

Lessons from Victoria's second COVID-19 wave

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Victoria has controlled a major outbreak of COVID-19, but needed to implement extreme measures to achieve this. As the outbreak evolved, epidemiologists and infectious disease experts have offered a wide range of opinions. We reflect on what we can learn from Victoria's second wave and its implications for the road ahead.

As imported cases declined in May, the Commonwealth released a 3-step framework for relaxing the restrictions that had previously maintained effective epidemic control.¹ The framework provided considerable detail on the order in which restrictions should be released, but little guidance on the timing of the steps or the metrics that should allow states and territories to progress through this sequence. While many states were successful in achieving complete elimination of locally-acquired cases, Victoria achieved only two days with zero cases in early June. Genomic analysis has since demonstrated that the subsequent outbreak was attributable to quarantine failure; however, virtually all the features that favour a dangerous COVID-19 were in place at this time (Table 1). A small number of locally-acquired cases rapidly turned into a significant outbreak as transmission became established within disadvantaged sub-populations of Australia's second largest city during winter. With such low case numbers and the considerable heterogeneity in infectiousness of COVID-19 patients, random events are important in determining whether sporadic cases lead to a significant epidemic.²

<i>Feature</i>	<i>June</i>	<i>October</i>
Elimination achieved when restrictions first released*	No	No
Speed of release of restrictions*	Rapid	Moderate
Well-staffed, adequately-prepared, decentralised public health systems*	No	Improved
Daily tests performed*	<10,000	≥10,000
Winter	Yes	No
Outbreak seeded into dense, urban settings	Yes	Yes

*Table 1. Epidemiological features in place in Victoria as daily new COVID-19 case numbers fell to zero in Victoria in June and October 2020. *Modifiable.*

Although random effects are important in determining whether elimination occurs when case numbers are very low, the inexorable growth in the epidemic in June and July was not attributable to chance. Since the second wave began, the focus has understandably been on ways in which the public health response could be modified and improved. However, it is important to recognise that explosive outbreaks in large cities in winter are entirely consistent with the international experience and the increasingly clear seasonality of virus transmission.³ The effective reproduction number was clearly in excess of the critical threshold of one throughout much or all of these two months. If case numbers are considerably greater in a particular week than they were the week before, this implies an effective reproduction number greater than one by definition, despite commentary to the contrary. With restrictions progressively applied over the course of these two months and most of July spent under Stage 3 lockdown, it is clear that even these highly restrictive measures were insufficient to control transmission and push the effective reproduction number below one.

As case numbers continued to increase, face coverings were mandated, even more restrictive Stage 4 measures were implemented⁴ and the epidemic began to decline. Although these two policy changes combined proved to be necessary control measures, the timing of their implementation makes it difficult to tease out their contribution to turning the epi-curve around. Face coverings were mandated in metropolitan Melbourne from the 23rd of July, Stage 4 restrictions were implemented in metropolitan Melbourne from the 2nd of August and case numbers peaked in the few days immediately before and after the start of August. This timeline is difficult to interpret, but appears to suggest some effect of face coverings and that the combined changes brought the effective reproduction number consistently below one, with improvements in the public health response and warmer weather also possible contributors. For COVID-19, even relatively modest changes in the effective reproduction number (e.g. from 1.1 to 0.9) can be sufficient to result in a marked change in the epidemic trajectory, because of the often short serial interval between linked cases, particularly if case isolation is effectively reducing the duration of infectiousness.

As Victoria reached very low case numbers in October, restrictions were again released. Although the sequence of relaxing restrictions was somewhat slower and was dependent on meeting metrics of an effective public health response, relaxation was not dependent on ensuring that elimination had been achieved. Indeed, the epi-curve in October, as Victoria started to transition back towards normal life, looked very similar to that in June at the start of the second wave. Fortunately a third wave did not result, which may be attributable to improved contact tracing and testing capacity, warmer weather, fewer importations or good luck. With very low case numbers, New South Wales has demonstrated that rigorous testing, contact tracing and isolation can maintain epidemic control and still facilitate local elimination with no sustained local transmission. As of late November, indications are that both Victoria and New South Wales have successfully achieved elimination, which is excellent news, but with very little population immunity, all states will remain vulnerable to re-introduced virus strains until vaccination offers some protection.⁵

In summary, several epidemiological features likely to facilitate a large outbreak were present in early June, when Victoria's second COVID-19 wave began. This outbreak required extreme mobility restrictions to bring it under control and these were only released as case numbers declined to very low levels, at which point elimination fortunately occurred. This picture makes it impossible to determine epidemiologically whether the Victorian public health response has improved sufficiently to contain another COVID-19 outbreak. Therefore, it is prudent to assume that we remain at considerable risk if new outbreaks are seeded from imported cases with restrictions now released and international arrivals due to recommence.

Put another way, it remains dangerous to rely on a suppression model of control successfully pursued by New South Wales and several Asian countries, which requires low case numbers and excellent contact tracing and control measures. The need for future lockdowns remains a strong possibility, particularly in the winter of 2021 if adequate vigilance and quarantine procedures are not maintained until broad-scale vaccination programs have been rolled out.

Therefore, Victoria now needs a clear strategy framed around either elimination or suppression to get through the coming months. If the chosen strategy is sustained elimination, greater liberties may well be permissible, but would also require: 1) a robust plan to prevent new local cases resulting from importations, 2) strategies to detect new outbreaks early and 3) a predetermined approach for rapidly responding to local clusters to prevent sustained community transmission and maintain elimination. With several promising vaccine candidates on the horizon, a strong elimination strategy to provide a bridge towards a programmatic vaccination policy seems a rational and feasible approach. However, even this approach may well not prevent future community transmission if herd

immunity cannot be achieved or if vaccination does not prevent infection and transmission, which remains uncertain. Nevertheless, it appears increasingly likely that a clear elimination strategy provides the best chance to avoid both the huge impacts of repeated lockdowns and the burden of excessive disease and death associated with uncontrolled epidemic spread.

References

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