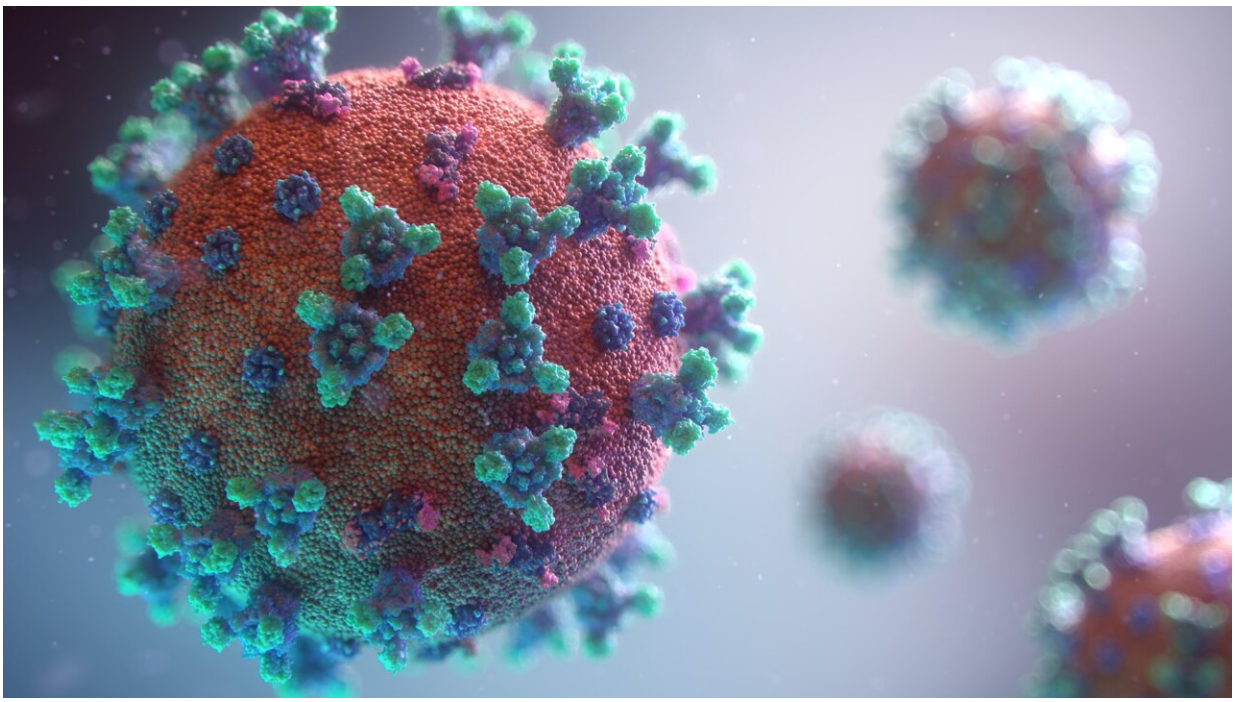
NZ's confirmed COVID case numbers are rising fast, but total infections are likely much higher

February 25 2022, by Dion O'neale



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With Aotearoa New Zealand's move into phase 3 of its response to the omicron outbreak, new definitions and protocols for testing and isolation will mean new ways of measuring the impact of COVID-19.

Broadly speaking, there are two aspects to this new regime. The first relates to the changing definitions of who counts as a close contact, and what their isolation requirements are.

The second concerns testing processes, advice for who should get tested when, what sort of test they should take, and how the result is recorded. Switching to phase 3 means a switch to predominantly using rapid antigen tests (RATs).

Testing policy is important because the number of confirmed or probable cases informs our estimate of the number of underlying infections.

New confirmed cases are a *lagging* indicator of new infections, but a *leading* indicator of other important metrics like hospitalisations. The more we know about who is newly infected and where, the better we can plan individual and community responses to the outbreak.

> Community testing centres throughout Auckland continue to struggle with growing demand, despite the introduction of quicker RAT testing. https://t.co/Nmr7olurMP
>
> — Stuff (@NZStuff) February 23, 2022

RATs and risk

With the high case numbers we're now seeing with omicron, speed is key in returning test results. Quick results mean people can modify their behavior accordingly and isolate if necessary. The sooner people receive a positive result, the sooner they can notify recent contacts, and those people can also isolate.

When case numbers are high, the risk of a false positive from a RAT is

very low. This means the extra value from having a more sensitive PCR test is reduced compared with when we had lower case numbers.

Conversely, when case numbers in the community are high, there is a risk of false *negative* results on a RAT for someone who either has symptoms or is a close contact of a confirmed case.

In such cases the prudent course of action would be to take a second test—either another RAT or a PCR test—and to assume there is still a decent chance you may be infected.

People who have no known exposure to a confirmed case, and no symptoms, can be relatively confident in the accuracy of a negative result from a RAT. And regardless of test results, anyone with COVID-like symptoms should be isolating until they recover from whatever is causing those symptoms, COVID or otherwise.

Estimating actual infection numbers

The move to phase 3 acknowledges that infection and confirmed cases are becoming high enough that many of the processes for monitoring and planning will be stretched and may become inaccurate.

As the number of infections rise, we can expect the "case ascertainment rate" (CAR) will start to fall. The CAR is a measurement of the percentage of *total infections* at a given point in time that are turned into *confirmed cases*.

That is, given an observed number of confirmed cases, how many infections do we think are actually in the community, including those that are unconfirmed?

Keeping track of this metric at different stages of the outbreak is

important. When isolation requirements for close contacts relax, infections may increase, while fewer people will be eligible for testing.

Or, people may test positive on a self-administered RAT but not report it. Both of these lead to higher numbers of unconfirmed infections.

Why accurate numbers matter

The only way to accurately estimate the CAR is through an "infection prevalence survey." An example is the UK's Office of National Statistics (ONS) survey, one of the strongest aspects of the UK's otherwise patchy COVID response.

This randomized survey tries to directly measure the fraction of people who are infected with COVID at any point in time. A well-designed survey makes sure to sample sufficient people in different demographic groups and with different infection risk factors.

Modeling can estimate the number of infections in different populations, subject to different assumptions. But without an infection prevalence survey, or equivalent data, only *confirmed cases* can be directly observed.

Since confirmed cases are an unknown fraction of total infections, and this fraction changes over time, it's important to be able to accurately estimate the underlying infection numbers to validate such modeling.

And since infection numbers are a leading indication for hospitalisations, they are valuable for planning adjustments to processes or policies, such as testing or isolation.

Case numbers a fraction of the whole

Without an infection prevalence survey it is necessary to fall back on less accurate measures of infection estimates.

For example, the fraction of people admitted to hospital who test positive for COVID is an unreliable estimate of infection prevalence because it is biased by a large number of factors that are difficult to control for.

Namely, people rarely turn up at hospital for random reasons. Many of the same factors that might drive hospital admissions, even for reasons not directly linked to COVID, are nonetheless related to COVID infection risk.

As an example of infection prevalence data in action, in early January 2022, the UK recorded an average of around 200,000 daily *confirmed* cases. The ONS survey estimated just under 4 million people were infected at the time.

Details around the length of the survey period during which people might test positive can affect the exact value of the CAR. But the UK figures paint a picture of only a small fraction of infections being detected, even with RATs being provided frequently and free to every household.

With access to testing in Aotearoa being more limited than in the UK, we might expect our CAR to be even lower, and hence the number of reported cases is likely to significantly undercount true infections.

But without an infection prevalence survey, it's difficult to tell exactly how much we are undercounting by.

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