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Independent OzSAGE

Advice for lifting COVID-19 restrictions in Australia

September 2, 2021

1. EXECUTIVE SUMMARY

OzSAGE is a multidisciplinary network of Australian experts from a broad range of sectors relevant to the well-being of the Australian population. Its role is to assist the safe opening up of Australia during and after the COVID-19 pandemic.

We aim to be a resource for federal and state governments, opposition, business, community and non-government agencies in Australia. We will formulate independent advice on public health, health systems and other policy matters relevant to COVID-19 control, from diverse and multidisciplinary perspectives. We will provide decision support, underpinned by the best scientific evidence, modelling and our core values and principles. We will be agile and responsive in providing rapid advice during emergencies.

We are guided by the values of respect, diversity and inclusion, justice, equity, transparency, authenticity, compassion and solidarity. We operate ethically, use the precautionary principle, and supply real-world examples, and understand that recommendations may change over time as evidence or needs change.

Ventilation and "*Vaccine-Plus*" are the pillars of safe lifting of restrictions. "Plus" refers to testing, tracing, masks and other non-pharmaceutical strategies. Ventilation is about providing safe air and mitigating airborne SARS-CoV-2 transmission in high-risk settings (borders, health and aged care) and in our schools, workplaces, social venues and homes.

In this document, we outline practical, actionable solutions in relation to:

- ◆ Ventilation and safer buildings
- ◆ Vaccination targets
- ◆ Testing and tracing
- ◆ Masks
- ◆ Aboriginal and Torres Strait Islander people
- ◆ Protecting children
- ◆ Protecting and surging the health workforce
- ◆ Protecting and enabling businesses
- ◆ Remote and regional Australia
- ◆ High-risk or disadvantaged populations.

More detailed advice will follow as OzSAGE working groups develop solutions and strategies to help Australia progress during and after this pandemic.

1. WHO WE ARE, OUR VALUES AND PRINCIPLES

OzSAGE formed in response to the current Australian COVID-19 Delta epidemic, meeting for the first time on August 16, 2021. We are a multidisciplinary network of Australian experts from a broad range of sectors relevant to the well-being of the Australian population (**see list of members and areas of expertise on page 17**). In the midst of many competing expert opinions, OzSAGE offers well-researched and robustly debated independent, consensus expert advice. We do this to inform the common national goal of achieving an exit strategy from this pandemic with the best possible health, social and economic outcomes.

OzSAGE members are unpaid and lack any political agenda. Members have experience, expertise and frontline roles in public health, infectious diseases, virology, immunology, epidemiology, vaccinology, clinical disciplines (intensive care, emergency medicine, infectious diseases, paediatrics, paediatric intensive care, occupational medicine, mental health, allied health, and multiple other subspecialities), Aboriginal health, engineering, the built environment, occupational hygiene, laboratory science, basic science, Paramedicine, research and development, behavioural and social science, multicultural engagement, communications, law, computer and data science, public policy and economics.

An Aboriginal and Torres Strait Islander-led working group of OzSAGE will provide a separate advice document, developed in consultation with relevant national peak bodies.

A. We aim to:

- ◆ be a resource for federal and state governments, opposition, business, community and non-government agencies in Australia.
- ◆ formulate independent advice on public health, health systems and other policy matters relevant to COVID-19 control, from diverse and multidisciplinary perspectives.
- ◆ provide decision support, underpinned by the best scientific evidence, modelling and other research, to inform the choice between policy alternatives.
- ◆ provide rapid advice during urgent public health events.
- ◆ assist with the safe opening up of Australia.

B. Values

Members are guided by the following values in providing advice:

Respect

Recognising the intrinsic value of a diverse range of perspectives and having due regard for the welfare, beliefs, perceptions, customs and cultural heritage of all Australians

Diversity & Inclusion

Providing a balanced and diverse range of expert advice and allowing debate and dissenting views.

Justice & Equity

Valuing fairness and equity in the treatment of all individuals and communities and focusing on achieving positive outcomes for the worst-off as a priority

Transparency & Authenticity

Valuing accuracy and truthfulness and being open and direct.

