SARS-CoV-2 Variants of Concern

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SARS-CoV-2 Variants of Concern

Most Common Strain	Variant of Concern (Country and Date First Identified)	Key Spike Mutations Common to all 3 = S106/G107/F108 deletion in Non-Structural Protein 6	Number of Countries with Cases	Number of Cases Identified in U.S. As of 2/16/21	Number of Cases Identified in Virginia
D614G (China) Late January 2020	**B.1.1.7** (U.K.) September 2020	**N501Y.V1** H69/V70 deletion, Y144 deletion, A570D, D614G, P681H	**94**	**1,277** (42 states)	**12** (3 regions – E, N, NW)
	B.1.351 (South Africa) Early August 2020	**N501Y.V2** L242/A243/L244 deletion, D614G, E484K, K417N	**46**	**19** (10 states)	**3** (2 regions – E, SW)
	P.1 (Brazil) December 2020	**N501Y.V3** D614G, E484K, K417N	**21**	**3** (2 states)	**0**

SARS-CoV-2 B.1.1.7

- Earliest sequence = 9/20/20 in U.K.; now dominant lineage in 36-75% more transmissible (WHO)
  - 10-13% increased secondary attack rate
- UK assessment = “realistic possibility associated with increase in disease severity”*
  - Initial assessment showed no difference in hospitalization or death
  - Recent study in UK showed increase risk of death
  - Additional studies needed

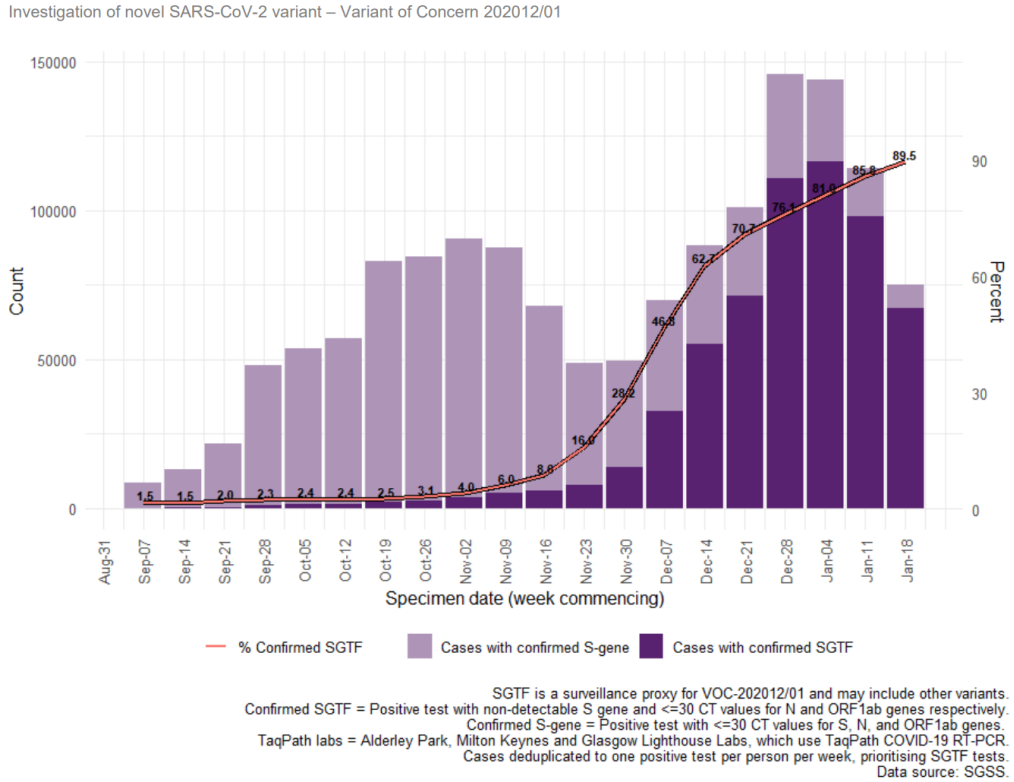


Figure 3. Weekly number (bars) and proportion (line) of England Pillar 2 COVID-19 cases with SGTF among those tested in TaqPath laboratories and with S gene detection results (7 September 2020 to 24 January 2021).

*Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/955239/NERVTAG_paper_on_variant_of_concern__VOC__B.1.1.7.pdf

Comparison of Case Rates: U.S., U.K., Ireland

9/21/20 – 2/7/21 Daily new confirmed COVID-19 cases per million people

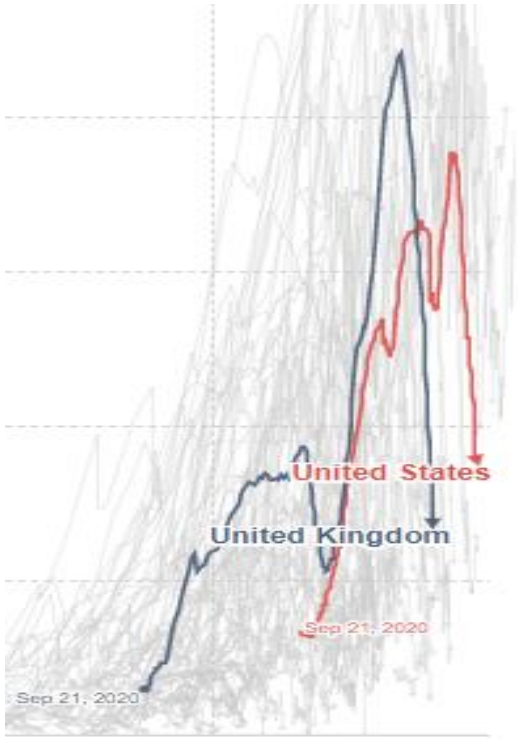
U.K. Response

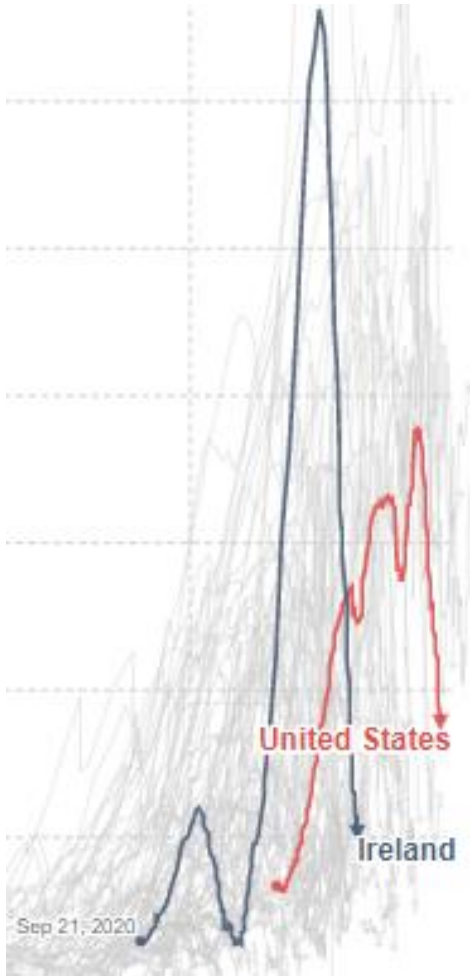
- **October 2020**

Regional containment measures

- **November 2020**

National stay-at-home order – still ongoing (likely until end of Feb/early Mar depending on country)





Source: https://ourworldindata.org/coronavirus#coronavirus-country-profiles;
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959426/Variant_of_Concern_VOC_202012_01_Technical_Briefing_5.pdf

SARS-CoV-2 B.1.1.7 in U.S.

