Eightieth SAGE meeting on COVID-19, 11 February 2021
Held via Video Teleconference

Summary

1. Data show that the restrictions in place (and people's adherence to them) are continuing to reduce the size of the epidemic (high confidence). R in the UK and in each of the four nations is between 0.7 and 0.9, and the growth rate in new infections in the UK is between -5% and -2% per day. Hospital occupancy is also continuing to decline, though remains at very high levels (and above the peak of the first wave).
2. NERVTAG is now of the view that it is it is likely that infection with B.1.1.7 is associated with an increased risk of hospitalisation and death compared to infection with non-VOC viruses. The absolute risk of death per infection remains low.
3. SAGE welcomed the RECOVERY trial result showing that tocilizumab reduces risk of death for hospitalised patients with severe COVID-19, shortens length of stay and reduces the need for mechanical ventilation. These benefits are in addition to those of steroids such as dexamethasone. This again demonstrates the value of randomised controlled trials.
4. SPI-M groups have modelled four scenarios which differ in speed of easing restrictions, over periods of around 2-5 months, with a baseline set of measures retained at the end. In all of the modelled scenarios, there is an epidemic resurgence because there are still many people in vulnerable groups who do not have protection.
5. There is the potential for such a resurgence to result in a very large number of infections (third wave), if restrictions are lifted early or rapidly (high confidence) which would lead to large numbers of hospitalisations and deaths unless vaccine coverage is very high (high confidence). If all restrictions were to be lifted by the start of May (over a period of around 2 months, starting in March), hospital occupancy would be highly likely to reach levels higher than at the peak in January 2021, even under optimistic assumptions around vaccine rollout.
6. The impact on infections, hospitalisations and deaths is smaller if measures are released when prevalence is lower and if changes are made gradually (high confidence). The impact is also smaller if more people are vaccinated when measures are lifted.
7. Retaining a baseline set of policies to reduce transmission after other restrictions have been lifted would reduce the scale of a resurgence (high confidence). It is impossible to precisely predict how specific policies (especially any baseline measures retained after Tiers are lifted) will change transmission. There is considerable uncertainty around the scenarios modelled and whether they can avoid putting hospitals under similar levels of pressure to those seen in January 2021.
8. Given the level of uncertainty, changes to measures are best made based on epidemiological data rather than based on predetermined dates. SAGE continues to advise an "adaptive management" approach, responding to data, for example setting levels of infection or hospitalisation that would need to be reached before making changes. It will be important to have effective early warning indicators and JBC should consider the most appropriate indicators now.
9. Maintaining control of the epidemic is easier at low levels of prevalence than at high levels because it gives more time to respond to increases before healthcare systems are overwhelmed; allows test, trace and isolate systems to operate more effectively; reduces the likelihood of needing to make unplanned interventions; and reduces the likelihood of new variants emerging. It is not possible to make quantitative predictions as to the risk of immune escape variants, but keeping prevalence low is the best way to reduce this risk.
10. The evidence base with respect to infection and mortality within occupational groups, (which may provide an indication of the risk of virus transmission in workplace settings) has a number of limitations in part because of varying degrees of workplace closure across different sectors. For many occupations, it is difficult to disentangle

the effects of transmission that relate to working as opposed to traveling and living conditions.

11. Evidence shows that people who work in some specific occupations and roles have increased risk of being infected, hospitalised or dying prematurely. This is higher in many occupations where people have to attend a workplace compared with people in occupations who can work from home (high confidence). Occupations which involve a higher degree of physical proximity to others tend to have higher COVID-19 mortality rates (high confidence).
12. Requiring more people to come to a workplace is likely to increase the risk of transmission associated with that workplace (high confidence), whereas people working from home where possible is likely to reduce it.