Compassion & Solidarity

Valuing concern for others, empathy and benevolence, and standing together to meet the challenges and burdens of the pandemic

C. High-level principles

(1) The precautionary principle

Reasonable steps to protect people and reduce risk should not await scientific certainty. Much about COVID-19 is still unknown (such as its chronic and long-term health effects, including on children), and the virus is clearly still evolving/worsening. The Delta variant is very unlikely to be the last SARS-Cov-2 variant we face, or the worst. Low case numbers should be the Australian strategy for the foreseeable future. COVID-19 should not be likened to seasonal influenza, referred to as **endemic** or regarded as tolerable; it is more like measles and polio – infectious, always epidemic, deadly and highly disruptive.

(2) Ethical considerations

This includes an appreciation of impact of both disease and lockdowns, especially on high-risk or disadvantaged populations, on children and on low and middle-income countries. In just one example, recommendations of 3rd booster shots (which we make in specific instances) need to be considered in a context of low vaccination rates in some Australian communities and in other countries, and ensuring that Australia contributes to global vaccine supply.

(3) Coming to terms with concepts of risk, uncertainty and probability is vital to personal and institutional decision-making during the pandemic.

We all consider risk in our daily lives, but the stakes are higher and the uncertainty is greater in a once-in-a-century pandemic. All decisions and options have pros and cons. Good decisions are based on a thoughtful weighing of the alternatives and their likely consequences. However, the uncertainty of the present environment means that, even with careful consideration, bad outcomes may flow from good decisions.

(4) Real-world data are important.

In the early days of the pandemic, knowledge about SARS-CoV-2 was scarce and decisions were based on analogies with other viruses and modelling. As more data have been acquired in epidemiological studies, they can inform decisions directly and fuel better predictive models.

(5) **Science works by peer review**, engagement, criticism, and collaboration – mostly during conferences, peer review, grant applications and scholarly editorials. Although hard to maintain in a pandemic, we encourage policymakers to understand and apply these principles.

(6) Changing recommendations over time is evidence of science working.

We will challenge our own thinking and recommendations constantly as knowledge advances and new tools and data become available. We aim to be agile and responsive to changing situations and changing evidence.

(7) Aspire to elimination.

A range of technical terms (**eradication, elimination, control**) with specific meanings have been misused during the pandemic, causing confusion among the community and decision-makers. “Elimination” does not mean outbreaks of COVID-19 will never occur; it means that sustained, ongoing outbreaks with high rates of illness and death can be prevented. We have achieved elimination of measles and polio through vaccination in Australia, but still have occasional outbreaks of measles. It will be possible to do the same for SARS-CoV-2 with the use of boosters and/or vaccinations matched to Delta or other variants, supported by other measures outlined in this document. **The economy** will fare better when COVID-19 is well controlled.

We believe the best possible outcome for Australia is a measles-like situation, in which

occasional outbreaks occur because of imported infections, but sustained community transmission is prevented because a high enough proportion of people has vaccine-induced immunity, and our lives can continue normally. This is what “**elimination**” means; we believe it is achievable with booster vaccinations that are matched to Delta or other variants and the other measures outlined in this document.

2. THE CURRENT SITUATION

In Australia, we have avoided the high rates of illness and death and the overwhelmed health systems seen in many other countries by rigorous implementation of public health measures, including tracking, tracing and isolation, social distancing, border controls and quarantine. **It is our strong view these gains should not be relinquished.**

Recent setbacks to control efforts in Australia have arisen for several reasons.

- i. Compared with the ancestral Wuhan strain and earlier variants, the now-dominant Delta variant is:
 - a. much more infectious, making “test and trace” alone insufficient
 - b. more likely to infect, and be **transmitted** by people who have been vaccinated (though vaccinated people remain protected against severe disease)
 - c. more likely to **transmit from people without symptoms**
 - d. more severe in its clinical consequences and risk of death in the unvaccinated.
- ii. Vaccine supply, and hence coverage, in Australia has lagged and, despite recent rapid uptake, remains low and unevenly distributed within the population (with particularly low coverage in Indigenous communities and young people).
- iii. Currently available vaccines were made for the ancestral Wuhan strain and are less effective against some other variants. **Moreover, vaccine immunity wanes.** However, this is a temporary setback, because vaccines and boosters matched to Delta and other variants will be available in time, making herd immunity possible.
- iv. We have been slow to recognise the importance of **the air we share** as the major mode of transmission, and hence have not taken the necessary action to prevent transmission in indoor public and private spaces by improving ventilation and ensuring safe air.
- v. SARS-CoV-2 does not recognise local, regional, national or sub-national borders. This highlights the importance of achieving a national and global solution to the problem, ensuring that few, if any local, country or sub-national regions are left without adequate coverage by effective vaccines. Quarantine and border controls will continue to be important and can be made safer.

