Sampling bias in S-gene target data

Epiforecasts

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Background

Among all cases that are test-positive, some are tested for the S-gene target (SGT). A successful test for the S-gene target can give either a failure or a positive result. The proportion of SGT cases that result in SGT-Failure is a useful proxy for the proportion of the Omicron variant in comparison to the Delta variant.

The ability to provide an SGT result is not uniform across all test-positive cases. If cases with an SGT result differ from cases which cannot be tested for SGT, this would create a bias in comparisons of Omicron compared to Delta. For example, test-positive cases with an SGT result may be a result of sampling contacts of a known case with Omicron variant, which are also sent in a batch to a lab which is able to process SGT results.

We can compare these two groups in a two-strain branching process model. If the transmissibility advantage for cases with an SGT result is not centred on 100% then this might indicate sampling bias.

Methods

Data We used data for all England test-positive cases (pillar 1 and 2 of the UK testing strategy). We used only the most recent three weeks of data, between 2021-11-18 and 2021-12-07.

Model We used a two-strain model to compare sampling of all test-positive cases compared to test-positive cases with any confirmed S-gene target (SGT) result. We estimated a daily growth rate and allowed weekly piecewise constant variation. We used a uniform prior for the growth rate advantage of SGT-result cases compared to no-SGT-result cases.

The transmission advantage is the difference in growth rate between the two sets of cases on a daily scale.

