Ninetieth SAGE meeting on COVID-19, 27 May 2021

Held via Video Teleconference

Situation update

1. R is estimated to be between 1.0 and 1.1 in England, between 1.0 and 1.3 in Scotland, between 0.8 and 1.1 in Wales, and between 0.7 and 1.1 in Northern Ireland. R is an indicator that lags by two to three weeks, and estimates are averages over populations and areas. There is considerable variation in different parts of the country.
2. For the most recent week of the study (16th to 22nd May), the ONS COVID-19 Infection Survey estimates that an average of 48,500 people had COVID-19 in the community in England, 8,300 in Scotland, 800 in Wales and 2,200 in Northern Ireland. SPI-M estimates that there are between 3,000 and 5,000 new infections per day in England.
3. At a national level, the decreasing number of B.1.1.7 infections has been masking the rapid increase (from low levels) of B.1.617.2 infections. It is almost certain that B.1.617.2 has a significant growth rate advantage over B.1.1.7 (high confidence), though there remains considerable uncertainty around the extent of this advantage.
4. At a local authority level, areas where most samples are S-gene positive (which is a reasonable proxy for B.1.617.2) almost all have an R above 1.
5. An estimate based on one model suggests that R for B.1.617.2 in the UK is around 1.2 (95% CI 1.0-1.5) while the number of non-B.1.617.2 samples identified by COG-UK continues to decrease. This is down from an earlier estimate of 1.9, which could reflect the variant spreading to different parts of the community or other changes. This estimate will not reflect the effects of any recent changes including step 3 in England, which will almost certainly increase it, or of surge testing and other local measures which may counteract this to some extent. It will be important to understand these effects in order to assess step 4 proposals.
6. An equivalent estimate of R for B.1.1.7 is not available but if it were around 0.85, that would be consistent with B.1.617.2 having a growth rate advantage of the order of 40% over B.1.1.7. This estimate is still highly uncertain due to the wide confidence intervals around the estimate of R for B.1.617.2, challenges in calculating this figure and the lack of a robust equivalent estimate for B.1.1.7.
7. If the growth rate advantage were to be of the order of 40%, it is likely that there would be a substantial increase in hospitalisations. A smaller growth rate advantage would result in a smaller increase. The uncertainty means that there is a very wide range of possibilities. This uncertainty will reduce over the next fortnight as more data become available.
8. The reasons for the faster observed growth of B.1.617.2 are not known, but lab studies show that it replicates quickly and is highly fusogenic.
9. PHE analysis also indicates some decrease in vaccine effectiveness against B.1.617.2. compared to effectiveness against B.1.1.7. Effectiveness against symptomatic infection after a first dose drops from around 50% to 33%, and after two doses from 88% to 81%. The extent of any relative decrease in effectiveness against severe disease is not yet known but the impact is likely to be smaller than that for mild disease.
10. Data are not yet available on disease severity following infection with B.1.617.2 given the relatively low numbers of hospitalisations and deaths to date in the UK but there are currently no signals of a worsening clinical course.

11. There is not currently evidence of a statistically significant difference in the age profile of people becoming infected with B.1.617.2 in the UK suggesting that it has a has a similar pattern of susceptibility to B.1.1.7.
12. Neutralisation data from several independent labs support that B.1.617.2 is antigenically distant from the current vaccine Wuhan S immunogen. Data from one lab suggest that B.1.617.2 is more antigenically distant from some other variants than it is from B.1.1.7. This means that in parts of the world where there is some population level immunity following infection with other variants (e.g. P.1 and B.1.351), there may still be a high degree of susceptibility to B.1.617.2.
13. CO-CIN analysis shows that use of steroids for COVID-19 patients receiving supplementary oxygen in England increased through December and January and has remained high since then.

ACTION: VSCG & PHE to review and update table of vaccine effectiveness and share with SPI-M, in w/c 31st May.