3. VENTILATION AND VACCINE-PLUS ARE THE PILLARS OF OUR EXIT STRATEGY

Control of COVID-19 results in better health **and economic outcomes**. Ventilation is about providing clean air to everyone. SARS-CoV-2 is spread predominantly through the air we breathe, so **shared air must be adequately ventilated**. Currently, vaccination alone is not enough to achieve control of the pandemic. Non-pharmaceutical intervention is required in addition to vaccination; we call this “Vaccine-Plus”. In the short term, a layered approach to protection – including vaccine passports, ventilation and masks – can enable businesses, the arts and other sectors to open.

VENTILATION is key to our exit strategy. Schools and businesses have immediate needs for better ventilation, and urban design needs to incorporate improved airflow in a post-COVID world. Fortunately, Australia has world-leading experts on ventilation and shared air, who are part of OzSAGE. They understand and can apply the substantial body of scientific evidence on **ventilation and the risk of airborne infections** in devising engineering and built environment solutions that will help Australia exit the pandemic.

VACCINE-PLUS means vaccines plus masks, testing, tracing and other non-pharmaceutical interventions (NPIs) as required. If high-efficacy 3-dose schedules and matched vaccines become available, masks may not be needed in the long term, but will be required with current vaccines and a two-dose schedule. The absolutes are vaccines, testing and tracing, with NPIs scalable and flexible for different scenarios and at different times, depending on the epidemiology of COVID-19 and guided by health system capacity. NPIs include crowd control, movement restrictions, masks, blended learning and working (online and face-to-face mix), curfews, lockdowns, and any other measures that reduce contact between people.

A. Learning from other countries

Israel, the UK, and the US all lifted restrictions, such as mask mandates, between May and June 2021, after Delta arrived, resulting in resurgences of COVID-19. In the UK, a dip in cases in early August was followed by a resurgence, possibly due to factors such as school holidays and a drop in testing. In the US, the pandemic is largely affecting the unvaccinated population in Southern states. In the UK, it has affected children through multiple school outbreaks. In Israel, 60% of hospitalised cases are vaccinated. This is an example of Simpson’s paradox: in highly vaccinated populations, **most** hospitalised cases will be vaccinated, because the vaccinated greatly outnumber the unvaccinated, even though their relative risk of hospitalisation is much lower. Severe illness prevalence in the unvaccinated is **double for under-60s and nine times higher in people aged 60-plus**, so vaccines remain highly protective against severe outcomes. Israel has reintroduced a green-pass system of **proof of vaccination or a negative test** for anyone aged 3 years or over accessing public indoor spaces.

In the US, Southern states with low vaccination rates are seeing the worst surges, with most hospitalised people being unvaccinated. Alabama, with 36% fully vaccinated (higher than Australia now) is overwhelmed, with hospitals and ICUs full and a **health workforce crisis** due to infected and quarantined workers. In Texas, with 52% of the population vaccinated, **paediatric ICUs are full** and children cannot get ICU beds. This is another indication that we must vaccinate children, at least those 12 years and over, before lifting restrictions.

There is a good news story in the most highly vaccinated city in the US, is an example of Vaccine-Plus in action. **Over 70% of the whole population** has been vaccinated, and with re-introduction of layered social measures such as mandatory masks, cases are starting to decline.

B. Better use of vaccines

THIRD DOSE BOOSTERS: There is evidence that the protection of vaccines, especially Pfizer, **wanes after about 6 months**. Studies suggest that a third dose **dramatically boosts immunity**, even in people with weakened immune systems. Israel has started vaccinating older adults with a third dose booster, and the US will soon do so for everyone. Our health workforce was vaccinated in March 2021, and its immunity may be waning just as the COVID-19 epidemic in NSW surges. It is urgent that we consider a 3rd dose booster for the health workforce, to ensure that a growing epidemic does not affect health workers, who are an essential part of the health system's ability to withstand a large epidemic surge. Third dose boosters and Delta-matched vaccines are a possible route to a vaccine-only exit strategy and must be considered more broadly in this context.

