
RAPID REPORTS

Observations on the Current Outbreak of the SARS-CoV-2 Delta Variant in Sydney

Nunes-Vaz, RA¹ & Macintyre, CR²

¹ Professor, Torrens Resilience Institute, Flinders University, South Australia

² Professor of Global Biosecurity, Kirby Institute, University of New South Wales

Abstract

Sydney, Australia, is currently experiencing an outbreak of the Delta variant of Covid-19. The Delta variant is much more transmissible than the original 'wild' variant of SARS-CoV-2, which was responsible for Australia's first wave of infections, and for the second wave largely confined to Melbourne in mid-2020. Our purpose here is to compare growth rates for the current Sydney outbreak with those of the earlier outbreaks, using doubling times as the principal indicator. By such means, it appears that non-pharmaceutical interventions are achieving similar, if not stronger effects in containing Sydney's Delta-variant outbreak.

Keywords: Covid-19, coronavirus, SARS-CoV-2, epidemic, pandemic, infectious disease, Delta variant

Introduction

Having effectively suppressed community transmission of the SARS-Cov-2 virus in Australia through much of 2020 and the first half of 2021, concerns now focus on an outbreak centred in Sydney. The outbreak was quickly confirmed to involve the Delta variant (VOC-21APR-02, B.1.617.2, WHO, 2021 and Public Health England, 2021), which is known to be much more transmissible than earlier variants.

The SARS-CoV-2 Delta variant emerged in India in October 2020 and, due to its greater infectiousness (higher reproduction number), is currently displacing earlier variants throughout the world. In England, sequencing prior to April 2021 showed almost exclusive dominance of the Alpha variant (first seen in the UK in September 2020). In early July 2021, the Delta variant now accounts for some 95% of English cases (Public Health England, 2021). In the United States, Delta accounts for 25% of new infections, and this proportion is rapidly growing. Compared with the original wild (first wave) variant of SARS-CoV-2, the Alpha variant is approximately 50% more infectious, while the Delta variant is thought to be 60% more infectious, again, than Alpha, therefore with a Ro of 5-7 (1).

Australia's suppression methods were proven to be successful in managing the first wave of infections in early 2020, and were ultimately successful in dealing with the Melbourne outbreak in mid-2020. However, public tolerance of lockdowns is diminishing as other parts of the world, particularly the UK and USA, are easing restrictions. These countries have much diminished susceptibilities to transmission as a result of their relatively high COVID-19 vaccination rates, as well as natural immunity following infection. In contrast, Australia has a highly susceptible population with low vaccination rates (about 5% fully vaccinated at the start of the Sydney outbreak) and very little natural immunity.

The purpose of this rapid report is to assess how the interventions being applied in Sydney are performing, measured in the relatively objective terms of infection doubling times.

Viral transmission dynamics are governed principally by: viral infectiousness; the population's susceptibility to this infection (the reciprocal of its immunity); and the occurrence of close contact events that could result in transmission. Epidemic growth or decline reflects these contributions. If, on average, an infected individual infects more than one other person (represented in the reproduction number) then the infection will grow exponentially. Exponential growth can be measured using doubling times, as discussed further below.

Since infectiousness is inherent to the particular variant in circulation, the only methods available for epidemic moderation are: changing the population's susceptibility, ideally through vaccination or less desirably through natural infection, and changing the frequency and nature of close contact events, through travel restrictions, social distancing, mask wearing and diligent sanitation.