Update on waning immunity

14. Most people infected with SARS-CoV-2 generate an antibody response in serum, saliva and mucosal fluids within 1–3 weeks after symptom onset. However, there is heterogeneity, some with mild disease developing weak antibody responses.
15. Antibody is detectable in saliva for at least 8 months, and in blood for at least 9 months after infection (high confidence) but individual trajectories vary, and levels depend on the assay method (of which there are many).
16. Plasma cells, Memory B cells and specific T cells enhance long-term protection against severe COVID-19 caused by current and (to a lesser extent) future variants of SARS-CoV-2 and can be detected at least 8 months after infection. Some of these effects may be very long lasting.
17. These immune responses lessen disease severity (high confidence) and may also reduce viral replication in the respiratory mucosa and inhibit SARS-CoV-2 transmission (moderate confidence).
18. Following natural infection with SARS-CoV-2, protection against symptomatic PCR-confirmed infection is high (estimated at 81%), for a period of at least 7 months and against asymptomatic or atypical PCR infections is moderate (estimated at 40%) for a period of at least 6 months. Overall, protection against all PCR-confirmed infections is high (estimated at 69%) for a period of at least 6 months (high confidence).
19. Protection against symptomatic infection is lower in those aged over 65 years than in younger age groups (low confidence).
20. Protection against SARS-CoV-2 infection, disease, and transmission may be diminished by antigenic changes in variant viruses (high confidence).
21. It will be important to monitor changes in immunity over long periods of time using both detailed smaller studies as well as larger surveillance studies.

ACTION: **VSCG & PHE** to review longitudinal studies on immunity underway to ascertain whether there are any gaps and if further work may need to be commissioned; and to identify the most appropriate group to analyse the combined output of these studies.

CO_2 monitoring and ventilation

22. Ventilation is an important COVID-19 mitigation measure and can reduce airborne transmission of SARS-CoV-2 beyond 2m (high confidence). However, compared to

other mitigation measures (such as hand hygiene and cleaning surfaces), it is less well understood by individuals or organisations (medium confidence). This may be, in part, because it is less visible. Carbon dioxide (CO_2) monitoring may help make ventilation issues more visible and guide actions to manage ventilation either in the short term (such as opening windows) or longer-term (such as changes to systems).

23. The level of CO_2 in a space can be used as a proxy for occupancy and ventilation (high confidence), though is not a direct proxy for infection risk (high confidence). CO_2 monitoring can be a cost-effective way to identify spaces with high occupancy and/or poor ventilation to indicate where transmission events may be more likely to occur.
24. Spaces with ventilation that meets current and recent UK building standards are likely to pose a lower risk for airborne transmission of COVID-19 (medium confidence). The quality of ventilation across UK building stock is unknown, although there is evidence to suggest that a wide range of building types are not adequately ventilated, especially in the winter months (medium confidence).
25. Sustained high CO_2 concentrations (>1500ppm) are likely to indicate overcrowding or poor ventilation (high confidence), whilst consistently low concentrations (<800ppm) would suggest ventilation is already sufficient and increasing it further is unlikely to significantly reduce risk of airborne transmission. Mitigation against other routes of transmission may still be needed. Other factors (such as thermal comfort and energy efficiency) will need to be balanced against risks of airborne transmission.
26. The Events Research Programme used CO_2 monitoring in various zones within large, well-ventilated venues. Initial findings show a correlation between occupancy and CO_2 levels in the space. In areas with higher crowd densities (such as queues near toilets or other congregation points), maximum CO_2 levels were up to 400 ppm higher than average CO_2 values.

ACTION: HSE and **BEIS** to review guidance relating to ventilation to reflect evidence in EMG's paper. A workshop discussion is planned for policy makers.

