Sixty-ninth SAGE meeting on Covid-19, 19th November 2020
Held via Video Teleconference

Summary

1. Estimates of R and growth rates have fallen slightly in recent weeks. The latest estimate of R for both the UK and England is 1.0 to 1.1, while the daily growth rate estimate for new infections is 0% to +2%. SPI-M are not confident that R is currently above 1 in England. Estimates of R for Scotland, Wales and Northern Ireland are all 0.8-1.0. These estimates are based on the latest data available on 17th November and do not yet fully reflect the interventions introduced in England on 5th November.
2. As previously noted, evidence shows that the earlier and more rapidly interventions are put in place, and the more stringent they are, the faster the observed reduction in incidence and prevalence. Recent data show uniformly shrinking epidemics as a result of the implementation of tier 3 restrictions in England, and national restrictions in Northern Ireland, although this is more mixed for the Welsh firebreak and Scotland central belt restrictions. Tier 3 restrictions in England were heterogeneous, with most areas having additional restrictions above the minimum set for this tier.
3. Within one month of natural infection, a high proportion of people will develop immunity which is likely to be protective against disease caused by reinfection (high confidence). This protection is likely to persist for at least three months (moderate confidence). The level of protection against subclinical reinfection (as opposed to disease) and transmission is uncertain.
4. Immunity certification is theoretically possible, however further data and considerations are needed before a recommendation can be made. New data are expected shortly. Behavioural and operational considerations would need to be taken into account, as well as the immunology.
5. Relaxation of interventions over the festive period presents a significant risk of increased transmission and increased prevalence, potentially by a large amount (high confidence). Keeping prevalence low before the festive season would reduce transmission during any relaxation period (high confidence).
6. Allowing households to 'bubble' during such a relaxation period (i.e. effectively form a single, larger household which does not mix with others) is likely to reduce the risks relative to allowing an individual a particular number of contacts. The larger the number of households in the bubbles, the greater the risk of 'extra-bubble' contacts and transmission risk. Whatever system is chosen, sequential or multiple bubbling should be avoided. SAGE will consider this further at its next meeting.

Situation Update

7. As previously noted, R and growth rate estimates rely on lagged data, mask wide regional variation in the number of new infections and cannot fully reflect recent changes in transmission that might have occurred in the past two to three weeks. Latest estimates are based on data available on 17th November and do not yet fully reflect the impact of the national restrictions introduced in England on 5th November or recent changes in the devolved administrations. They should therefore be treated as an indication of the general trend.
8. Estimates of R and growth rates have fallen slightly in recent weeks. The latest estimate of R for both the UK and England is 1.0 to 1.1, while the daily growth rate estimate for new infections is 0% to +2%. Estimates of R for Scotland, Wales and Northern Ireland are all 0.8-1.0.

9. It is highly likely that the national restrictions introduced in England have reduced R from the levels currently estimated. SPI-M is confident that R is below 1 in Scotland, Wales and Northern Ireland. Data show the epidemic in the North West of England is now shrinking, with R estimated as 0.8-1.0 in that region. However, incidence and prevalence there remain high, with continued pressures on the healthcare system and continued high mortality.
10. Changing patterns in testing continue to make it hard to interpret changes in confirmed case numbers. As testing becomes more locally-led, the application of Pillar 2 testing is varying more from place to place. As a result, it is very hard to interpret changes in pillar 2 testing data in different parts of the country.
11. Estimates from SPI-M using data up to 16th November suggest that there are between 48,000 and 76,000 new infections per day in England.
12. The ONS infection survey estimates that from 8th to 14th November an average of 664,700 people had COVID-19 in the community in England, with 38,900 new infections per day in England. The data do not include people in care homes, hospitals, or university halls of residence. ONS data is however more likely to reflect changes in prevalence more rapidly than the clinical data that SPI-M models rely on.
13. SAGE considered scenarios produced by SPI-M in which the interventions from 5th November led to decreased R values ranging between 0.6 and 1.1. As previously noted, these are not forecasts or predictions, they illustrate a range of scenarios of COVID-19 hospitalisations and mortality over the next six weeks. Although the impact of the new measures in England is not yet clear from the data, and so differentiation between these scenarios is not possible, models suggest that it is highly unlikely that the epidemic is in line with scenarios for R being 0.6.
14. SAGE continues to consider mass testing as the technology and availability of tests evolves. If done successfully, mass testing a large proportion of the UK's population could identify a large number of infected people. Targeted, more frequent testing of people who are at higher risk of being infected (such as key workers, health and social care workers, and people in high prevalence areas) is likely to have a larger impact than less frequent testing of the whole population.
15. Mass testing alone will not reduce transmission; this will only happen if people who are early in their infection successfully isolate (and these people would not have isolated otherwise, or would have isolated later). A one-off period of mass testing should therefore not be considered as means to reduce R, but as reducing post-testing prevalence compared to what it otherwise would have been (analogous to a circuit-breaker). Once the testing period is over, if no additional control measures are put in place, the epidemic will return to its previous trajectory. Repeat frequent testing would be expected to have a continued effect.
16. Once test assay characteristics, viral kinetics, test sample variations and within-household transmission from isolated infected people are accounted for, a reduction in prevalence of 15-20% might be a realistic expectation for a single-round, highly effective, untargeted mass testing event.

