The 2\textsuperscript{nd} Covid-19 wave in South Africa: Transmissibility & a 501.V2 variant

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Covid-19 in South Africa

7-day moving average of new cases, sentinel hospital admissions and Covid-19 deaths – to 17 Dec

Source of hospital admissions data: Lucille Blumberg and Waasila Jassat – DATCOV, NICD

7-day moving average of daily cases

Hospital admissions (116,335)
Cases (892,813)
Deaths (24,011)
Confirmed SARS-Cov-2 cases by province
(7-day moving average cases per 100,000 population – up to 17 December)
Confirmed SARS-Cov-2 cases by province

(7-day moving average cases per 100,000 population – up to 17 December)
Comparison of SARS-CoV-2 cases in first and second wave in Western Cape

(7-day moving average cases per 100,000 population – up to 17 December)

- Western Cape - first wave
- Western Cape - second wave

Latest results: 59/67
(88% are the new variant)
Comparison of SARS-CoV-2 cases in first and second wave in KwaZulu-Natal

(7-day moving average cases per 100,000 population – up to 17 December)
5 Mar – 31 May: 7,608 less deaths (all-causes) than expected, mostly from fewer non-natural deaths
1 Jun – 16 Aug: 32,809 excess deaths (all-causes) - 11,483 reported Covid-19 deaths

Source: Bradshaw D, et al
The fine balance between virus and host

• Viruses usually evolve to become more transmissible & less severe (less pathogenic or less lethal)
  • Mostly within humans in response to immune pressure
  • Sometimes when they pass through another species

• SARS-CoV-2 relatively stable in 1\textsuperscript{st} wave – SA recorded about 35 lineages (most were the more transmissible D614G variant from Europe with minor variations)

• 2\textsuperscript{nd} wave now in all provinces with some early signs of it spreading faster than 1\textsuperscript{st} wave

• Not clear if 2\textsuperscript{nd} wave has more or less deaths (severity unclear)
2nd wave – new 501.V2 variant with 3 RBD mutations has spread & become predominant

3 RBD mutations: K417N, E484K, N501Y
- ↑ affinity to ACE2 receptor & potential Ab escape

Source: Tyler N et al, Cell 2020
Preliminary results: 501.V2 variant associated with higher viral load

Speculate the following:

- Higher viral load in swabs may translate to higher efficiency of transmission, i.e., higher transmissibility.
- This may translate into a higher $R_0$.
- While other viruses are transmitting, this variant is transmitting faster.
- This may translate into a 2nd wave that will have many more cases than the 1st wave.
What **do** & **don’t** we know about the 501.V2 variant?

1. Unusual for a new variant to contain several mutations – 3 in RBD incl. N501Y – which alters ACE2 affinity & ?Ab effects
2. N501Y is being reported in other countries (0.2%) e.g. UK
3. Early signs that the new variant is spreading fast – sometimes faster than 1st wave viruses
4. It is widespread – probably across most of SA by now

1. Where did it come from & why did it form? Why NMB? – we have a few hypotheses to investigate
2. Is it more severe? – to early to tell
3. Is it re-infecting people who got infected in the 1st wave
4. Will the current vaccines work against this variant? – currently being studied by KRISP, AHRI, NICD & CAPRISA
What should we do next?

1. There is reason for concern that we have a virus that seems to be spreading rapidly; but it is something we can deal with.

2. Same prevention measures & treatment work for 501.V2

3. Similar 501 variants are in other countries e.g. Australia, UK

4. Inform key role-players & the public about the 501.V2 variant

5. Publish the data in a prominent journal

6. Urgently increase phylogenetic screening – need to sequence 100-200 viruses every month from across SA

7. Complete the studies to answer the 4 unknowns – fortunately, there are vaccine trials underway in SA e.g. J&J