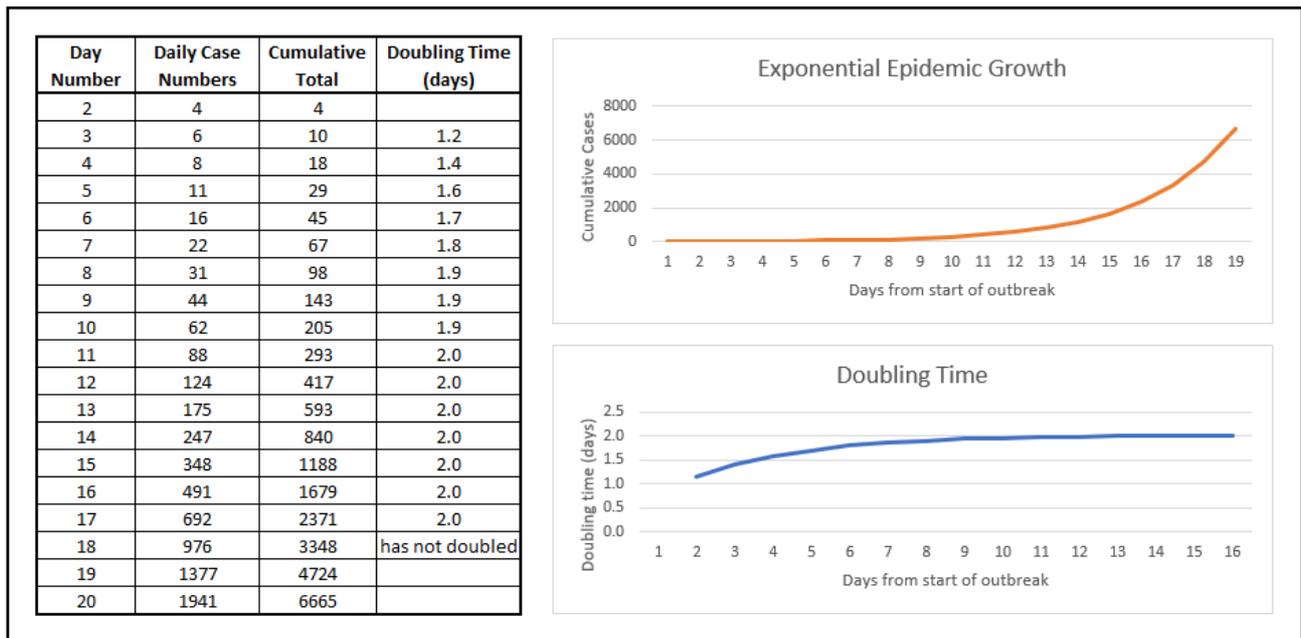
When a new variant has a higher infectiousness, epidemic (pandemic) growth will be faster. Without significant immunity, a more infectious variant therefore demands more stringent control methods to achieve the same suppressive effect. Nunes-Vaz (2020) described the use of doubling times to monitor and compare the dynamics of Covid-19's first wave through several countries (2).

The method involves assessing how long it takes to double the number of recorded infections, as a rolling calculation on successive days. Without interventions in a susceptible population, the doubling time should remain approximately constant, as an outbreak grows. For example, Figure 1 shows case numbers if each 100 infected persons infect (exactly) 141 others (reproduction number 1.41). This leads to a doubling

time of 2 days, as shown. Where changes of doubling time are observed, since these do not (usually) represent changes of viral infectiousness, they indicate the success (or failure) of interventions where doubling times increase (or decrease). Worthy of note

in Figure 1, even though the reproduction number is held constant in the example, it takes some days for the doubling time to stabilise at its ‘true’ value of 2.0. The early phase estimates are contaminated by the rounding errors associated with small numbers.

Figure 1. Hypothetical dataset to illustrate the growth of an epidemic, and its representation using doubling times. In this artificial case, the number of daily cases increases by the factor 1.41 every day, yielding a doubling time (after initial rounding errors) that settles at a steady value of 2 days.



Sydney’s Outbreak and Comparisons

Sydney’s first case in the current outbreak was confirmed on 16 June 2021, involving a driver taking international flight crews to their Sydney accommodation and initial cases in Bondi and the Eastern suburbs of Sydney. One day later, the driver’s partner became a confirmed case, and contact tracing immediately identified some 700 potential close contacts. The scope of contact tracing grew very rapidly with the movements of various cases across the city and within the State of New South Wales. It then suffered another large increase when one close contact, who subsequently became a confirmed case, worked as a flight attendant on five flights into, and back from, Queensland during 25 and 26 June.

The Bondi cluster lies at the heart of the current outbreak, and accounts for some 238 of the 330 cases recorded to 5 July. Hanrahan & Blumer (2021) showed that the growth rate of the Bondi cluster has been markedly steeper than any previous Sydney cluster (3). Nevertheless, and while it may still be quite early in the outbreak’s timeline, Sydney’s current outbreak has so far behaved similarly to previous Australian experience.