ACTION: Small group to meet on 20th November to consider testing, including representation from SPI-M, and to consider available international evidence, including from Slovakia.

Impact of interventions across the UK

17. SAGE endorsed the paper 'Four Nations' Autumn Interventions'.
18. SAGE has previously considered analysis from SPI-M on how the introduction of local COVID alert levels (tiering) has impacted viral transmission across England since 12th October (see SAGE 67). Further analysis on recent restrictions across the UK show a general reduction in growth rate following the implementation of interventions, although there are some instances where local epidemics continued to grow in the weeks following the interventions considered within the paper (moderate confidence).
19. There was significant heterogeneity in interventions implemented across the UK, with changes to those interventions over autumn (interventions applied across the four nations and the timings of each were laid out in the paper). This heterogenous approach, alongside many confounding factors (e.g. the implementation of the most stringent interventions being related to the previous prevalence and growth rates in an area, which vary widely; and behavioural changes which may be linked to changes in prevalence irrespective of formal guidance) make analysis of the impacts of interventions difficult, and care should therefore be taken in describing the patterns and correlations. The paper does not attempt to infer causality.
20. As previously noted, evidence shows that the earlier and more rapidly interventions are put in place, and the more stringent they are, the faster the observed reduction in incidence and prevalence. Recent data show uniformly shrinking epidemics as a result of the implementation of tier 3 restrictions in England, and national restrictions in Northern Ireland, although the picture is more mixed for the Welsh firebreak and Scotland central belt measures.
21. In England, in tier 1, many Lower Tier Local Authorities (LTLAs) had positive growth rates both before and after the introduction of tiers. In tier 2, the epidemic in some but not all LTLAs was shrinking after the introduction of tiers, with almost all of these areas having a reduction in growth rate as a result of the intervention but with many nonetheless remaining positive. All tier 3 LTLAs (where prevalence was generally highest) had negative growth rates after the introduction of tiers, and in all these areas the growth rate had decreased as a result of the intervention. SAGE noted that tier 3 restrictions in England were heterogeneous, with most having additional restrictions above the minimum set for this tier.
22. Data show that after interventions have been in place for some weeks, growth rates continue to change. The data available to date are mixed, though there is some evidence of decreasing effectiveness over time in some areas, and sustainability of measures remains an important consideration.
23. If measures are relaxed there is a risk growth rates will return to previous levels. It will be important to monitor growth rates and implement interventions to prevent areas of low prevalence from becoming areas of high prevalence, as well as reducing prevalence where it is high. As soon as rising prevalence is detected, measures should be strengthened in order to manage the overall epidemic, irrespective of the absolute prevalence.
24. SAGE agreed on the value of sharing learning on the impact of interventions across the UK and will consider further analysis at a subsequent meeting as more data emerges.

ACTION: Cabinet Office to hold briefing for relevant policy officials (including from DAs) on 20th November.

Transmission in settings consensus

25. SAGE has previously noted the challenges with using case control studies to ascertain where transmission is happening, and particularly the difficulties in matching cases and

controls. Using these to identify occupational groups at higher risk is considered a more reliable indication than looking at individual self-reported activities, which are subject to biases.

26. Initial findings from the draft PHE & NHSTT case control study indicates that certain occupational groups are associated with increased odds of being a COVID-19 case. These include working in warehouse settings, construction, and hospitality, as well as health and social care. There is also an indication that working in transport or emergency services are associated with increased odds of being a COVID-19 case. The findings for education are less clear as attending educational settings as a student is grouped together with working in education, and different levels of education are grouped together.
27. Activity data are less clear, and there may be significant reporting biases. It might be expected that settings where there is an indication of higher occupational risk also present a higher risk to those doing activities in those settings but not working there.
28. These findings are consistent with previous iterations of this case-controlled study and evidence from other studies. SAGE will consider this issue in more detail at its next meeting.

ACTION: ONS to provide input to PHE transmission group**; PHE transmission group** to provide an update for the next SAGE meeting.