Situation Update

13. Data show that the restrictions in place (and people's adherence to them) are continuing to reduce the size of the epidemic (high confidence). R in the UK and in each of the four nations is between 0.7 and 0.9, and the growth rate in new infections in the UK is between -5% and -2% per day. Hospital occupancy is also continuing to decline, though remains at very high levels (and above the peak of the first wave).
14. Although it has decreased, the number of infections also remains high with SPI-M estimating that there are between 28,000 and 58,000 new infections per day in England. The ONS community infection survey for the most recent week of the study (31st January to 6th February) estimates that an average of 695,400 people had COVID-19 in the community in England (credible interval 660,200 to 732,200).
15. SPI-M estimates that R is now below 1 across all NHS England regions. Although the epidemic is decreasing in all the nations of the UK and regions of England, transmission is heterogeneous more locally. In smaller areas where the number of infections may not be declining as fast, a relaxation of non-pharmaceutical interventions could quickly lead to increases in transmission. This would be a particular risk if these areas also had lower vaccine uptake (e.g. if there was a correlation with harder-to-reach groups). It will be important to look for localised early warning signals of increased transmission through the JBC system.
16. There are not yet clear signals of the population-level impact of vaccination (nor would they be expected yet given lag times).
17. There is emerging evidence that the B.1.1.7 variant which is dominant in the UK may have a shorter generation time than previous variants (low confidence). If this were the case, it would mean that the epidemic would grow more quickly when R is above 1, and shrink more quickly when R is below 1. This finding would also affect estimates of R. SPI-M will review the evidence as it develops.
18. There have been outbreaks reported in a significant number of prisons, despite control measures in place. Imprisoned populations are especially vulnerable to infectious diseases, including COVID-19, due to a variety of different factors including crowding, confined spaces, and high population turnover. These outbreaks have the potential to drive outbreaks in the community, though the likelihood of this is unknown. JCVI continues to review the potential role of transmission blocking strategies for vaccination, which may be relevant here.
19. SAGE remains concerned by reports of low vaccine uptake in some groups including staff in some care homes.
20. NERVTAG has continued to review analyses of the severity of B.1.1.7 and the evidence is now stronger to support the previous finding of increased severity. NERVTAG is now of the view that it is it is likely that infection with B.1.1.7 is associated with an increased risk of hospitalisation and death compared to infection with non-VOC (variant of concern) viruses (the previous assessment was that this was a realistic possibility). The absolute risk of death per infection remains low.

21. PHE continues to track variants of concern (VOC), and is now treating the cluster in the South West of England of B.1.1.7 with E484K mutation as a VOC. There are 105 confirmed and 46 probable cases of B.1.351 now identified, and it has also now been identified in surveillance studies, which indicates that it is likely that there are significantly more cases than this. There is work underway to better understand what the current prevalence in the UK might be.
22. SAGE welcomed the RECOVERY trial result showing that tocilizumab reduces risk of death for hospitalised patients with severe COVID-19, shortens length of stay and reduces the need for mechanical ventilation. These benefits are in addition to those of steroids such as dexamethasone. This again demonstrates the value of randomised controlled trials.

ACTION: SAGE secretariat to share evidence of low vaccine uptake in certain groups with Cabinet Office and DHSC.

ACTION: Jennifer Rubin and **Cath Noakes** to consider whether data from prisons are able to provide insight into how transmission occurs.

ACTION: SPI-M to share insights on early warning signals with JBC.

Exit scenarios and easing restrictions

23. SPI-M groups have modelled four scenarios which differ in speed of easing restrictions, over periods of around 2-5 months, with a baseline set of measures retained at the end. The findings are consistent with those discussed at SAGE 79.
24. In all of the modelled scenarios, there is an epidemic resurgence because there are still many people in vulnerable groups who do not have protection; neither directly (either because they are not been vaccinated, or because their vaccination does not prevent infection or illness – even though highly effective, vaccines do not provide perfect protection), nor indirectly from wider population immunity. For example, a vaccine with efficacy of 85% against severe disease, with an uptake of 79%, would protect 67% of adults from severe disease. Population level protection would be lower (adults make up 77% of the population), and protection against infection is likely to be lower than protection against disease.
25. There is the potential for a resurgence to result in a very large number of infections (third wave) if restrictions are lifted early or rapidly (high confidence) which would lead to large numbers of hospitalisations and deaths unless vaccine coverage is very high (high confidence). If all restrictions were to be lifted by the start of May (over a period of around 2 months, starting in March), hospital occupancy would be highly likely to reach levels higher than at the peak in January 2021, even under optimistic assumptions around vaccine rollout.
26. The impact on infections, hospitalisations and deaths is smaller if measures are released when prevalence is lower and if changes are made gradually (high confidence). The impact is also smaller if more people are vaccinated when measures are lifted (i.e. vaccine rollout is faster) and if vaccine uptake is higher, particularly in the most vulnerable groups (high confidence). Relaxing measures later therefore has two benefits; it allows prevalence to be brought down further, and also allows more people to be vaccinated before R increases. The combined effect of these means a significantly smaller resurgence.
27. If restrictions are eased over 3 months, the number of infections, hospitalisations and deaths is lower than easing over 2 months, and over 4 months it is lower still. In the slowest scenario modelled, an easing over 5 months, the results are similar to the 4 month easing (with a delay) as in both scenarios a high proportion of vulnerable people would have been vaccinated (based on an optimistic assumption about vaccine rollout). With a slower pace of vaccine rollout easing over 5 months results in fewer deaths and admissions than easing over 4 months.

