TFC subgroup of SPI-M-O: Comments on schools and universities
Response to DfE commission
8 July 2020

Summary

1. This note is provided to SAGE to form part of the response to a commission from the Department for Education. It should be read in conjunction with the main paper from the Children's Task and Finish Group (TFC).

2. We advise reviewing the general principles provided on school relaxations and segmenting of the population in past TFC and SPI-M-O papers, as these are relevant to a number of the schools-based questions.

3. We recommend that the term "bubble" is dropped in the context of education as this conflates the issue with that of the household bubble. As this is conceptually different and relates to segmenting of the population (potentially with social distancing and other protective measures in place), rather than an extension of the household, this risks confusion.

4. Segmentation of school or university groups not only limits potential outbreak size, but support detection of cases and outbreak response.

5. Infection dynamics within a university are likely to be highly dependent on the interplay of different layers of networks across years of study, courses, accommodation and wider social networks. As this will differ across institutions, there is unlikely to be an optimum segmentation that applies to all institutions. However, nesting of living networks within teaching or study networks is likely to reduce the size of outbreaks which occur.

6. Any analysis of universities and the student population will be sensitive to assumptions on the asymptomatic fraction and relative infectivity of asymptomatic cases in young adults.

7. We are concerned that this commission does not consider the most effective testing and monitoring strategies within universities, nor outbreak response planning. We have previously highlighted these as priorities for the education sector, and modelling could add value here.

Comments on schools

8. General principles on the use of rotas and segments are discussed in the SAGE 31 and SAGE 38 TFC papers, and are also referenced in the following universities discussion.[1] We do not repeat them here, but please note that staff should also be included in segments where possible rather than bridging groups.

Question 5: Are rotas relatively more or less effective with respect to older children given they have more contacts including out-of-school contacts than younger kids?

Use of rotas

9. School opening cannot be viewed in isolation, and their interaction with other measures must be considered. Previous modelling on rotas (cohorts split into groups attending school on alternating cycles – for example: week on, week off), as discussed at SAGE 31[2], has been in the context of previous stricter interventions.

10. The benefit of rotas is in breaking transmission chains within schools and workplaces. The "on" window in school should be short enough to prevent multiple infection generations, with the "off" window long enough for any onset of symptoms to be detected before returning to school in the next cycle.

11. However, as previously emphasised, this is reliant on children in the different groups not mixing (e.g. those attending in week 1 not mixing with those attending in week 2), and on classmates not mixing outside of school and in the time off from school. Its effectiveness is also reduced by multiple children from the same household attending different groups or schools.

12. Consequently, there may be minimal benefit of rotas (beyond segmentation of the population, as discussed below) in the context of current relaxations or measures short of a lockdown or wider community restrictions. During the "off" period, children may go on to infect others within and beyond their household and be infected by others, if they are mixing more broadly in the community.

Age of children

13. Transmission risk is not solely determined by the number of contacts made, but is also affected by the duration and type of contact. The risk of a wider outbreak will

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/886994/s0257-sage-sub-group-modelling-behavioural-science-relaxing-school-closures-sage30.pdf
https://www.gov.uk/government/publications/tfc-comments-on-sequencing-of-social-distancing-measures-schools-20-may-2020

[2] Ibid

also be impacted by the degree of clustering in contacts. Younger children tend to have a greater number of contacts and higher contact time, but also have more clustered contacts limiting the potential for extensive transmission chains. Older children have a higher degree of social mixing and variation in who they contact.

14. As discussed in the main paper, it is possible that susceptibility and infectivity is higher in adolescents than younger children – although evidence for this is still uncertain. However, older children have greater capacity for self-regulation though this may not always translate into greater adherence to social distancing and handwashing.

15. In the context of greatly reduced population mixing, the indirect impact of returning younger children to schools on contacts outside of school may be greater. Resuming of early-years or primary provision is likely to have more of an impact on adults returning to work and parental contacts at the school gates etc.

Question 7: Does the concept of educational 'bubble' (classes or year groups) have specific impacts other than serving to generally constrain the increase in contacts?

Question 8: Current guidance for Early Year settings is that children should attend only one setting if possible. What would be the impact of removing the restriction?

Segmenting school children

16. We recommend that the term “bubble” is dropped in the context of education as this conflates the issue with that of the household bubble. As this is conceptually different and relates to segmenting of the population (potentially with social distancing and other protective measures in place), rather than an extension of the household, this risks confusion.