Results

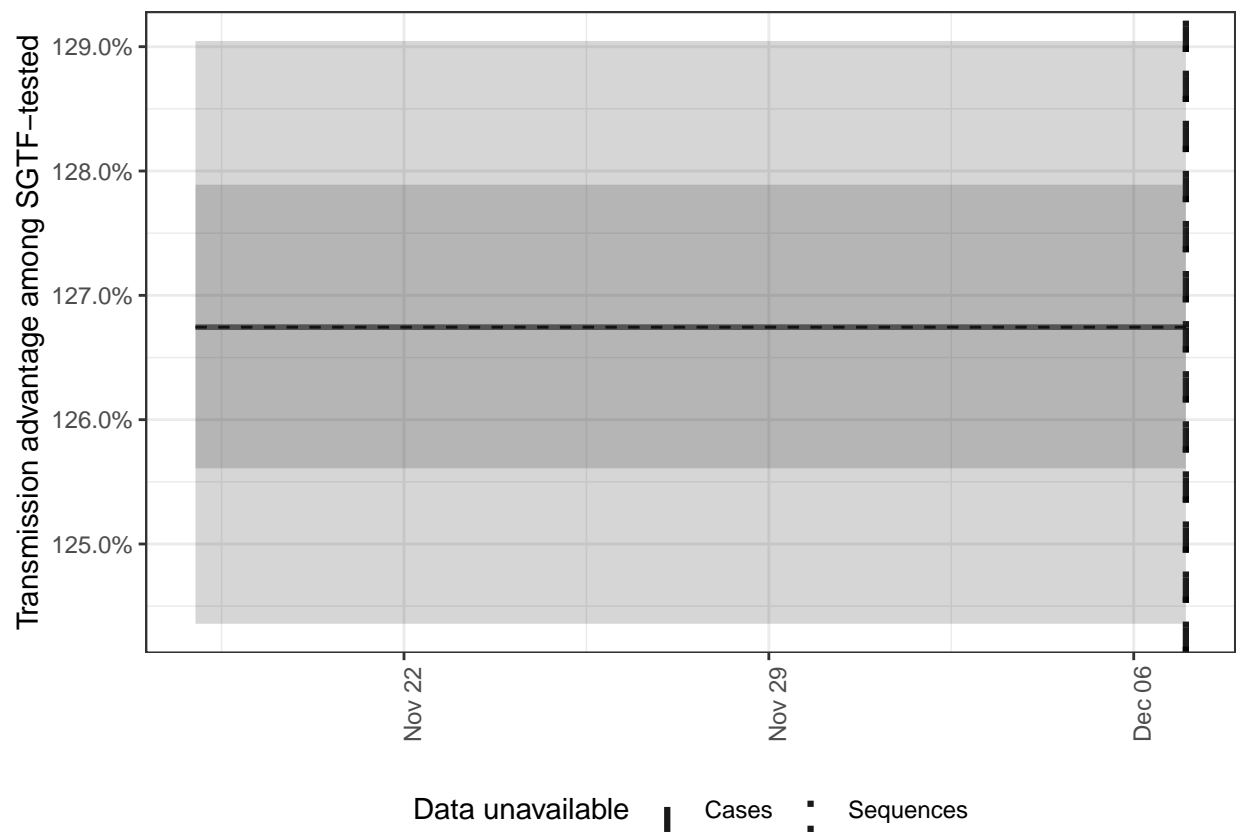- Transmission advantage

- Growth rate

- Cases (log)

