Non-Pharmaceutical Interventions (NPIs) in the Context of Omicron

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Introduction

1. The aim of this paper is to examine where the properties of Omicron may differ with respect to Delta and update scientific advice regarding the effectiveness of current or prospective interventions. This is a preliminary assessment, as there remains considerable uncertainty around many of the characteristics and impacts of Omicron.
2. The UK is facing a very significant wave of infections. The winter festive season presents a further transmission risk due to indoor gatherings of people in large groups from multiple households for prolonged periods, often with poor ventilation. In addition, the NHS is under increased pressure over the winter period. It is likely that additional interventions will be required if the aim is to avoid unsustainable pressure on the NHS.
3. This paper considers a range of measures but does not specify what an overall package needs to be. Given the current situation, all measures discussed are with a view to immediate or rapid implementation rather than for the medium or long-term, unless otherwise stated. There are no silver bullets and measures need to be applied together to be effective.
4. This paper should be read in conjunction with previous SAGE advice on individual NPIs and the composition of packages [i,ii,iii]. The different context at the time when these papers were written should be noted as the measures required to bring down cases where there is an extremely high growth rate are different from those required to maintain the status quo or manage transmission during low prevalence.

What properties of Omicron affect NPIs?

5. Details of what is currently known about Omicron can be found in minutes and papers from SAGE 97 and SAGE 98, UKHSA technical briefings, and the latest UKHSA Risk Assessment. Briefly:
    - **Omicron has a significant growth advantage over Delta** in the UK [iv,v,vi] (high confidence) with infections/cases doubling rapidly with a short doubling time [vi,vii,viii]. This is likely to be a combination of greater transmissibility and immune escape but the relative contribution of each is as yet undetermined.
    - **Secondary attack rates among contacts and households may be significantly higher** than for Delta [iv](medium confidence).
    - **Omicron shows a higher degree of escape from vaccine- and infection-derived immunity than earlier variants,** (high confidence) **and there is reduced vaccine effectiveness** (VE) in relation to symptomatic disease. A booster dose can restore VE for symptomatic disease with Omicron infection to approximately 80% but this must be compared to approximately 95% for the equivalent protection with Delta infection. This amounts to a four-fold increase in the number of boosted individuals who would experience symptomatic disease if infected with Omicron rather than Delta [iv,vi,ix]. Overall, VE is likely to be even more affected in the case of infection, and VE is likely to be less affected in relation to severe disease, but all are likely to be lower than for Delta (medium confidence).
    - Any increased transmissibility of Omicron may relate to a **lower infectious dose and /or a higher viral load** (low confidence). This might increase the relative risk of long-range aerosol transmission (low confidence), which could lead to superspreader events and rapid

transmission in settings including households, workplaces, health care, social care and hospitality.

- There is currently no evidence that Omicron may have a **shorter incubation period or a shorter serial interval**.
- There is currently no evidence that the **length of the infectious period** with Omicron differs from previous variants.
- There is currently no evidence that the **survival of the virus in the environment** with Omicron differs from previous variants.
- It is unclear whether the **severity of disease** is lower (or higher) for Omicron than for Delta.
- There are thus far insufficient data to detect any shifts in **age profile (or other predisposing factors) of susceptibility to infection, symptomatic disease or severe disease.**

General implications of rapid growth

6. **The short doubling times seen with Omicron reinforce the value of going even harder, earlier and wider with any interventions than for Delta.** When three or more doublings occur within a week, and hospitalisations lag infections by two weeks or so, action is needed long before critical hospital capacity thresholds are reached. Rapid doubling will also mean lag times in data are likely to be more significant in terms of underestimation of the true number of infections and geographical spread than for Delta.
7. **The list of core measures to reduce transmission, infection, and severe outcomes remains largely unchanged**:
    - **Vaccination** remains an important countermeasure. The aim should be breadth as well as depth. This means **reducing the size of the unvaccinated population as well as raising the proportion that have received boosters.**
    - **Reduction of contacts is essential and most likely to have the biggest impact on controlling transmission in the short term**: there is a direct link between number and duration of contacts and infection. Moreover, **there is a lag after vaccination for full protection to develop**. Relevant measures include working from home, limitations/closures of non-essential premises and reduction of social contacts and/or household mixing (particularly indoors).
    - **Testing (see below) is an important tool for identifying infections, whether symptomatic or not.**
    - **Isolation, particularly on the basis of symptoms or following a positive test, but also when identified as a contact, is an important way to reduce onwards transmission.** The benefits of financial and other support for isolation are magnified.
    - **Environmental mitigations** can make contacts safer – for example physical distancing, ventilation, high-quality face coverings, meeting outside and hand washing – although they may need to be applied with greater rigour and extent to maintain their effectiveness.
8. **Hospitals, care homes and other high-risk environments such as prisons and homeless shelters are extremely vulnerable to Omicron.** Enhanced prevention and control measures, along with more frequent testing, are urgent and essential, in addition to increasing levels of vaccination, to reduce potential for and severity of outbreaks, and to prevent outbreaks spilling back into the community. Risk assessments should also be reviewed, and control measures reinforced and monitored as new information regarding the properties of Omicron become clearer.

