Good Ancestors Policy

Dear Review Panel,

Good Ancestors Policy is an Australian charity dedicated to reducing existential risk and improving the long-term future of humanity.

The number of new pathogen outbreaks has been increasing decade-to-decade since at least the 1940s (1). Further, the expected deaths from future pandemics are at least an order of magnitude higher than all natural disasters combined (2). Given the risk is so grave, governments must invest proportionally in prevention and preparedness. This Review is an opportunity to learn the lessons from COVID-19 and ensure that Western Australia (WA) is well-placed to fight the next pandemic, whatever that may look like.

Our submission addresses terms of reference a.i. and e.i. and ii.

Planning and exercising for unknown pathogens (a.i.) | Previously, WA's pandemic plan was revised every half decade and in response to global disease outbreaks. WA should regularly update its pandemic plans, ensure they cover multiple scenarios, and exercise them frequently.

Routine sequencing for influenza-like illness (e.ii.) | Genomic sequencing data is incredibly powerful. The testing and sequencing capability WA built should be maintained. It can be used for epidemiological monitoring, and ready WA for a future pandemic.

Ultraviolet germicidal irradiation (UVC) pilot (e.i.) | WA was a leader in suppressing community transmission. Piloting promising technology is the logical extension of WA's leadership and approach. WA should keep up with South Australia by trialling upper-room UVGI, continuing to explore and trial other emerging technologies, and including them in updated plans.

Planning and exercising for unknown pathogens (a.i.)

Summary
The SARS-CoV-2 virus was novel, but pandemic-causing pathogens are not unexpected. Just as this pandemic was caused by a previously unknown virus, the next pandemic will likely also be caused by a "Disease X". Governments are faced with the challenge of planning for unknown diseases with unknown characteristics that will emerge at an unknown time. To rise to this challenge, governments' plans must cover multiple scenarios, including a novel pathogen emerging in their jurisdiction, as well as pandemics significantly worse than COVID-19. A single plan that tries to cover all likely scenarios will not be suitable for challenges to come. In addition to having a range of plans, WA should routinely bring together relevant parts of government and civil society to exercise those plans. Regular tabletop exercises would ensure that our current shared appreciation for the gravity of pandemics does not atrophy over time. Exercises would identify gaps, ensure changes are effectively integrated into plans, new ideas are surfaced, and maintain institutional memory to ensure the activation of a plan is a success.

A history of being reactive

The first version of WA's pandemic plan was released in July 2006 and revised in November 2008. Then there were significant gaps between updates in 2014 and 2020.

Amendment		Details
1	July 2006	Initial issue as the Western Australian Government Human Influenza Pandemic Plan
2	November 2008	Revised to reflect the work of the Western Australian Government Human Influenza Pandemic Taskforce
3	April 2014	Revised to take account of developments in national and health plans since the 2009 H1N1 pandemic
4	March 2020	Revised and re-issued as Western Australian Government Pandemic Plan
5	June 2020	Minor updates to links in Annexure 1 and Appendix B.

Table from Western Australian Government Pandemic Plan (2020)

Five years is too long between revisions. Staff turnover and structural changes are given in that period, meaning that a five-year-old plan is unlikely to be fit for purpose from a purely administrative perspective. Further, changes in public health practice and emerging technology compound these challenges. Revisions coincided with global disease outbreaks, suggesting updates were reactive not scheduled. WA adopting a structured, not reactive, approach to pandemic planning is essential given that the rate of emerging pathogen outbreaks is increasing with climate change, factory farming and encroachment into wilderness areas (1,3).

Planning: Known unknowns in future pandemics

Although the next pandemic pathogen is unknown, we do know that there are different scenarios that plans need to account for. For instance, policies like vaccine stockpiles make sense for smallpox, but not for deadly human transmissible avian influenza for which vaccines do not exist. Because potential scenarios are relevantly different, we need tailored plans. Further, just as we expect other jurisdictions to monitor for novel pathogens and respond adequately, WA needs to be positioned to do the same. Late detection, response and containment – as observed in the COVID-19 pandemic – has global consequences. WA should also plan for high-mortality pathogens, particularly those that affect essential workers, like the 1918 flu pandemic, which had high mortality in the 20-40 age group (4).

Exercising: Placing oneself in the next crisis

Yearly tabletop exercises and "war games" ensure that staff remain aware and updated plans as systems change. Exercising a realistic scenario, such as the emergence of a human-transmissible avian flu in a WA poultry farm, would uncover gaps in the planned response as well as identify preventative measures to guard against an avian flu (5,6). A poultry farm scenario would also stress test overlaps between human-focused and animal-focused biosecurity approaches. Pandemic plans can then be revised to account for bureaucratic changes and integrate the scientific and technological advances since the last review.

Routine sequencing for influenza-like illness (e.ii.)