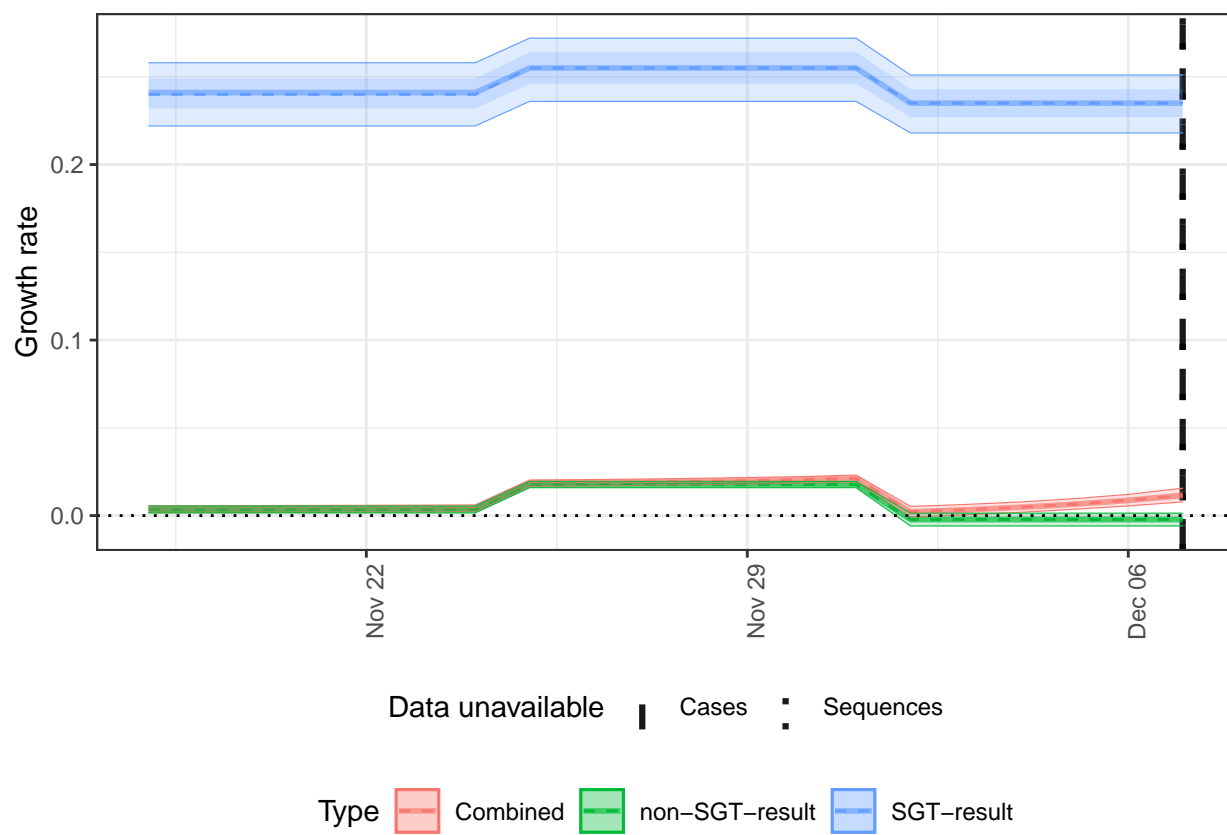Figure 1: The transmission advantage
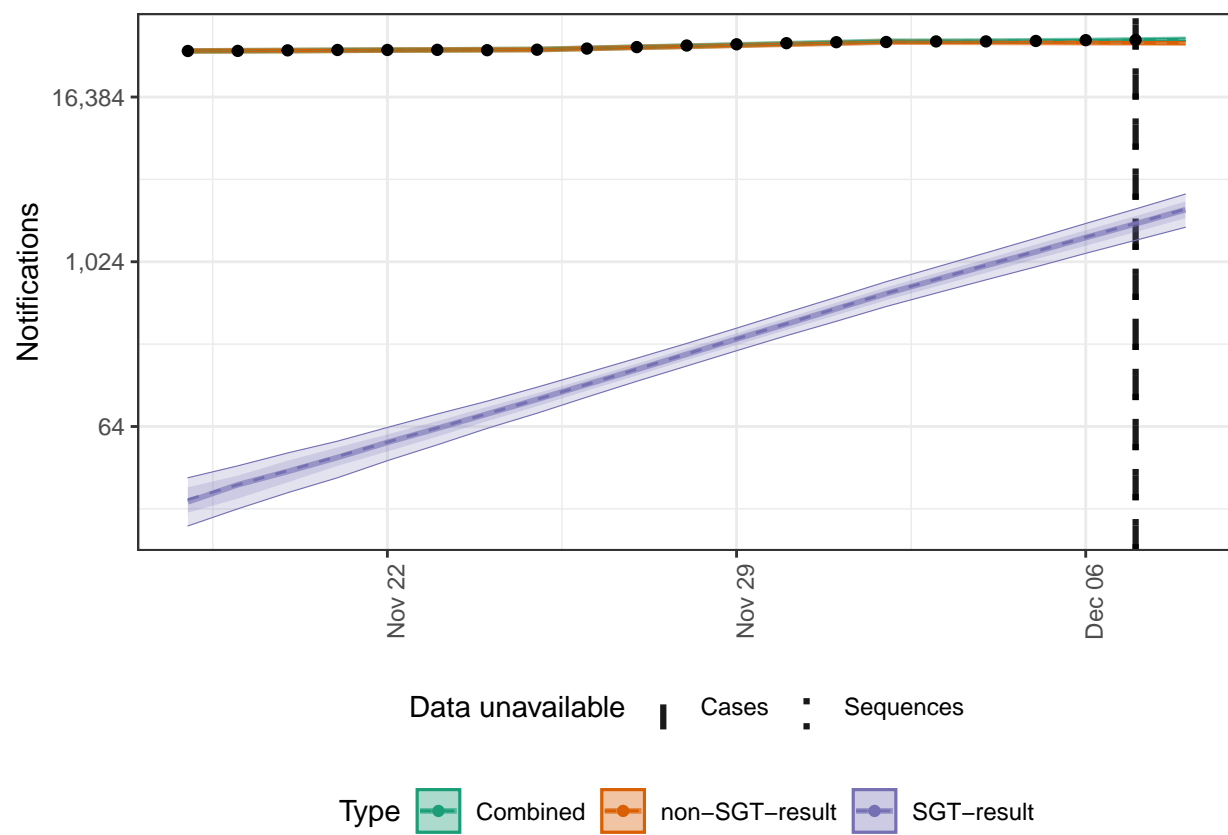
Figure 2: The growth rate

Figure 3: Cases

Discussion

We adapted a two-strain branching process model to explore sampling bias in cases with and without any S-gene target result.

We expected that the growth rate in cases with an S-gene target result would be higher than cases without an SGT-result, because our testing strategy preferentially tests contacts of known Omicron cases. These may be more likely to be tested with an S-gene target result.

However, we find very similar trends in increasing growth rate over time between cases which have been tested for S-gene target and those that have not.

We used data with strong weekly seasonality (day of the week effects). We repeated this analysis using a 7-day moving average of total cases, and found similar results.

We have not shown the reproduction number in this report. We did not explore trends between S-gene target negativity or positivity, or the relationship between Omicron variant cases and the S-gene target.