STANDALONE 70–80% TARGETS FOR ADULTS ARE INSUFFICIENT. It is proposed to relax restrictions such as lockdowns, movement restrictions and masks at a **70–80% vaccination rate for adults**; this corresponds to 56–64% of the whole population. Without ventilation, Vaccine-Plus and higher vaccine uptake, reopening at these levels will turbocharge COVID-19, as seen in countries that lifted restrictions at about 60% whole population vaccination rates. Sydney is facing daily incident case numbers in the 1000s, which will increase the forecast cases and deaths after reopening. Moreover, vaccination rates in the community are widely varied, as seen in regional and remote communities affected by the NSW epidemic. We must specify minimum geographic and population sub-group vaccination thresholds for reopening. Models should also be adjusted for decreasing rates of testing and tracing and larger case numbers, which will cause a worse epidemic. Indications from NSW are that tracing capacity is already exceeded and testing results delayed, which will lead to worse epidemic outcomes.

CHILDREN ARE PART OF THE CALCULATION: Ultimately, vaccination of children will be needed to fully control SARS-CoV-2, or it will become a pandemic of the young, with unknown **long-term health effects**. In addition to serious **outbreaks of Delta in schools**, new data shows **children 0–3 years** of age are higher transmitters of the virus (than older children) to adults, challenging prevailing theories that children do not contribute to transmission. Safe schools and childcare (better ventilation, as well as vaccination of teachers and childcare staff) are a key part of lifting restrictions while protecting unvaccinated children.

A REASON FOR HOPE – THE VACCINE PIPELINE IS DYNAMIC: There is reason to be optimistic, because in the near future we will have access to boosters and vaccines matched to Delta and other variants. This will raise their efficacy and lower the herd immunity threshold. Herd immunity may still be possible with Delta-matched boosters, and matched vaccines can be made for any variant that emerges; this can be done most rapidly for mRNA vaccines.

Historically, we know that many vaccines require three doses for full protection. It is too early to determine the optimal immunisation schedule for SARS-CoV-2 vaccines. It may turn out that three doses plus regular boosters, or **more effective spacing of two doses**, are required.

C. Premature lifting of restrictions without a ventilation & vaccine-plus strategy will cause a resurgence

A Ventilation and Vaccine-Plus strategy, with a higher target for full vaccination (80%+ of the population 12 years and over) will make lifting of restrictions safer. We must also continue some interventions like masks, vaccinate children, make schools safer, ventilate public venues, and give front-line health workers a third dose booster to protect them and the health system. If restrictions are lifted under the current plan, we will likely face a resurgence like those in Israel and the US, with the health workforce and system overwhelmed. All indications are that the health system in NSW is already under substantial stress, with many health workers furloughed and significant bed block.

4. RECOMMENDATIONS FOR RAPID ACTION

Listed below are selected concrete, rapidly actionable recommendations to allow safer lifting of restrictions following achievement of vaccination targets.

A. Ventilation and safe buildings

- ◆ Produce mandated air quality standards, as developed for safe water, for all public buildings.
- ◆ Ventilation for all public indoor spaces and in school classrooms – open windows where safe to do so. Where airflow can't be improved, reduce occupancy or add localised systems such as **HEPA portable air purifiers that are appropriately sized for the space.**
- ◆ Engage with mechanical engineers and occupational hygienists to improve air quality in buildings.
- ◆ Commence a public communication campaign on ventilation and shared air to empower people to mitigate risk in domestic and community settings.
- ◆ Develop a government-supported infrastructure investment plan for improved ventilation in public and private buildings.
- ◆ Update all Commonwealth and state advice about transmission to reflect the fact that the airborne route is dominant.
- ◆ Update all public health signage and communications to prioritise outdoor settings, enhanced ventilation and air filtration, and mask use (especially while speaking).

B. Vaccination targets

- ◆ Use target of at least 80% of the population 12 years and over vaccinated, with a PLUS strategy of scalable and flexible NPIs (such as masks) is required for safer lifting of lockdown based on a range of **available mathematical models.**
- ◆ An overall target of 80% may still leave some groups under-vaccinated. We should enable all Australian jurisdictions, regional and remote populations, high-risk and disadvantaged populations will need to reach the same thresholds, with equity of access to vaccines within Australia.
- ◆ Threshold levels of vaccination in the most disadvantaged populations should be met before opening.

C. Test and trace

- ◆ Develop or enhance automated digital methods to trace and monitor contacts that do not require opting in - OzSAGE includes computer scientists who can advise on this.