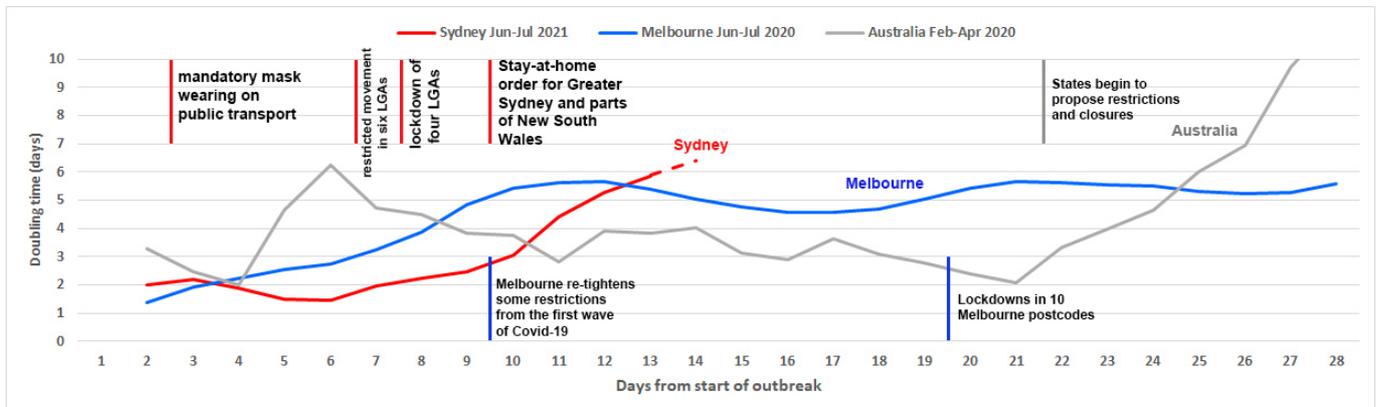
Figure 2 shows the trend of doubling time for the Sydney outbreak to date (red). Results are placed on the same relative timeline (days from the outbreak’s

start) as those from the first wave of Covid-19 across Australia (grey) in early 2020, and for the major outbreak in Melbourne in mid-2020 (blue). Sydney’s doubling time (ignoring the initial week tainted by rounding errors) shows a consistent rising trend from about two days, to six days, through its second week. This represents a significant slowing of the outbreak.

As explained in Nunes-Vaz (2020), doubling times are calculated as ‘lag indicators’, that is, a new data point will only be added when the number of cases on that day has already doubled (some days later) (2). With doubling times now approaching one week, the total of all cases confirmed up to 29 June (i.e., 167) is yet to double.

Figure 2 also indicates when interventions were introduced for each outbreak, colour coded according to the traces they relate to. Mandatory wearing of masks on public transport was introduced throughout Greater Sydney within a few days of the first case in the current outbreak. On 22 June (day-6 in Fig. 2), restrictions on people’s movements were introduced in six local government areas (LGAs). On day-7, four Sydney LGAs were formally locked down. These non-pharmaceutical interventions appear to be having the intended effect in slowing the outbreak’s growth.

Figure 2. Doubling times for Sydney’s Delta variant Covid-19 outbreak up to the present time (in red). This is compared with doubling times from the whole country’s first wave of covid-19 in early 2020 (grey) and Melbourne’s major outbreak through the middle of 2020 (blue). The dashed extension of Sydney’s result is based on the observation that more than six days has passed and doubling is yet to occur.



Conclusion

While the current Covid-19 outbreak in Sydney is the largest to date and involves the more transmissible Delta variant (4,5), evidence to date indicates that the outbreak’s rate of growth is being slowed, in similar degree to earlier Covid-19 outbreaks in Australia. Those previous outbreaks were ultimately contained using non-pharmaceutical methods. Spread to aged care and healthcare facilities as well as to a broader geographic distribution in Sydney may still pose a challenge to control, as well as the re-opening of schools on July 10, 2021. A decision about lifting restrictions is planned for July 7, 2021.

References

1. Callaway E. Delta coronavirus variant: scientists brace for impact. *Nature*. 2021 Jul;595(7865):17-18. doi: 10.1038/d41586-021-01696-3.
2. Hanrahan, C. & Blumer, C. The Bondi cluster is NSW’s biggest COVID cluster so far. Australian Broadcasting Corporation, [https://www.abc.net.au/news/2021-06-](https://www.abc.net.au/news/2021-06-30/bondi-is-nsw-biggest-covid-cluster-so-far/100253676)

3. Nunes-Vaz, R., 2020. Visualising the doubling time of COVID-19 allows comparison of the success of containment measures. *Global Biosecurity*, 2(1), DOI: <http://doi.org/10.31646/gbio.61>
4. Public Health England, 2021. SARS-CoV-2 variants of concern and variants under investigation in England, Technical briefing 17, 25 June 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/997418/Variants_of_Concern_VOC_Technical_Briefing_17.pdf (last accessed 6th July 2021)
5. World Health Organization, 2021. Tracking SARS-CoV-2 Variants. <https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/> (last accessed 6th July 2021)

How to cite this article: Nunes-Vaz, RA & Macintyre, CR. Observations on the Current Outbreak of the SARS-CoV-2 Delta Variant in Sydney. *Global Biosecurity*, 2021; 3(1).

Published: July 2021

Copyright: Copyright © 2021 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.

Global Biosecurity is a peer-reviewed open access journal published by University of New South Wales.