17. The value of segmenting school groups is not simply reducing transmission risk to the children and staff involved. Segmentation limits the extent of local transmission and potential outbreak size. If children were moved between segments daily, then the number of school contacts would remain the same – but this would be worse in terms of epidemic potential.

18. Segmentation of groups may also support easier detection of linked cases - two or more cases in the same segment would provide a signal of where transmission is likely to be occurring.

19. The use of segments is invaluable in outbreak response. Rather than closing an entire school, grouping of children in this way may mean that only certain classes and staff need to be isolated.

20. Attendance of multiple early years settings would risk creating extensive transmission networks. The close contact/intimate care provided in early years setting may increase this risk. This would also make outbreak response and control more difficult, as children, parents and staff at multiple providers would potentially need to be traced and isolated.

Insights on universities

21. The following comments are informed by existing analysis of universities that two groups are independently developing for their home institutions, and a discussion of this work and the commission with a subgroup of SPI-M-O members. It draws on existing work, and does not specifically consider the breadth of UK institutions and the wider sector. Further information is needed to provide additional insights that would be generalisable to all universities.

22. We are concerned that this commission does not consider the most effective testing and monitoring strategies within universities, nor outbreak response planning. We have previously highlighted these as priorities for the education sector, and modelling could add value here.

23. As for schools, we recommend that the term “bubble” is dropped in this context as this conflates the issue with that of the household bubble.

24. It is essential to note that universities do not only affect students: university (including ancillary and support) staff will comprise a significant minority of the population. Staff are more likely to be from older and vulnerable groups relative to students.

25. Any analysis of universities and the student population will be sensitive to assumptions on the asymptomatic fraction and relative infectivity of asymptomatic cases in young adults.

Question 9: If an individual is exposed the multiple ‘education’ bubbles (for example university halls of residence and course lectures) does this remove any potential gains in limiting contacts elsewhere -or even increase risks of clusters? is there a hierarchy, or principle, to how different education bubbles might affect transmission?

Question 10: Given emerging understanding of clusters – what are the associated risks for ‘class’, ‘course’, and ‘accommodation’ “bubbles” mixing across education settings or likewise for ‘course’ and ‘employment’ bubbles to mix in FE (due to apprenticeships etc)? i.e. do

overlapping ‘bubbles’ increase risk more significantly than the increase in contact numbers alone?

Infection dynamics and networks

26. Infection dynamics within a university are likely to be highly dependent on the interplay of different layers of networks across years of study, courses, accommodation and wider social networks (e.g. societies, sports etc).

27. For example: simulation of transmission within the Bristol student population suggests that infection would be concentrated in first-year undergraduates. This is due to the number of students in the same university halls and that this student accommodation is mixed across different courses. Second and third year undergraduates are less affected given their smaller households and as their term-time residence contacts are highly assortative (i.e. they tend to live with others in the same year and department).

28. However, this interaction of links across courses, accommodation and wider networks will differ across universities – and findings from Bristol cannot necessarily be extrapolated to other institutions. For instance, networks and student behaviour will likely differ for campus vs. city universities, by size and type of accommodation (e.g. self-contained flats vs. dorms; whether catered), structure of course and study (e.g. if multiple courses share modules vs. smaller class-based groups) etc.

29. Some institutions will have different scales of networks, such as collegiate institutions (e.g. York, Durham etc) or those sharing facilities with other universities. One example would be the intercollegiate halls shared by University of London colleges (15+ institutions).

30. Modellers from Warwick are also independently analysing transmission and network dynamics within the University of Warwick. Additional analyses beyond Bristol and Warwick (and groups represented through SPI-M-O) would help to identify commonalities and generalisable insights.

Segmentation of the university population

31. As for schools, transmission risk is affected by the duration and type of contact, not simply the number of contacts. The risk of a wider outbreak is also influenced by the degree of clustering. If contacts are highly clustered then this will limit for potential for extensive transmission chains (e.g. students from the same course living and

socialising together vs. students living and socialising with those with completely different networks, such as via a society).

32. The effectiveness of segmenting groups on transmission will also be affected by the wider context and population measures in place – segments will have greater impact if there are fewer contacts outside the group (i.e. fewer relaxation of measures). If wider community transmission is high, then the subtleties of dynamics within universities and their role in spread across the country also becomes less relevant.

33. Given differences in structure and networks across universities (as discussed in paragraphs 28- 29), there is unlikely to be an optimum segmentation that applies to all institutions.