- ◆ Address privacy concerns that are barriers to use of digital tracing methods, using public health legislation if required.
- ◆ Consider community-based screening (active case finding) in high incidence areas and at-risk settings (priority LGAs, workplaces, schools), utilising point of care tests (rapid Ag for low-risk), with confirmatory PCR testing.
- ◆ **Pooled testing** can be used for rapid screening of low incidence communities.
- ◆ Analyse current performance bottlenecks in QR code processing and make recommendations for designing efficient and scalable information services that make use of elastic cloud computing techniques to cope with mass scale data collection and analysis requirements.
- ◆ Pilot the use of post-exposure ring vaccination or use of monoclonal antibodies for contacts (or of secondary contacts of contacts).
- ◆ Approve rapid point of care tests for home use and use in workplaces.

D. Masks

- ◆ Massively scale up procurement of P2/N95s for health workers and other first responders. This should be calculated based on a minimum of 2 disposable N95 or P2 respirators a day for 150 days, for every clinical health worker. An alternative would be re-usable elastomeric respirators.
- ◆ Mask mandates for publicly accessible indoor spaces including public transport to continue after vaccination targets met.
- ◆ Provide easy to access guidance to the community on **design principles of protective home-made masks**.
- ◆ Invest in further expanding and sustaining domestic mask and PPE manufacturing.

E. Protecting children

- ◆ Mandate masks in all schools for K-12 and recommend masks for children aged 2 and over as the **American Academy of Paediatrics** has done.
- ◆ Vaccinate all children 12 years and older as soon as possible and formulate policy for younger children while awaiting phase 3 clinical trial data.
- ◆ Priority vaccination for all teachers.
- ◆ Departments of Education and private providers should immediately embark on a process of measuring ventilation levels at every school and taking action where required, in accordance with the recommendations below.
- ◆ Develop flexible blended learning models to allow a sliding scale of indoor/outdoor learning at schools as well as online/face-to-face learning.
- ◆ Improve ventilation of classrooms and schools, which can be achieved **at low cost** by simply opening windows or using portable air cleaners.
- ◆ The use of outdoor facilities should be encouraged as much as possible.

F. Protecting and surging the health workforce

- ◆ Optimise vaccine coverage for health and age care workers by providing a 3rd dose vaccine **booster** with a mRNA vaccine as soon as possible.
- ◆ Protect all healthcare staff with maximal available measures including PPE and increase stockpiles of airborne viral-level hospital and ambulance PPE stocks. Based on estimates for the health workforce in 2019, for NSW, we estimate 30 million disposable N95 or P2 respirators for the first 100 days or 100,000 reusable elastomeric respirators are required for NSW alone.
- ◆ Use command and control systems for health system operations, with audits of current

and required assets (equipment and staff), informed by input from hospital response teams.

- ◆ Standardise protocols to share COVID and other patients equitably across all hospitals in highly affected cities.
- ◆ Implement a range of strategies to bolster the existing clinical workforce to cope with increased illness and quarantine of staff and unsustainable increased workload. This includes recall of experienced nurses deployed to vaccination hubs back to clinical service.
- ◆ Implement a range of strategies to maintain clinical services (for COVID-19 and for non-COVID patients) during the surge. This includes provision of new infrastructure and modified models of work and patient care. Our detailed recommendations provided to government include specific recommendations for ambulances, EDs, hospital wards, primary care and telehealth.
- ◆ Ensure health care environments (including ambulances, EDs and wards) are safe for patients and for health care staff by monitoring CO₂, optimising ventilation and air flow, use of air purifiers (HEPA filters), and supply and use of airborne PPE.

G. Protecting and enabling business

- ◆ Provide a guide for business, including offices, entertainment, dining, performing arts and other large gatherings, on layered protections (vaccination, masks, ventilation) for safe resumption of activities.
- ◆ Implement ventilation and staff vaccination star ratings for businesses and community spaces, so that customers are aware of risk and can choose preferred business (e.g., restaurants, gyms) on the basis of venue ventilation and vaccination rate of staff.
- ◆ Mandate use of CO₂ meters in public indoor spaces as indicators of adequacy of ventilation, publish guidance on their use, and require businesses to use them. **Belgium has a model that can be adapted.**
- ◆ Expedite the availability of rapid point of care testing and regulatory approval of home testing kits so that businesses can use these for risk mitigation.
- ◆ Enable in-house test and trace teams for large businesses during large epidemics.
- ◆ Use domestic vaccine passports to enable safe re-opening of business.
- ◆ Enact Commonwealth legislation to clarify issues around mandatory workplace vaccination. In particular, define when it is “reasonable” for an employer to require vaccination.
- ◆ Enable workplace vaccination through incentives (such as paid vaccination leave) and disincentives (ineligibility to work in customer facing roles).
- ◆ Encourage and enable on-site vaccination provision for larger businesses, with flexibility to cater for shift workers.