Summary
During the COVID-19 pandemic, Australian states and territories vastly expanded testing and genomic sequencing capacity. Testing, supported by sequencing, allowed us to understand the state of the public health crisis and contact-trace transmission chains (7). This increased capability should not go to waste, but pivot to current outbreaks and facilitate early detection of public health threats. The WA Government Pandemic Plan 2020 states that the WA health sector has a responsibility for "monitoring levels of epidemic or influenza-like illness". Rather than sequencing a given percentage of **PCR-confirmed** COVID-19 or flu cases, WA should instead sequence a percentage of samples from people who **present with symptoms** of influenza like illness (ILI). While subtle, this distinction is critical. This greater resolution of data would help public health units and epidemiologists study variant mutation, making WA a leader in ILI tracking. This would also allow WA to detect novel pathogens causing respiratory disease early, potentially before a pandemic was declared globally, while also keeping critical testing and sequencing infrastructure "warm" for rapid scale-up.

Why are influenza-like illnesses important to monitor?
A pandemic pathogen is highly **transmissible**, capable of causing **great death and disruption** to society, and **unknown to the immune systems** of current people. ILIs are often caused by respiratory viruses which score highly on each of these criteria (8). Respiratory pathogens are readily spread by close contact, aerosols in the air and droplets, making quarantine of sick people difficult. Viruses also mutate faster than other pathogens, making it possible for them to evade the immune system multiple times (e.g. contracting the delta strain of SARS-CoV-2 did not completely protect against the omicron strain.) This increases the costs to society in terms of both deaths and disruption. For these reasons, the next global pandemic is likely to be respiratory.

How does whole genome sequencing prepare us for the next pandemic?
In the current medical paradigm, diagnostic techniques only tell you if a targeted pathogen is present or not. That is, a PCR test looks for specific viruses, not just any viruses. However, if an ILI is caused by an unknown "Disease X", nothing will be detected and further investigation is not the norm. Sequencing can discover novel pathogens because it determines an exact genome and investigation can identify its closest relative. Whole genome data allows the identification of transmission chains, guides outbreak responses and helps monitor variants. During the COVID-19 pandemic, SARS-CoV-2 genome data traced most cases from a large Victorian outbreak to a single hotel quarantine breach and led to changes in the management of hotel quarantine facilities (7).

Expanding sequencing from a sample of SARS-CoV-2 to a sample of ILIs would give an understanding of the full variety of ILI circulating. To capture as much of the pathogen variety as possible, care should also be taken to ensure sampling is both "representative" at the community-level and "focused" by sequencing ILIs of travellers, zoonotic infections, medical staff, etc. Specifically, and with reference to Figure 3 below (7), WA should move from "non-strategic sequencing" (status-quo) to an "ideal dataset sequencing strategy". Modelling has suggested that if Wuhan had locked down one, two or three weeks earlier, cases of COVID-19 could have been reduced by 66%, 86% or 95% respectively (9). Early detection of "Disease X" will be crucial to minimising costs to society and potentially preventing pandemics before they begin.

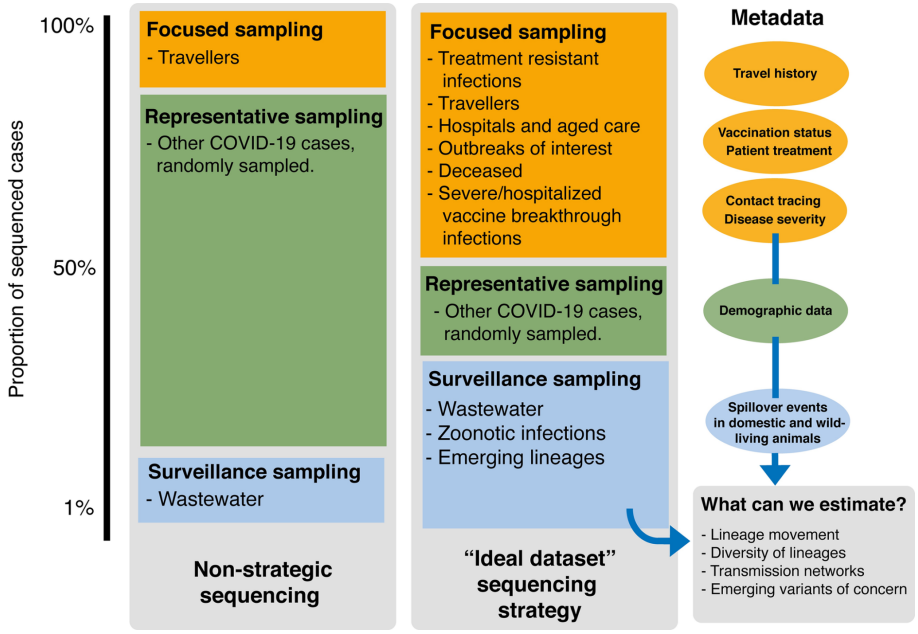

Figure 3 from [New rules for genomics-informed COVID-19 responses–Lessons learned from the first waves of the Omicron variant in Australia] PLOS Genetics (2022)

Ultraviolet germicidal irradiation pilot (e.i.)