Household mixing over the festive season

29. Relaxation of interventions over the festive period presents a significant risk of increased transmission and increased prevalence, potentially by a large amount (high confidence). Parallels can be drawn (though the scale is different) between the return of students in autumn and people from different households mixing intensively over the festive season.
30. There is also a risk of increased contacts outside the household over this period (e.g. in retail, worship, or hospitality). The order in which activities happen matters. For example, socialising outside the household before seeing older relatives presents a risk to them, and it may be preferable to delay socialising until afterwards.
31. Keeping prevalence low before the festive season would reduce transmission during any relaxation period (high confidence). The duration of any such period is also critical. The period of new networks should be shorter than one generation time (which is around one week), so that transmission occurs in events, rather than outbreaks. This may limit the increase to one doubling in prevalence.
32. Allowing households to ‘bubble’ during such a relaxation period (i.e. effectively form a single, larger household which does not mix with others) is likely to reduce the risks relative to allowing an individual a particular number of contacts. The larger the number of households in the bubbles, the greater the risk of ‘extra-bubble’ contacts (and transmission risk). Sequential bubbling would present a very large risk.
33. The impact of household mixing over the festive season could be mitigated to an extent by limiting transmission elsewhere afterwards (e.g. schools and workplaces) so that the increased transmission does not propagate through those environments (medium confidence).
34. The setting in which gatherings take place is important (medium confidence), including where possible limiting the number of people sharing facilities or bedrooms. Regulated environments, where COVID-secure measures are in place, may present a lower risk than environments such as private homes (for the same activities). SAGE will provide further advice on reducing transmission within households at its next meeting.
35. Targeting lateral flow testing where prevalence is likely to be higher, and where there are greater risks is likely to be disproportionately beneficial. This could, for example, include

offering testing to younger people (who are more likely to be asymptomatic and therefore not tested otherwise), before they visit older people who are at higher risk.

ACTION: SAGE secretariat to review papers for consistency of language around celebrations and observances.

Direct and indirect impacts of COVID-19 on excess deaths and morbidity

36. SAGE considered further analysis on the possible direct and indirect impacts of COVID-19 on mortality and morbidity, in the event of a significant winter peak. This follows analysis shared at SAGE 48. The updated analysis is based on a scenario which is not a projection, prediction or forecast, and which is not SAGE-endorsed. It represents one example of the potential impact and the epidemic could look very different to this.
37. Understanding of morbidity associated with COVID-19 has improved as further evidence has started to emerge on the longer-term impacts of the virus, both for those who initially self-isolate at home and those who are hospitalised. However, several important challenges remain when estimating the impact of long-COVID.
38. In the scenario analysed, the most significant mortality impacts in terms of excess deaths come from direct COVID-19 deaths. The most significant morbidity impacts may occur for the wider population living through a pandemic or under restrictions, changing behaviours, or as a result of the economic impacts of a recession. Much of this impact is in the medium to long-term (up to 50 years), and there is significant uncertainty around the estimates. There may be scope for these effects to be mitigated over time e.g. through policy decisions.
39. Counterfactual scenarios (including the impact of doing nothing and letting the epidemic spread) have not been analysed but are required to enable better understanding of how short-term versus long-term and direct versus indirect impacts might vary. The economic assumptions in these scenarios will have a significant effect. Under any response to the pandemic, there would have been significant mortality and morbidity impacts. Such analysis is subject to significant uncertainty, but may be useful in assessing impacts of individual elements of government's interventions to help inform future decisions, including the impact on mortality and morbidity where interventions are not put in place. Future policy choices will inevitably influence long-term effects of COVID-19.

ACTION: SPI-M to provide input on counterfactual scenarios for further analysis**; ONS** to follow up with Kamlesh Khunti on the potential impacts of long-Covid.

Immunity and reinfection

40. Within one month of natural infection, a high proportion (over 90%) of people will develop immunity which is likely to be protective against disease caused by reinfection (high confidence). Antibodies can be measured within approximately a week after onset of symptoms, peaking at about one month; they then decline to a quite stable level which shows little evidence of further decline over 5 or 6 months (high confidence).
41. The type of antibodies most closely associated with protection are neutralising antibodies (these are not currently measured by commercial tests). Other immune parameters may also confer protection from disease, though may not prevent initial infection. Effects on transmission are not yet known. Measurement of cell mediated immunity is not currently possible in routine laboratories.
42. Reinfection upon re-exposure to SARS-CoV-2 does occur but seems rare. Most reported reinfections are mild, but some are severe.
43. With an effective vaccine, a high proportion of people develop immunity which is protective against disease 28 days after the first dose (high confidence). The duration of

protection is yet unknown. The level of protection against subclinical reinfection is uncertain. This will require infection data from the vaccine trials.