H. Remote and regional Australia

- ◆ Culturally appropriate education on airborne transmission and ways to stay safe as a priority provided for regional and remote communities.
- ◆ Ensure adequate supply of food and other provisions
- ◆ Prioritise the provision of rapid testing with a maximum 24-hour turnaround for results.
- ◆ Capability to insert an emergency medical team to stay on the ground at short notice. This will require military support and mass medevac capability.
- ◆ Ensure rapidly implementable plans to mobilise further civilian medevac assets from out of state in event of need.
- ◆ Ensure adequate airborne and other PPE readily available to regions.

I. Disadvantaged and high-risk populations

- ◆ Provide targeted, stepped, tiered mental health interventions and support for high-risk groups, prioritising children and adolescents.
- ◆ Capacity building existing mental health services and increasing capacity in public-private partnerships.
- ◆ Support timely vaccination of aged care, disability care and prison residents and staff immediately and provide vaccination on site for staff, catering for different shifts.
- ◆ Develop a strategy to the identification of community champions and the provision of training to relevant community stakeholders so that community groups are not missed.
- ◆ Provide training and other support for local community champions including bicultural workers, case workers and interpreters.
- ◆ Increase the number of translators and bicultural health workers in areas with large populations from non-English speaking backgrounds. Identify bilingual health students and/or retired health staff who can provide support at vaccine pop-up or mass vaccine clinics.
- ◆ In-language virtual education sessions offered across all communities and continued to be held throughout vaccine roll-outs.
- ◆ Link community groups to local health workers so that shared resources can be developed.
- ◆ Support community organisations and stakeholders to debunk misinformation when appropriate. Provide easy to read/access resources to support efforts to address misinformation by local community members and healthcare workers with shared backgrounds.
- ◆ Develop a booster vaccination plan for immunocompromised and high-risk patients with full implementation schedule.
- ◆ Develop home vaccination service for frail or disabled people living at home, so that GPs can give COVID-19 vaccines during home visits.
- ◆ Vaccination available at all cancer and other specialist medical centres for at-risk patients and via mobile services e.g., utilising private 'chemo in the home' services.
- ◆ Develop a strategy to ensure vaccinations in children in out of home care and incarcerated populations.

J. Aboriginal and Torres Strait Islander people

- ◆ Equity of vaccination for people in urban, rural and remote areas. Establish mobile, pop-up vaccination clinics for remote and regional towns, and utilise community elders as champions.
- ◆ Support community controlled health organisations and primary health care services to identify and prioritise the vaccination of Aboriginal and Torres Strait Islander people with existing comorbid conditions.
- ◆ Work closely with communities to help them stay safe and able to isolate in ways that work for them.
- ◆ A comprehensive Aboriginal and Torres Strait Islander education campaign to address vaccine hesitancy, that will also prepare families for the possibility of children (aged < 12 years) receiving a vaccine in the near future.
- ◆ Assess the quality of Aboriginal and Torres Strait Islander data used in COVID-19 reporting, particularly vaccine data

K. Therapeutics and biotechnology

- ◆ Invest substantially in expanded vaccine manufacturing and mRNA capacity in Australia with a view to Australia being a regional hub that can support countries in our region with their vaccine needs.
- ◆ Invest in production of monoclonal antibody and other new therapies for COVID-19.
- ◆ Invest in additional capacity for development and testing of new drugs.

L. Surveillance and modelling

- ◆ As a nationally notifiable disease, SARS-COV-2 should remain notifiable and new cases should continue to be documented and reported. This can occur easily through the Public Health Laboratory Network and other laboratories, which already notify diseases on the National Notifiable Diseases System.
- ◆ Develop modelling to take account of vaccination heterogeneity in the community at local and regional geographic scales and within specific communities and social networks.
- ◆ Develop modelling that takes into consideration the different age structure and community structures of Aboriginal and Torres Strait Islander Australians.
- ◆ Review modelling outputs of all Australian groups who have conducted modelling to inform safe lifting of restrictions. The **Australian COVID-19 Modelling Initiative** is a resource for policy makers that brings together many modelling groups in Australia.