Not peer reviewed

- Several independent introductions of B.1.1.7 into the U.S.
  - As early as late Nov 2020
- By last week of Jan 2021, B.1.1.7 made up ~2.1% COVID-19 cases in the U.S.
  - ~2% in California; ~4.5% in Florida
- Estimated increased transmissibility of 35-46%
- Estimated doubling time of B.1.1.7 to be 9.8 days
- Predict will become dominant variant in March 2021 unless urgent mitigation efforts implemented

Source: Genomic epidemiology identifies emergence and rapid transmission of SARS-CoV-2 B.1.1.7 in the United States, Scripps Research Center, https://doi.org/10.1101/2021.02.06.21251159

SARS-CoV-2 B.1.351

Figure 6. Countries, territories and areas reporting SARS-CoV-2 variant 501Y.V2 as of 16 February 2021

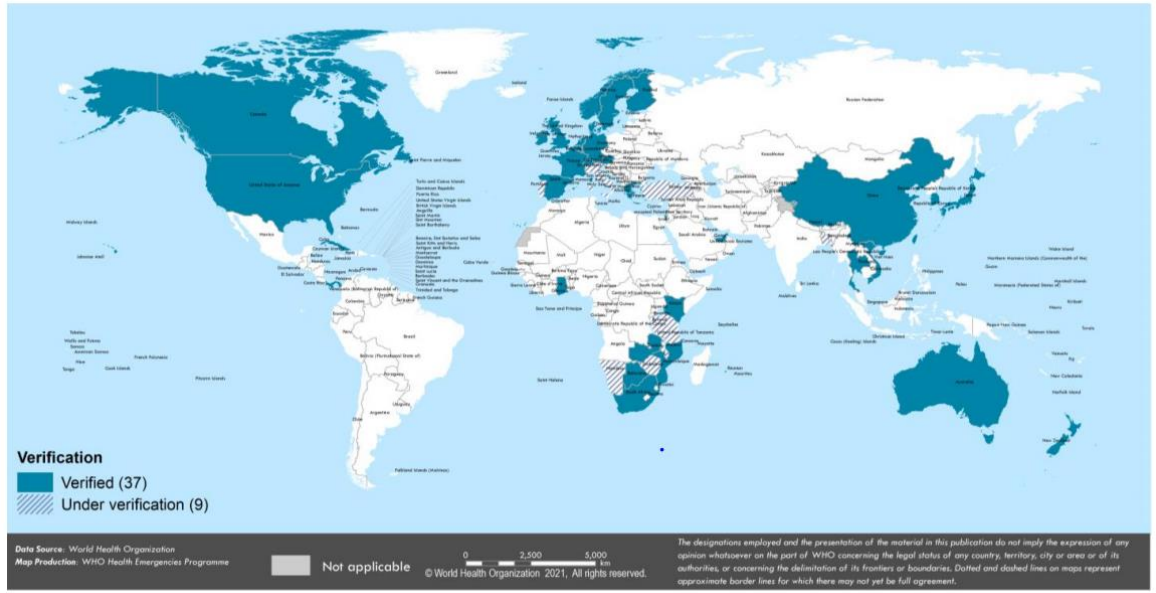
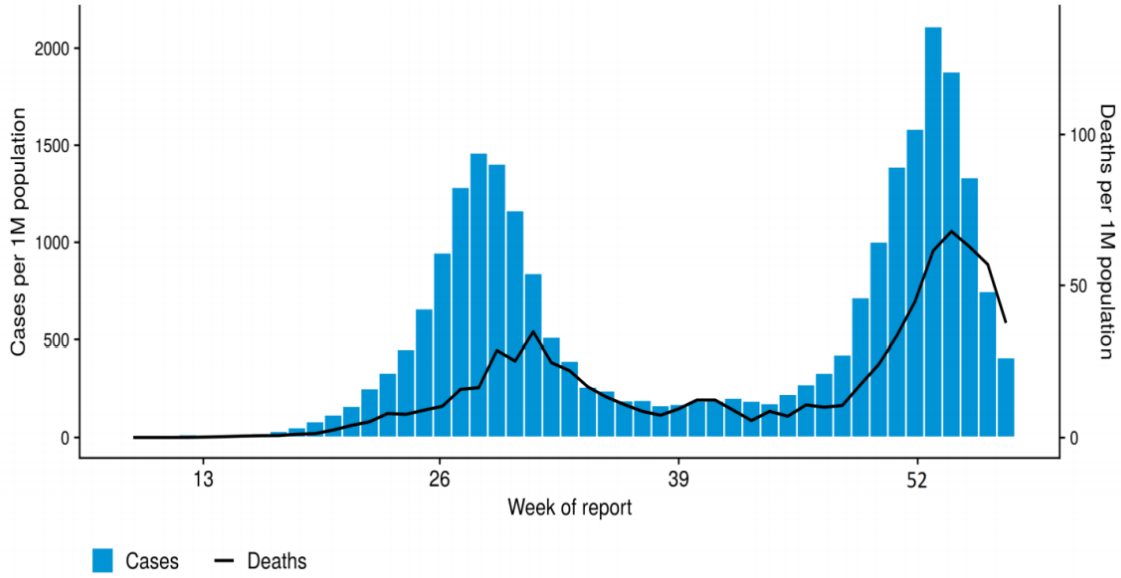