28. Retaining a baseline set of policies to reduce transmission after other restrictions have been lifted would reduce the scale of a resurgence (high confidence). A specific set of policies has not been modelled, but could include voluntary measures (e.g. hygiene measures, mask wearing in certain situations, avoiding crowding), environmental measures (e.g. ventilation), and test, trace, and isolate systems. These and potentially additional measures may be needed throughout Winter 2021/22.
29. It is impossible to predict precisely how specific policies (especially any baseline measures retained after Tiers are lifted) will change transmission. There is considerable uncertainty around the scenarios modelled and whether they can avoid putting hospitals under similar levels of pressure to those seen in January 2021.
30. Given the level of uncertainty, changes to measures are best made based on epidemiological data rather than based on predetermined dates. There will be greater uncertainty about vaccine efficacy and coverage during the earlier steps of relaxation.
31. As changes to restrictions interact with each other, and networks can be created as multiple activities resume, later steps have the potential for causing larger increases in transmission. Linear increases should not be assumed.
32. If there is an increase in transmission, it will take time for the data to show this, and then more time for any response to be implemented and have an effect. The risk associated with this lag needs to be considered when relaxing measures. Gradual relaxation would make it easier to monitor and assess the impact of changes. It may be helpful to plan breaks in the easing of measures to allow this assessment and help maintain control. Planning these in advance could allow them to happen at more convenient times (e.g. around school holidays).
33. SAGE continues to advise an “adaptive management” approach, responding to data, for example setting levels of infection or hospitalisation that would need to be reached before making changes. It will be important to have effective early warning indicators which may include monitoring infection rates in groups of people who have higher numbers of contacts. This makes it more likely that the epidemic can be kept under control. It is advised that JBC consider these measures now.
34. Maintaining control of the epidemic is easier at low levels of prevalence than at high levels because it gives more time to respond to increases before healthcare systems are overwhelmed; allows test, trace and isolate systems to operate more effectively; reduces the likelihood of needing to make unplanned interventions; and reduces the likelihood of new variants emerging.
35. The extent of any seasonal patterns in transmission (for example, as a result of environmental or behavioural factors) is not yet clear and so is not included in the models. This adds further uncertainty around the timing of a resurgence, but it could be later than the models suggest due to transmission being reduced over the summer. If waning immunity were to be a factor in the autumn or winter, this could exacerbate the scale of any resurgence. The models also do not take into account differential vaccine effects on disease severity or death rather than infection risk, or the effects of possible new variants.
36. It is not possible to make quantitative predictions as to the risk of an immune escape variant, but if vaccination is being relied on to control transmission while prevalence remains relatively high, this creates the conditions in which an escape variant is most likely to occur. Keeping prevalence low is the best way to reduce the risk of emergence of escape variants.
37. The behavioural principles for relaxation of measures are similar to those which have been outlined previously. Adherence to protective behaviours is expected to remain high (high confidence), with the exception of those activities where people require more support to adhere, such as self-isolation (unless this support is provided). The order in which restrictions are eased will give an implicit message about government priorities and it will be important to explain why decisions are made, and why certain

behaviours are necessary. As people's perceptions of their immunity change, it will be essential to communicate why these behaviours remain important.

ACTION: Transmission group to review evidence on seasonality and consider whether it is possible to use this to refine modelling.

ACTION: C-19 task force to incorporate behavioural evidence into analytical work, and to share with CO Comms.