5. SUBSEQUENT DETAILED ADVICE TO FOLLOW:

We will be providing more detailed, practical advice documents in the coming weeks on topics such as:

- ◆ **Vaccination**
- ◆ **Community driven multicultural response and communications**
- ◆ **Ventilation**
- ◆ **Lockdown**
- ◆ **Community mask use**
- ◆ **Safer schools**
- ◆ **Contact tracing and quarantine**
- ◆ **Hospital and ICU capacity**
- ◆ **PPE and hospital infection control**
- ◆ **Economic rescue and stimulus packages**
- ◆ **Aboriginal and Torres Strait Islander people**
- ◆ **Cancer and immunosuppressed**
- ◆ **Mental health**
- ◆ **General practice**
- ◆ **Remote and regional communities.**

LONGER-TERM ADVICE will be provided to inform:

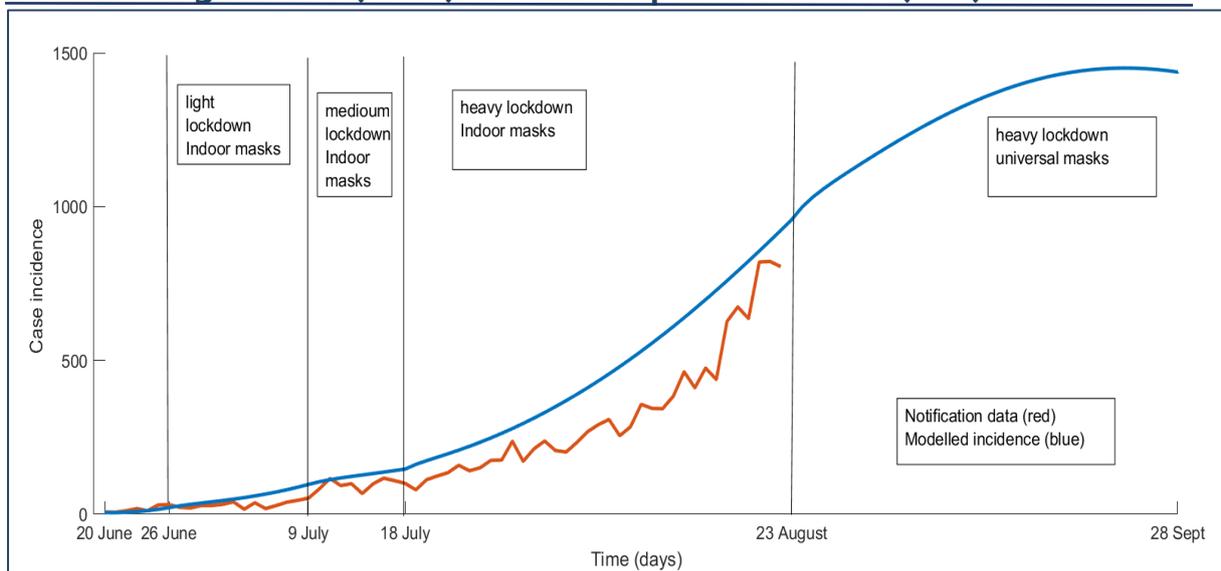
- ◆ **Safe and flexible quarantine plans as we scale up to full international travel**
- ◆ **Urban design for mitigation of airborne threats**
- ◆ **Vaccine passports**
- ◆ **Australia's contribution to global vaccine equity**

◆ **Biotechnology research and development for Australia.**

Modelling of the NSW Health System with restrictions lifted at 70–80% eligible vaccinated

We developed a deterministic SEIR mathematical model of COVID-19 in NSW (developed by the UNSW Biosecurity Program, part of **AusCMI**). It forecasts health system capacity for NSW under different vaccination scenarios to assist with planning for surge capacity and understanding the health system impact of policy decisions. The research involved adapting a model for **NSW on COVID-19 vaccines**; assumptions about face masks were taken from studies of **masks in Victoria** and **mask effectiveness** during the Victorian second wave. Current movement restrictions, testing and tracing are incorporated in the model. The COVID-19 model parameters were updated for the Delta variant, using an R_0 of 6.4. The vaccination rate was obtained from the publicly available data on first and second dose coverage over time in NSW to estimate time to target vaccination. Based on these projections, the eligible population (aged 16 years and over) will be 70% vaccinated by the end of October 2021, and 80% by mid-November. **Vaccine effectiveness** against Delta was assumed to be 30% following dose one for both and 88% and 67% for two doses of Pfizer and AZ respectively. The model starts on 20 June 2021, when 7 cases were reported, and runs for 300 days. It is assumed the current lockdown and mask settings remain unchanged until 28 September. With current restrictions continuing and contact tracing capacity reduced to 20%, we estimate there will be an average of 1437 new cases per day from 28th September, which is the earliest starting point for the release of restrictions in the scenarios below. This appears low, considering there were 1023 cases on August 26th, and suggests the model does not overestimate cases. The model's fit to the data is shown below. The need for hospital and ICU beds under different exit scenarios will be presented in a forthcoming report.

