SPI-M-O: Statement on relaxation of NPIs and the re-opening of schools

Date: 27th January 2021

All probability statements are in line with the framework given in the Annex

Summary

1. Any proposals to relax non-pharmaceutical interventions (NPIs), including the re-opening of educational settings, must be considered in the wider context.
2. SPI-M-O's consensus view is 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%). Options with fewer children in attendance (such as selected year groups or cohorts) are likely to fall towards the lower end of this range.
3. The major determinant for the impact of opening schools, or any scope for relaxation of NPIs, is the community prevalence and proportion vaccinated. Consequently, provided R remains below 1 up to the point of easing and vaccination continues at current rates, the outcome in terms of transmission and hospitalisations is always better the later the opening.
4. It is possible that regional differences in R, prevalence, and incidence may mean that some areas could have "headroom" to relax measures or open some schools before others. A partial return to school for some pupils *may* be possible next month **if R is currently, and remains, below 1, the prevalence of infection and hospital occupancy have demonstrably fallen, *and* vaccines are effective against transmission**. SPI-M-O's medium-term projections, however, show that it is unlikely that hospital occupancy and prevalence will have fallen significantly over the next four to six weeks.
5. An initial, limited, and cautious reopening of schools (e.g. primary schools only) for a time-limited period, in the absence of easing other restrictions, would allow for an assessment of the impact on community transmission.

Impact of school openings

6. As set out in previous SAGE advice[1], the opening of schools is likely to increase transmission at the population level. The extent to which this is the case, and the role played by transmission *within* schools versus transmission *associated with schools being*

[1] https://www.gov.uk/government/publications/tfc-children-and-transmission-update-paper-17-december-2020

opened remains uncertain and difficult to quantify. Emergence of the B1.1.7 variant of SARS-CoV-2 has increased uncertainty, yet there is consensus it has almost certainly increased the rate of transmission when schools are open.

7. SPI-M-O's consensus view is 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 is broadly consistent with CoMix[2], which estimates that reopening all schools would increase R_0 by a factor of 1.3 to 1.9 including estimated reduced transmissibility in children (this reduces to 1.1 to 1.4 if **only** primary or **only** secondary schools were opened). Options for school opening with fewer children in attendance (such as selected year groups or cohorts) are likely to fall towards the lower end of these ranges.
8. Previous papers have discussed evidence that suggests primary-aged children are less susceptible to infection and disease than secondary-aged children, and that the *direct* impact on transmission from contacts *within* primary schools may be less than in secondary schools. It is not apparent to SPI-M-O, however, that opening of primary schools has less of an impact on *overall community transmission* than opening secondary schools. The indirect impact on parental behaviour and other contacts outside of school is likely to be greater for younger children, for example enabling parents and carers to return to their workplace.

Relaxing non-pharmaceutical interventions (NPIs)

9. Schools cannot be viewed in isolation. Any proposals to relax non-pharmaceutical interventions (NPIs), including the re-opening of educational settings, must be considered in context. The consequences of any easing of restrictions, including opening schools, will heavily depend on the trajectory of the epidemic, background prevalence and/or incidence, and pressure on the NHS. Increased transmission will have more concerning consequences for hospital pressures and deaths in a scenario of high prevalence nationally, with health services close to capacity, than it might in a scenario that starts with low prevalence. Interaction with and adherence to any other measures in place will also be important.

Medium-term trajectory and scope for easing of school restrictions

10. As discussed in previous SPI-M-O consensus statements, medium-term projections and six-week scenarios indicate that hospital occupancy will remain very high, and vaccinations will have limited impact over the coming month, even if R is below 1. These are not forecasts or predictions, and cannot reflect recent changes in transmission that

[2] This estimate is in relation to baseline R_0, rather than effective R. R_0 will depend on the relative proportions of different variants of SARS-CoV-2 and contact patterns.

have not yet filtered through into surveillance data. They do, however, illustrate that there is little room for optimism that hospitals will soon be in a position to absorb any fresh wave of infections that might be caused by a mis-timed or unrestrained re-opening of schools.