Occupation, transmission, risk and outcomes

38. The evidence base with respect to infection and mortality within occupational groups, (which may provide an indication of the risk of virus transmission in workplace settings) has a number of limitations. These include limited datasets; the nature of transmission as a continuous risk which can occur in any setting; work-related exposures being modified over time by NPIs and lockdowns; and limited evidence on causation (much evidence is on association). There are more data (albeit still limited) for those occupations that have continued during periods of restrictions than for those more affected by restrictions. Because of this pattern of differential restrictions it is difficult to get precise data on what risks may be when workplaces are more fully open.
39. Transmission risk is a complex combination of environmental and human factors that are associated with the likelihood of infection (high confidence).
40. There is a clear interplay between occupational risk of SARS-CoV-2 transmission and socioeconomic inequities, which reflects the amplifying effects between the working environment, crowded housing, job insecurity and poverty. Workplaces are likely to be a significant route of infection into the home.
41. For many occupations, it is difficult to disentangle the effects of transmission that relate to working as opposed to traveling and living conditions (medium confidence). Increased risks in those employed in certain occupations may be due to workplace factors, (e.g. lack of ventilation) or factors outside of the workplace (e.g. household size), which increase individuals' risk of infection (high confidence).
42. Activities linked to the workplace, such as travel and the associated social activities, have different associated risks that require effective protective controls and preventative mitigations to manage them. There are several factors that affect transmission, for example, frequency and length of any exposures, proximity or physical contact, and the number of people within a workspace.
43. Within sectors that have remained active during lockdown, evidence shows that people who work in some specific occupations and roles have increased risks of being infected, hospitalised or dying prematurely. This is higher in many occupations where people have to attend a workplace compared with people in occupations who can work from home (high confidence). Occupations which involve a higher degree of physical proximity to others tend to have higher COVID-19 mortality rates (high confidence).
44. Requiring more people to come to a workplace is likely to increase the risk of transmission associated with that workplace (high confidence), whereas people working from home where possible is likely to reduce it. People attending the workplace while unwell (more likely if not provided with sick leave or financial compensation) increases the risk of transmission in the workplace. It will be very important to ensure that those with symptoms or who test positive do not come into the workplace.
45. There is heterogeneity between employers and workplaces as well as between occupations. Overall, compliance with required control measures in work environments contacted by HSE appears high (medium confidence).
46. ONS analysis of COVID-19 Infection Survey (CIS) data shows no statistically significant evidence of a difference in risk between sector or 2-digit SOC occupations

with the highest positivity rates. Marginal probabilities also do not draw any definitive conclusions about statistically significant differences between sectors.

47. SAGE endorsed the paper 'COVID-19 Risk by Occupation and Workplace' subject to minor changes.

ACTION: **Cabinet Office Taskforce** and **SAGE Secretariat** to organise a teach-in session to provide policy colleagues with an overview of the evidence on occupations and risk.

Education (schools and universities)

48. SAGE has previously provided advice on children, schools and transmission at SAGE 73 and 65. Evidence continues to suggest that children are susceptible to COVID-19 infection, with primary aged children being at lower risk of infection than older children (medium confidence). Children and younger people (<19 years) are much less susceptible to severe clinical disease than older people (high confidence).
49. There is no change to the assessment that the risk to children is low.
50. CIS data suggest that the B.1.1.7 variant leads to higher infection rates, but is not particularly adapted to any age group (medium confidence). There is limited information on the severity of B.1.1.7 infection in children relative to other variants, due to the very small numbers of children affected by severe disease.
51. Paediatric Multisystem Inflammatory Syndrome (PIMS) which is temporally associated with COVID-19 is rare and is estimated to occur in 45 cases per 100,000 SARS-CoV-2 infections in 0-14 year-olds.[1]
52. Evidence from multiple PHE surveillance and outbreak data sources (which are likely to underestimate asymptomatic cases and transmission, particularly among children) suggest that the levels of risk of infections and outbreaks in educational settings is strongly associated with community infection rates (weak evidence, low-medium confidence).
53. Differences in school settings and structures and the number of mitigations in place influence the potential for transmission. As with other settings, appropriate mitigations such as ventilation, social distancing and handwashing are important in school settings to reduce transmission (high confidence).
54. HSE spot checks in 5000 and inspections in 1000 primary and secondary schools between September and December 2020 identified that around 80% had a good understanding of the guidance and what it means to be "COVID-secure". Where issues were identified these were minor, with less than 1% requiring any formal enforcement.
55. There is still clear evidence of the negative educational impact of missing school, particularly for younger children (high confidence); and that the pandemic has had a negative impact on the mental health of children and young people, with adolescents being particularly affected (high confidence).
56. There is ethnicity-specific variation in testing, with children from minority ethnic groups having lower uptake of testing and being more likely to test positive than those from White population groups. Whilst rates are very low, Asian children were more likely to be admitted to hospital and intensive care for COVID-19 than White children and Black and Mixed/other children are more likely to have had longer hospital admissions (medium confidence).
57. SPI-M's consensus view remains that the opening of primary and secondary schools is likely to increase effective R by a factor of 1.1 to 1.5 (10% to 50%). This relative impact on R is highly sensitive to assumptions on susceptibility and infectivity by age – particularly any distinction between primary and secondary school-aged children.