COVID-19 model (blue) fitted to epidemic data (red)



Separate modelling by the Population Interventions Unit, University of Melbourne of the **NSW outbreak** in early August, with starting case numbers of about 200 per day, found that speeding up vaccine coverage could reduce the time to get to five cases per day by weeks. In the short run other restrictions are required to achieve control, with increasing vaccination coverage more of a medium-term strategy. This work suggests we have to maintain strong restrictions until case numbers turn and come down again, and not rely solely on accelerated vaccine rollout.

6. MEMBERS OF OzSAGE

Members of OzSAGE include the individuals listed below and other experts from a variety of fields, including science, healthcare (including from government hospitals), law and business. Members and their specialisations are listed below in alphabetical order.

A/Prof David Anderson (laboratory)

Prof Nancy Baxter (public health, oncology)

Prof Tony Blakely (public health, modelling)

Dr Timothy Churches (modelling)

Ms Kate Cole (occupational hygiene, ventilation)

Prof Brendan Crabb (public health, basic science)

A/Prof Carmel Crock (emergency medicine)

Ms Anna Davidson (regional primary care)

Dr Charitha de Silva (engineering, aerosols)

Prof Con Doolan (engineering, aerosols)

Dr Michael Doyle (Aboriginal health)

Prof Chris Edmond (economics)

Dr Kalinda Griffiths (epidemiology, Aboriginal health)

Dr Bridget Haire (ethics)

A/Prof Nada Hamad (haematology, multicultural engagement)

Prof Geoff Hanmer (built environment, ventilation)

Prof Margaret Hellard (infectious diseases, public health, epidemiology, modelling)

A/Prof David Heslop (occupational medicine, disaster medicine, primary care)

Prof Richard Holden (economics)

Prof Lisa Jackson-Pulver (public health, Aboriginal health)

Prof Bin Jalaludin (public health, safe air)

Prof Sanjay Jha (cybersecurity, computer science)

Dr Greg Kelly (paediatrics, ICU, retrieval medicine)

Dr Ebony Lewis (emergency nursing, geriatrics, Aboriginal health)

A/Prof Kamalini Lokuge (public health, community driven epidemic response)

Prof Raina MacIntyre (public health, infectious diseases)

Prof Lisa Maher (public health, vulnerable communities)

A/Prof Suman Majumdar (infectious diseases, public health)

Prof Guy Marks (respiratory medicine, public health)

Prof Emma McBryde (infectious diseases, modelling)

Dr Julie McEniery (paediatric ICU)

Dr Alan Mclean (ambulance, Paramedicine)

Dr Katrina Mclean (primary care)

Dr Andrew Miller (anaesthetics)

Prof Jason Monty (ventilation, engineering)

Dr Jennifer Moore (public health law)

Prof Lidia Morawska (ventilation, safe air)

Ms Faeza Netfa (vaccine hesitancy, multicultural communities)

Dr Tracey O'Brien (paediatric oncology)

Dr Helen Paik (software engineering)

Dr Karina Powers (occupational medicine)

Prof Mikhail Prokopenko (complex systems)

Prof Fethi Rabhi (software engineering)

Prof Ian Ring (public health, epidemiology, Indigenous health)

A/Prof Holly Seale (vaccine hesitancy, social research)

Prof Eva Segelov (oncology)

Dr Benjamin Veness (psychiatry, public health)

Dr Craig Underhill (oncology, regional

health)

Prof Wenjie Zhang (computer science)

Dr Lina Yao (software engineering)

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MEDIA

This advice was provided to federal and NSW government stakeholders on August 27th 2021. A media release was issued on September 2nd, and a range of other key stakeholders were sent the report simultaneously. The media release contains a list of OzSAGE media spokespeople.