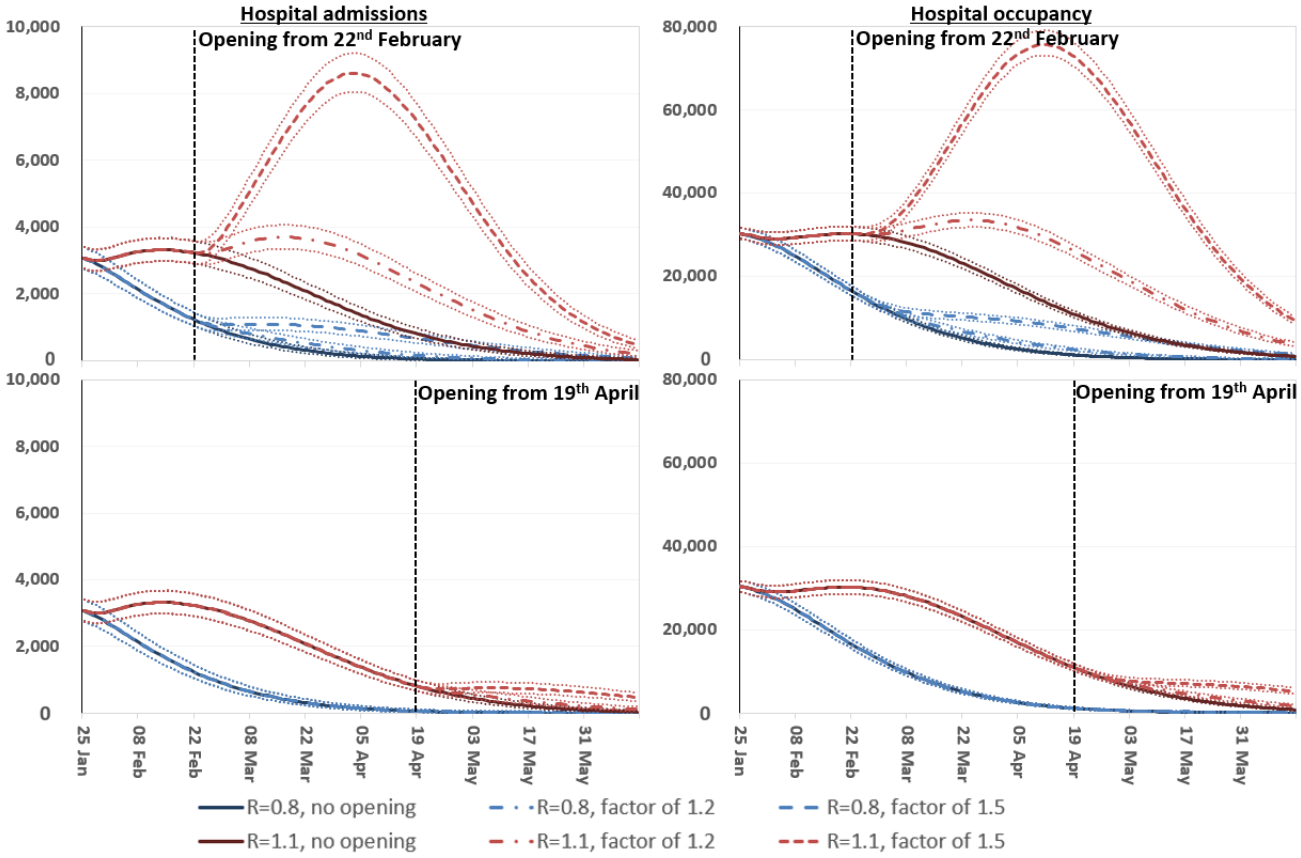
11. Two SPI-M-O models have explored the potential impact of a partial relaxation of NPIs in England from mid-February or mid-April. **These scenarios have been produced with the potential opening of primary and secondary schools in mind, however, general insights from this analysis will be applicable to a broader range of relaxations** and are not dependent on age-related mixing. Neither model includes age-dependent risks of infection. These are relatively simple models and offer qualitative insights, rather than precise estimates. These are not forecasts or predictions, but rather exploratory scenarios.
12. Similar work presented at previous SPI-M-O meetings, using different, reasonable assumptions in a more complicated age-structured framework, shows the same major principles.
13. These scenarios consider the medium-term trajectory of the epidemic under different starting conditions (R = 0.8 or 1.1), and a plausible range of increases in R that could arise from a range of school opening options (R increases by between 20% and 50%, as well as a counterfactual for if there were no increase). These "openings" happen from either 22nd February (after February half-term) or 19th April (at the start of summer term).[3] Between 25th January and these dates, it is assumed there are no other policy or behavioural changes. With the exception of vaccination rollout, the scenarios represent a continuation of trend given the initial starting conditions. These scenarios then run for a further eight weeks following the relaxation in measures. Details on vaccine assumptions can be found in Annex A.

[3] These dates correspond to the most common term dates at UTLA level in England.

Discussion and insights

Figure 1: Scenarios considering R = 0.8 (blue) and R = 1.1 (red) with incremental increases to R of a factor of 1 (full line), 1.2 (dot dash line), and 1.5 (dashed line) for hospital admissions (left column) and occupancy (right column) in England. Rows consider relaxation by factors of R from 22nd February (top) and from 19th April (bottom). Medians with 90% confidence intervals shown.

Please note: y-axes are different between columns but the same between rows; x-axes are the same for all plots.



14. Figure 1 demonstrates that the level of R and prevalence at the point of relaxation is critical. If measures are relaxed when R is at, just under, or above 1 and prevalence is high, it is almost certain that there will be a rapid further increase in hospital admissions and occupancy. Although the extent of relaxation and subsequent increase in R affects the size of impact, this has less of an effect compared to delaying easing.

15. If restrictions are maintained and R is sustained below 1 for a longer period and vaccine rollout continues around its current pace, allowing prevalence and NHS demand to fall, the magnitude of this impact is reduced. These scenarios suggest that easing restrictions six weeks later (19th April rather than 22nd February) could lead to over a ten-fold reduction in peak hospital admissions after opening, if R increases by 50% (almost five-fold for an increase in R of 20%).