[1] *This point was corrected, and these minutes reissued on 15 February 2021.*

58. The relative impact increases as additional cohorts of children return to school. This largely results from compounding the impact from other groups of pupils who have already returned. Therefore, the risk is not linear and the groups which return latest may have the greatest impact on R.
59. Reopening schools needs to be considered in the wider context. Opening schools will interact with other NPIs, and affects the activities and behaviours of parents and other adults as well as children. Targeting communications at adults about the risks associated with these changes in behaviour could help people to reduce them.
60. There are a number of uncertainties in the modelling including the potential network implications of reopening schools. A phased reopening would allow the effects to be assessed which would be particularly valuable if schools were one of the first things to reopen, as there will be more uncertainties in the early stages of releasing measures (e.g. around the impact of vaccines).
61. SAGE has previously provided advice on Higher Education, including at SAGE 55.
62. Multiple data sources (including ONS and PHE) show that the rates of COVID-19 infection rose among many HE student populations in October 2020 (moderate evidence, moderate data), with rates of infection subsequently reduced in November (high confidence). Several case studies of individual outbreaks and/or transmission in HE settings document outbreaks among students in HE settings in late September to October 2020.
63. Evidence from genomic studies in a limited number of universities suggests that mitigation measures were successful in minimising transmission. However, different residential settings and levels of integration in the local community will impact on community transmission and so findings from one university may not be applicable to others.
64. Survey evidence related to COVID-19 indicates disruption to research and learning, lower wellbeing, and increased mental distress in HE students (medium confidence). Almost two-thirds (63%) of students indicated that their well-being and mental health had worsened since the start of the autumn 2020 term.

ACTION: **DfE** to organise a teach-in with policy colleagues to provide an overview of the evidence on school reopening.

ACTION: **DfE** to share evidence on universities with Universities UK and Russell Group.

List of actions

SAGE secretariat to share evidence of low vaccine uptake in certain groups with Cabinet Office and DHSC.

Jennifer Rubin and **Cath Noakes** to consider whether data from prisons are able to provide insight into how transmission occurs.

SPI-M to share insights on early warning signals with JBC.

Transmission group to review evidence on seasonality and consider whether it is possible to use this to refine modelling.

C-19 task force to incorporate behavioural evidence into analytical work, and to share with CO Comms.

Cabinet Office Taskforce and **SAGE Secretariat** to organise a teach-in session to provide policy colleagues with an overview of the evidence on occupations and risk.

DfE to organise a teach-in with policy colleagues to provide an overview of the evidence on school reopening.

DfE to share evidence on universities with Universities UK and Russell Group.

Attendees

Scientific experts (40): *Patrick Vallance (GCSA), Chris Whitty (CMO), Angela McLean (MOD), Brooke Rogers (KCL), Catherine Noakes (Leeds), Charlotte Deane (UKRI), Charlotte Watts (FCDO CSA), Calum Semple (Liverpool), Declan Bradley (DoH Northern Ireland), Fliss Bennee (Wales), Graham Medley (LSHTM), Harry Rutter (Bath), Ian Boyd (St Andrews), Ian Diamond (ONS), Isabel Oliver (PHE), James Rubin (KCL), Jeanelle de Gruchy (ADPH), Jeremy Farrar (Wellcome), Jenny Harries (DHSC), John Edmunds (LSHTM), Jonathan Van-Tam (dCMO), Julia Gog (Cambridge), Kamlesh Khunti (Leicester), Linda Partridge (Royal Society), Maria Zambon (PHE), Mark Walport (UKRI), Mark Wilcox (NHS), Matt Keeling (Warwick),* [redacted] *Michael Parker (Oxford), Peter Horby (Oxford), Phil Blythe (DfT CSA), Rob Orford (Wales, Health CSA), Russell Viner (UCL), Sheila Rowan (Scotland, CSA) Stephen Powis (NHS England), Susan Hopkins (PHE/NHST&T), Wei Shen Lim (JCVI), Wendy Barclay (Imperial), and Yvonne Doyle (PHE).*

Observers and government officials (28): *Alan Penn (MHCLG CSA), Andrew Curran (HSE CSA), Andrew Morris (HDR UK),* [redacted] *Ben Warner (No.10),* [redacted] *Gideon Henderson (Defra CSA), Imran Shafi (No. 10), James Benford (HMT), Jennifer Rubin (HO CSA), Jim McMenamin (Health Protection Scotland), Julian Fletcher (CO), Laura Gilbert (No.10),* [redacted] *Osama Rahman (DfE, CSA),* [redacted] *Paul Monks (BEIS CSA),* [redacted]*,* [redacted] *Rob Harrison (CO), Robin Grimes (CSA),* [redacted] *Thomas Waite (JBC), and Tom Rodden (DCMS CSA).*

Secretariat (all GO-Science) (21): [redacted] *Simon Whitfield,* [redacted] *Stuart Wainwright, and* [redacted]

Total: 89