Summary

Indoor gatherings contributed to the spread of SARS-CoV-2. Ultraviolet germicidal irradiation (UVGI) is the use of ultraviolet light to inactivate or kill pathogens such as bacteria, fungal spores and viruses. UVGI lights in indoor spaces could decrease the number of pathogen particles in the air in a safe, scalable and simple manner. Crucially, UVGI technology provides a line of defence that does not require human behavioural change. Trialling these technologies is the necessary next step to assessing their real-world impact. WA should join South Australia in studying the associated incidence of infectious disease after implementing UVGI and consider its pros and cons as a public health tool (10).

What is UVGI?

UVGI or "germicidal UV" are wavelengths of light that straddle the ranges of both UVC and Vacuum UV. Such wavelengths are readily absorbed by single-celled organisms and inactivate pathogens. **Far-UVC,** a subset of UVGI, describes the band of shorter UVC light that can travel through the air, is germicidal, but cannot penetrate past the outer non-living calls in the skin and eyes of animals (11).

To date, UVGI has been implemented and studied in two configurations. The best characterised is **upper room UVGI** which sterilises air cycled up to the tops of rooms by existing ventilation systems. **Far-UVC lights** are a newer innovation. Far-UVC can reduce close contact, airborne and surface contact transmission by bathing a room in far-UVC wavelengths. However, far-UVC lights are

currently more expensive than lights suitable for upper room UVGI and more data regarding their long-term safety is required (12). Specifically, according to one study using computer modelling, far-UVC may produce more indoor air pollution than UVGI (13). As such, any assessment will need to balance the benefit to public health from reduced infectious disease against any evidence of harm caused by indoor air pollution. Upper room UVGI appears to be a promising enough technology to invest in now, and far-UVC could have even greater benefits after conducting more safety research.

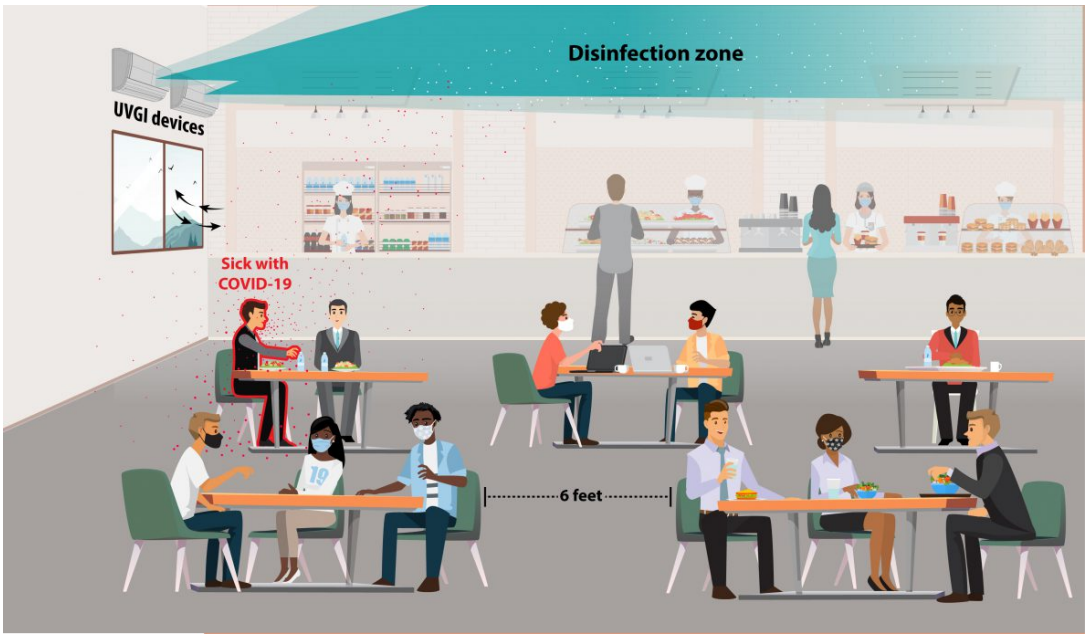

Illustration from Upper-Room Ultraviolet Germicidal Irradiation CDC (2021)

Proposal

The WA Government should fund relevant WA medical research institutes to trial upper-room UVGI lights in high-traffic indoor areas and assess the associated reduction in infectious disease (e.g. SARS-CoV-2 or influenza). Examples of high-impact installation options could include government buildings, hospitals or, as in an upcoming South Australian study, aged-care residential homes (10).

In conclusion, the number of new pathogen outbreaks is increasing (1) and the number of deaths from pandemics is expected to greatly outnumber those from all other natural disasters combined (3). The Review Panel should urge the WA Government to take serious measures to address the risk of future pandemics – in particular, maintaining a diverse range of regularly exercised pandemic plans, transitioning existing sequencing capacity into a new paradigm, and remaining on the cutting edge of technology.

Yours faithfully,

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Citations

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