain and administration (some candidates require special administration techniques, an additional device for administration, use of multi-dose vials and or additional training of immunisation service providers) will have to be factored in when considering feasibility of delivery to priority population groups. Education and training of the healthcare workforce will be needed.

It will be critical that **all** vaccine doses administered be recorded on the Australian Immunisation Register (AIR) within a short time frame after vaccination, irrespective of the priority group targeted. Only approximately 40% of influenza vaccine doses recently distributed have been entered onto the AIR, and data on the utilisation or non-utilisation of the remaining doses are absent.

In addition, data from the AIR, which contains only minimal demographic information (age, sex, postcode and Indigenous status), must be linked to other health and demographic data to ensure that monitoring and evaluation of COVID-19 vaccine use at the individual and population level is done. This will provide a basis from which to ensure target populations are reached, and to monitor vaccine safety (including long-term or rare adverse outcomes, which will not be known at program commencement), vaccine effectiveness in real world conditions, and overall vaccine impact.

Modelling using a range of assumptions to inform anticipated and real-world impact of different candidate COVID-19 vaccines on reduction of death and disease in the populations at greatest risk from COVID-19 disease, similar to work that has been done for pandemic influenza, would be advantageous prior to and during vaccine program roll-out. Data on the impact of potential vaccine candidates, including benefits (particularly efficacy against severe outcomes), potential harms, virus shedding, infectivity of vaccinated people and the duration of protection, when robust enough to input into a model, would be key to predicting potential program impacts and any potential for herd protection.