Adult social care in the context of post-vaccination risk landscape

27. Care homes will remain more vulnerable to COVID-19 outbreaks than most other settings, because they are closed settings with relatively large populations of particularly vulnerable people (high confidence). This will continue to be the case even after residents have been vaccinated, because vaccines do not provide complete protection.
28. In closed settings, even at times when there are low levels of infection in the community, there can still be outbreaks of infectious diseases. There is evidence that the package of interventions which has been in place has been effective in reducing morbidity and mortality, particularly when community prevalence was low (moderate confidence). Some of these interventions are likely to continue to be needed.
29. Interventions need to balance the risk of illness (from both COVID-19 and other infectious diseases) against many other factors including quality of life and the physical and mental benefits of exercise and seeing visitors for individuals in these settings. Decision makers will need to take into account the risk appetite of residents, their families and the wider community and society, and acceptable levels of risk should be articulated to enable balanced decision-making.
30. There is currently a high degree of uncertainty around how the epidemic will develop in light of the spread of the B.1.617.2 variant, which will make it difficult for those who have to make decisions to accurately assess these risks at this point.

ACTION: SCWG chairs to arrange a teach-in with relevant policymakers on risks and mitigations in care homes, with ethics input as needed.

List of actions

VSCG & PHE to review and update table of vaccine effectiveness and share with SPI-M, in w/c 31st May.

VSCG & PHE to review longitudinal studies on immunity underway to ascertain whether there are any gaps and if further work may need to be commissioned; and to identify the most appropriate group to analyse the combined output of these studies.

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SCWG chairs to arrange a teach-in with relevant policymakers on risks and mitigations in care homes, with ethics input as needed.

Attendees

Scientific experts (38): *Patrick Vallance (GCSA), Chris Whitty (CMO), Andrew Rambaut (Edinburgh), Angela McLean (MoD, CSA), Calum Semple (Liverpool), Catherine Noakes (Leeds),Charlotte Deane (UKRI),Charlotte Watts (FCDO, CSA), David Crossman (Scottish Government, Health CSA), Eamonn O'Moore (PHE), Gavin Screaton (Oxford), Harry Rutter (Bath), Ian Boyd (St Andrews), Ian Diamond (ONS), Ian Hall (Manchester), Ian Young (Northern Ireland, Health CSA), James Rubin (KCL), Jamie Lopez Bernal (PHE), Jeremy Farrar (Wellcome), John Edmunds (LSHTM), Jonathan Van-Tam (dCMO), Julia Gog (Cambridge), Kamlesh Khunti (Leicester), Linda Partridge (Royal Society), Lucy Yardley (Bristol/ Southampton), Maria Zambon (PHE), Mark Walport, Mark Wilcox (Leeds), Matt Keeling (Warwick), Meera Chand (PHE), Michael Parker (Oxford), Mike Prentice (NHS England), Nicola Steedman (Scottish Government, dCMO), Peter Horby (Oxford), Rob Orford (Welsh Government, Health CSA), Sharon Peacock (PHE), Susan Hopkins (PHE/NHST&T), and Wendy Barclay (Imperial).*

Observers and government officials (29): *Andrew Curran (HSE, CSA), Andrew Morris (Edinburgh),* [redacted] *Anna Seale (JBC), Christopher Williams (Welsh Government), Daniel Kleinberg (Scottish Government),* [redacted] *Giri Shankar (PHW), Henry Cook (No.10), Jennifer Rubin (HO, CSA), Jim McMenamin (Health Protection Scotland), Julian Fletcher (CO), Liz Lalley (Welsh Government), Louise Tinsley (HMT), Lucy Chappell (KCL),* [redacted] *Osama Rahman (DfE, CSA),* [redacted] *Paul Monks (BEIS, CSA), Paul Taylor (NPCC, CSA),* [redacted] *Phil Blythe (DfT, CSA),* [redacted] *Rob Harrison (CO), Rosie Bate-Williams (No.10), Steve Willner (PHE),* [redacted] *Tom Rodden (DCMS, CSA), and* [redacted]

Secretariat (all GO-Science) (16): [redacted] *Laura Eden,* [redacted] *Simon Whitfield, Stuart Wainwright,* [redacted] *and Zoë Bond.*

Total: 83