16. SPI-M-O estimate, as of 27th January, is that R in the UK is between 0.7 to 1.1, with some regional variation. It is possible that regional differences in R, prevalence, and incidence

may mean that *some areas could* have "headroom" to relax measures or open some schools before others.

17. These scenarios suggest that a *partial* return to school for *some* pupils **may be possible** next month if R is currently, and remains, below 1 **and** the prevalence of infection and hospital occupancy have demonstrably fallen **and** vaccines are effective against transmission **and** people's behaviours do not become riskier as more of the population is vaccinated.
18. These scenarios are also dependent on underlying assumptions around vaccine rollout and effectiveness, particularly against transmission (see Annex A for details). As cautioned in previous SPI-M-O papers[4], a further epidemic wave will take place if NPIs start being lifted before vaccine rollout is well advanced.
19. Any easing of restrictions in the coming weeks will be less likely to result in exponential growth in infections and hospital occupancy levels that endanger the usual standard of care if:
    - Prevalence is low when such a relaxation takes place
    - Hospital occupancy is low when such a relaxation takes place
    - The number of vulnerable people who are unprotected is low – this will be a combination of the proportion of vulnerable people who have been vaccinated and the real-world effectiveness of the vaccine against hospitalisations and deaths in these cohorts
    - Restrictions are lifted individually and gradually over time, allowing the impact of individual measures to be monitored in order to inform later relaxations
    - Basic social distancing measures, such as COVID security and effective Test and Trace (with high adherence to isolation) are ensured
20. If measures are lifted earlier, before prevalence and hospital occupancy are reduced to low and sustainable levels, this may risk the need for immediate re-implementation of restrictions. An initial reopening of schools, for example starting with certain year groups or only primary schools, for a time limited period and without easing other restrictions, would allow for an assessment of the impact on community transmission.
21. Although these scenarios have been developed with schools in mind, the insights in this paper will be applicable to modest relaxation of other NPIs during this time period. More extensive easing of restrictions, such as the opening of the Further and Higher Education sectors *in addition* to schools, are likely have a much larger impact than those covered by

[4] SAGE 76 SPI-M-O Consensus Statement and accompanying papers

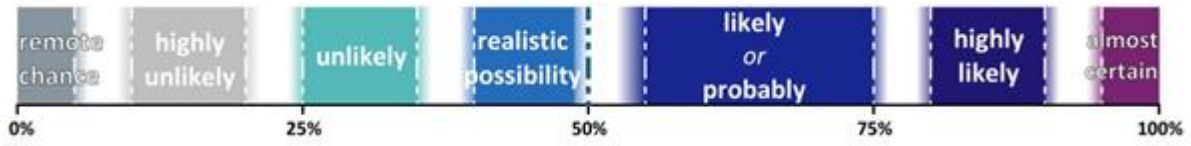
this range of scenarios. In such cases, the growth in hospital admissions, occupancy and deaths following the relaxation will be substantially faster, and the peaks higher, than illustrated.

Annex A: Vaccine assumptions

22. The modelling presented here include the impact of proposed vaccination rollout in England over the next few months, which is based on information provided by Cabinet Office for modelling purposes. This follows the trajectory of approximately 2.5 million people per week vaccinated in England and assumes around seven million people have been vaccinated to date. In total, this would account for a total of approximately 30 million people vaccinated by the end of March 2021. Vaccines are assumed to be administered according to JCVI's priority order.[5]

23. The real-world effectiveness[6] of vaccines against infection, hospital admission, and death are not yet known[7]. It is likely that these three quantities will not be the same. For these scenarios, the models have assumed that the first dose effectiveness of the Pfizer-BioNTech against both hospital admission and death is 88%, and that the first dose effectiveness of the Oxford-AstraZeneca vaccine is 70% (in line with JCVI's estimates[8]). Second dose effectiveness is assumed to rise to 94% and 88% respectively. In the absence of evidence on effectiveness against infection, both vaccines are modelled as reducing the risk of infection by 48% after the first dose and 60% after the second. Trajectories would be different had other effectiveness assumptions been modelled.[9]

Annex B: PHIA framework of language for discussing probabilities



[5] https://www.gov.uk/government/publications/priority-groups-for-coronavirus-covid-19-vaccination-advice-from-the-jcvi-30-december-2020/joint-committee-on-vaccination-and-immunisation-advice-on-priority-groups-for-covid-19-vaccination-30-december-2020

[6] Efficacy is performance of an intervention under ideal controlled circumstances whereas effectiveness refers to its performance under 'real-world' conditions

[7] And the effectiveness of a vaccine is against infection is unlikely to be the same as against serious disease.

[8] https://www.gov.uk/government/publications/prioritising-the-first-covid-19-vaccine-dose-jcvi-statement/optimising-the-covid-19-vaccination-programme-for-maximum-short-term-impact

[9] Footnote added for release: These assumptions apply to the more complex models referenced. The simple model shown in figure 1 to illustrate key qualitative insights considered effectiveness assumptions of 70% and 85% (latter shown).