34. However, alignment of these different networks or segments of the student population may help to reduce transmission risk. This could be achieved by nesting living networks within teaching or study networks – that is, ensuring that students on same course/modules also live together. This will be more difficult to achieve in universities where students do not already self-select in this way, and for students in private accommodation. It would also need to be balanced against wider considerations such as student diversity and mental health.

35. Reduction of any overlapping networks with other universities, particularly any shared halls of residence would also further reduce outbreak risk and size of outbreaks if they occur.

36. As for schools, the value of segmenting groups is not only in limiting outbreak sizes, but also in detection and outbreak response. Rather than isolating an entire course or halls of residence, use of segments may also mean that certain classes or flats can be isolated instead, minimising wider disruption. This is particularly important when considering numbers in quarantine – if there were no controls or segmentation in place, relatively few infections could result in the majority of a university needing to be isolated.

Further analysis

37. Given the diversity of academic, residential and social structures across universities in the UK, it is difficult to extrapolate insights from existing analysis of two institutions to the wider sector. Detailed analysis of these networks at other universities (beyond SPI-M-O members) would be welcome, and help to identify further generalisable principles.

38. Although institution-specific data and analysis is of most interest, further centralised information on the sector would be helpful, including but not limited to:

    - Characterisation of universities: campus size; distribution of campus; integration with wider community (campus vs. city); size and types of accommodation (e.g. flats vs. dorms; whether catered; private vs university-organised etc); types of courses (e.g. those with greater contact within groups of students, lab-based, small group teaching, etc)
    - At a minimum for 2018/19 or 2019/20, but ideally also expected numbers for 2020/21:
        i. Data on the number of students by year of study (including whether undergraduate, taught masters or postgraduate research) and course by institution.
        ii. Data on the number and proportion of international students by year of study and domicile country for each institution
    - Origin-destination data on students (home postcode (or country for overseas), term-time postcode) by institution

    Where possible, this should be limited to students normally expected on-site in the UK (for example - excluding those at overseas campuses, distance learning, study-abroad years, transnational students, but including any exchange students etc)

39. We note that the commission does not cover testing and monitoring, or response planning in universities. It is essential that universities have clear protocols in place for reactive closures and/or quarantines, and how this interacts with segmentation of the student and staff populations (e.g. whether the household is quarantined, and contacts isolated; or if swab-positive students are sent to separate residences for self-isolation etc). This should explicitly consider vulnerable groups, as well as wider implications for student welfare.

40. We have previously highlighted these as priorities for the education sector. Further work should be done on proposed testing strategies and response planning for universities, and modelling could add value here. This is of interest if focusing on student movements and seeding conditions at the start and end of term.

41. In particular, there is a risk that students falling ill and/or testing positive return to their parental homes, rather than isolating at university. This would be highly problematic given the potential transmission to household members and the wider

community; it risks importation of cases into a new area and/or part of the community. Although isolation at university could not be enforced, this risk needs to be communicated, and guidance given.

Question 12: What are the potential impacts on infection incidence of:

- mass travel patterns and contacts at the beginning and end of University terms?

- students leaving one household (home) to join another one temporarily (for a term) and returning home at the end of term?

Question 13: Can we model the impact of migrations at beginning and end of term, from homes to universities and then back home at end of term does to infection incidence? Are there also half-term migrations? What information would DfE need to provide?

Potential for seeding

42. The relative importance of universities in changing the geographical distribution of infection will depend on the background incidence and extent of regional variation across the UK and overseas (international students arriving from countries with no mandatory quarantine period). This may also partially be mitigated by local lockdown measures, if restrictions apply to students leaving/entering the area.

43. The group thought that migration at the end of term warranted more attention than that at the start of term, as universities may act as amplifiers. If there is an outbreak at a university (even if not widespread transmission), then students returning home could pose a risk for spread across the UK. Students are also more likely to be integrated with the wider community at their home address than at their term-time address.

44. The potential for “spillover” into the local community during term-term will depend on the characteristics of the university (or universities) and level of integration with the wider population. All measures to reduce the risk and size of outbreaks within universities and rapid detection and containment of outbreaks within universities would all help limit transmission to the wider community.

Modelling

45. The potential seeding of cases from student migrations could be modelled, but any findings will be highly dependent on background incidence, regional variation and whether university outbreaks are in place. The response to sick students, and whether they return home during quarantine is likely to be more of an impact. Further work on testing and monitoring, and outbreak response should be a higher priority.