Figure 6. Weekly COVID-19 cases per 1 million population in South Africa, as of 7 February 2021



- 1.5 time more transmissible
- Higher viral load
- No evidence to date of higher severity of infection
- Dominant virus in South Africa

Source: WHO file:///C:/Users/xnb73963/Downloads/20210209_Weekly_Epi_Update_26.pdf; file:///C:/Users/xnb73963/Downloads/20210216_Weekly_Epi_Update_27.pdf

SARS-CoV-2 Vaccines and Growing Threat of Variants

- **B.1.1.7**
  - Slight reduction but overall neutralizing antibody levels remain above level expected to confer immunity (WHO)
- **B.1.351**
  - NIH study shows that neutralizing antibody levels induced by the Moderna mRNA vaccine are about 6-fold less active against B1.351
  - Unclear whether the reduction in sensitivity is enough to seriously reduce vaccine efficacy*
    - mRNA vaccines generate neutralizing antibody levels greater than needed
    - mRNA vaccines also induce virus-specific helper T cells and cytotoxic T cells
  - J&J and Novavax – Lower vaccine efficacy
    - J&J trial: Protection against moderate and severe disease - US 72%; Latin America 66%; South Africa 57%
  - AstraZeneca – Lower vaccine efficacy
    - Minimal vaccine efficacy against mild-moderate disease; serologic neutralization substantially reduced
- **P.1**
  - Under investigation

*Source: https://jamanetwork.com/journals/jama/fullarticle/2776039

Virginia's Precarious Situation

- Smaller percentage of Virginians immune due to natural infection (as of 2/18/21)
  - Low COVID-19 case rate compared to other states of 6,536 cases per 100,000
    - North Dakota 12,996; Tennessee 11,133; North Carolina 7,909
  - Antibody positivity - Red Cross - approx. 14% non-vaccinated donors in Virginia as of 2/1/21 (Testing approx. 4,000 Virginians each week)
    - CDC MASS-C Survey* – 5.7% as of 12/23/20
- Percent of population vaccinated with at least one dose = 12.6% as of 2/18/21

- Currently Virginia has a higher level of transmission than other states
  - Ranked #10 highest in U.S. for case incidence per 100,000, #5 highest for PCR % positivity and #6 for highest new COVID-19 admissions per 100 inpatient beds as of 2/14/21

*Source: CDC Multi-State Assessment of SARS-CoV-2 Seroprevalence Commercial Laboratory Survey provided Feb. 8, 2021; Includes antibody positivity estimate with 95% confidence interval (all ages)

Virginia's Response to Threat from Variants

- Enhancing surveillance for variants
  - Increase sequencing
  - Monitor Helix COVID-19 RT-PCR tests results (proxy for B.1.1.7 variant)
- Preparing to increase testing if cases begin to surge again due to increasing spread of variants
- Planning for option of testing strategy to support for K-12 return to school
- Implementing Containment 2.0
  - Prioritize specific cases for enhanced case investigations
  - Implementing Specialized CI/CT teams
  - Enhancing regional CI/CT teams

Questions