44. Some individuals will not develop immunity following either natural infection or vaccination (high confidence). The proportion is unknown, but likely to be small (moderate confidence).
45. In Non-Human Primate (NHP) challenge studies, vaccinations can avert disease, but viral load in the nose was not affected. This leads to uncertainty that individuals with some immunity could become asymptomatic and still contribute to onward transmission of the virus. How relevant the NHP challenges is to virus acquisition through normal transmission events is not clear, given the very high dose of virus used in challenge (moderate confidence). Challenge studies in humans could provide one way of finding out to what extent vaccinated individuals could contribute to transmission.
46. Immunity certification is theoretically possible, however further data and considerations are needed before any recommendation can be made. New data are expected shortly. Behavioural and operational considerations would need to be taken into account, as well as the immunology.

ACTION: NERVTAG to review emerging evidence over the next 3 weeks from SIREN, Oxford Health Care Worker Study and vaccine trials, and provide an update to SAGE in 3-4 weeks; **SPI-B** to provide behavioural input on considerations for certification.

ACTION: ONS to consider whether household survey can measure infectiousness.

Update on wastewater testing

47. Wastewater surveillance is a cost-effective method to detect the presence of SARS-CoV-2 viral RNA in wastewater and to identify diversity of SARS-CoV-2 strains between and within cities. Work is underway with COG-UK to compare the wastewater sequences across the country.
48. SAGE noted plans to use wastewater sampling to support mass testing across various cities in England. Wastewater testing will be deployed 1-2 weeks ahead of diagnostic tests to understand trends in incidence and to help inform where to deploy diagnostic testing.
49. Work is underway to better understand how wastewater surveillance can be used in areas with a high proportion of asymptomatic individuals, e.g., universities, as well as in settings such as schools, hospitals and high-density accommodation. Wastewater testing could also be used to monitor the effects of Tiers.
50. Current measurements and comparison with test and trace suggest that detection is typically at least as good as 1 infected person in 1000, though this is dependent on local plumbing, and on the significant variability in faecal shedding rates of SARS-CoV-2 from individuals.

List of actions

Small group to meet on 20th November to consider testing, including representation from SPI-M and DAs, and to consider available international evidence, including from Slovakia.

Cabinet Office to hold briefing for relevant policy officials (including from DAs) on 20th November.

ONS to provide input to PHE transmission group**; PHE transmission group** to provide an update for the next SAGE meeting.

SAGE secretariat to review papers for consistency of language around celebrations and observances.

SPI-M to provide input on counterfactual scenarios for further analysis**; ONS** to follow up with Kamlesh Khunti on the potential impacts of long-Covid.

NERVTAG to review emerging evidence over the next 3 weeks from SIREN, Oxford Health Care Worker Study and vaccine trials, and provide an update to SAGE in 3-4 weeks; **SPI-B** to provide behavioural input on considerations for certification.

ONS to consider whether household survey can measure infectiousness.

Attendees:

Scientific Experts (40): *Patrick Vallance (GCSA), Chris Whitty (CMO), Andrew Morris (HDR UK), Angela McLean (MoD CSA), Brooke Rogers (KCL), Calum Semple (Liverpool)**,** Cath Noakes (Leeds)**,** Charlotte Watts (DfID CSA), Gideon Henderson (Defra CSA)**,** Graham Medley (LSHTM)**,** [redacted] Harry Rutter (LSHTM), Ian Boyd (St Andrews), Ian Diamond (ONS), Isabel Oliver (PHE), [redacted] James Rubin (KCL), Jenny Harries (dCMO), Jeremy Farrar (Wellcome), Jim McMenamin (Health Protection Scotland), John Edmunds (LSHTM), Jonathan Van Tam (dCMO), Kamlesh Khunti (Leicester), Lucy Yardley (Bristol/Southampton), Maria Zambon (PHE), Mark Walport (UKRI), Mark Wilcox (NHS), Matt Keeling (Warwick), [redacted] Michael Parker (Oxford), Nicola Steedman (dCMO Scotland), Peter Horby (Oxford), Rob Orford (Health CSA, Wales), Sheila Rowan (CSA Scotland), Stephen Powis (NHS England), Susan Hopkins (PHE/NHST&T), Wendy Barclay (Imperial), Wei Shen Lim (Nottingham), Yvonne Doyle (PHE)*

Observers and government officials (21): *Alan Penn (MHCLG CSA), Andrew Curran (HSE CSA),* [redacted] *Ben Warner (No.10), David Lamberti (DHSC),* [redacted] *Imran Shafi (No.10), James Benford (HMT), John Aston (HO CSA), Julian Fletcher (CO), Laura Gilbert (No.10), Liz Sadler (Scotland),* [redacted] *Paul Monks (BEIS CSA), Phil Blythe (DfT CSA), Robin Grimes (MoD CSA), Rupert Shute (HO CSA),* [redacted] *Thomas Waite (JBC),* [redacted]

Secretariat (all GO-Science) (19): [redacted] *Simon Whitfield,* [redacted] *Stuart Wainwright,* [redacted]

Total: 80