Changes to testing and isolation

9. The following measures relate to testing and action taken in response to a test result. It is important to note that no assumptions are made about limits to testing capacity. Rising prevalence and increasing reliance on testing could well outstrip available supply, particularly for PCR assays. **Ensuring sufficient testing capacity as well as maintaining speed of processing of results and data flows will be essential** if these measures are to be effective. If testing is not possible physical distancing and environmental interventions may need to increase further to compensate. The same is true if contact tracing capacity is exceeded.
10. While early indications are that vaccines, particularly after boosting, remain effective, the protection against infection and transmission is likely to be reduced. To minimise risk that a person is infectious, proof of **vaccination plus negative test offers better assurance than vaccine status alone** and two doses plus booster offers better assurance than two doses alone
11. Given the potential for high transmissibility, even if formal certification is not currently required, **testing before attending <u>any</u> gathering or event (including at workplaces and schools) is highly desirable,** with isolation to follow if the test is positive.
12. The negative predictive value (NPV) of a negative test declines in a matter of hours, **so a test should be conducted as close to a meeting or event as possible**. Similar considerations should apply to pre-departure testing for travel.
13. High household and secondary attack rates mean that if one person in a close-knit group (e.g. household, work team) tests positive, there is a significant chance that others are already infected. Therefore, **if one person from a group tests positive prior to an event or gathering then none should attend**. This is especially important in the festive season when family events may increase the risk of infecting the elderly or vulnerable.
14. **Testing *after* mixing with others would also be beneficial**. For example, testing on days 2, 3 and 4 after an event and isolation if positive would reduce the risk of onwards transmission.
15. **A shorter incubation period or serial interval would mean that case-based interventions (i.e. those that begin only when a positive test result is received) are relatively less effective for controlling Omicron compared to Delta**. This relates primarily to case confirmation by PCR (and especially by sequencing). These remain very important tools but potential responses include:
    - Increasing interventions that do not rely on case detection (also referred to as population-based interventions). This includes most NPIs based on distancing or environmental mitigations.
    - Strengthening isolation requirements on the basis of symptoms or a positive lateral flow test, for example mandatory isolation for people who are LFD positive.
    - Consider initiating contact tracing on the basis of a positive LFD test, prior to PCR confirmation.
    - Encouraging the use of informal networks to alert contacts (for example school parent networks) with subsequent testing and isolation. This will be particularly important as rising prevalence exceeds official TTI capacity.
16. The “pingdemic” of Summer 2021 coincided with a substantial impact on contacts, comparable in many respects to that of a lockdown. Effective contact tracing could be facilitated by **increasing the use of QR-code check-ins** to premises as well as additional measures to encourage/require use of the NHS TTI app. In addition, **requiring isolation of close contacts** is likely to be more effective at preventing onwards transmission than daily LFD testing, assuming an equal level of adherence, and would also reduce demand for lateral flow devices if supply is limited.

Changes to environmental and behavioural mitigations

17. The transmission routes for Omicron are unlikely to have changed but could all have increased. This is likely to have had a more noticeable effect for airborne than close range and fomite routes, so airborne transmission beyond 2m may happen more frequently. This points to the need for additional or reinforced measures, noting in particular the risk of long-distance aerosol transmission causing superspreader events and increased transmission in health, care, school, household and other settings.
    - **Distancing is still very beneficial**. Short range inhalation of aerosols containing virus is likely to be the highest risk for exposure in many settings. However, distancing on its own is not enough, especially if a space is poorly ventilated.
    - **Reduction in group size and/or occupancy levels** would reduce the potential size of outbreaks and may also **increase physical distancing** between individuals and groups of people. Close contact is the highest risk and reducing this is likely to be very important in the coming weeks. Closure of high-risk settings would reduce transmission.
    - **Attending multiple separate work or social events one after another poses additional risk** from the linking of otherwise separate networks. Again, this is an important consideration during the festive season when events involving peer networks and families come in rapid succession.
    - **Wearing face coverings in as many indoor environments as is practicable will help to reduce transmission**. There is clear evidence from studies with individuals that face coverings can substantially reduce emission of the virus and can provide some protection to others, and higher quality, better fitting face coverings are more likely to be effective. This is detailed in a paper discussed at SAGE 96 [i]; In the current circumstances it may be necessary to reconsider the wearing of face coverings in places where the balance of risks and benefits did not previously support it, for example primary school classrooms, and for vocal activities such as singing. There is evidence that mandating the use of face coverings is likely to increase adherence.
    - Many face coverings such as scarves, other single-layer fabrics and valved masks, though currently permitted, are likely to be ineffective at reducing transmission. There is **significant scope to improve effectiveness through use of higher quality, well-fitting face coverings**. Renewed public communications on selection and wearing of effective face coverings is likely to be beneficial. Offering free masks at entry points would likely improve adherence by mitigating cost and improving availability.
    - **The importance of effective ventilation is increased.** In the short term this means redoubling efforts to ensure that the owners, operators and staff of spaces/facilities understand the ventilation system in place for that setting, prioritise the improvement of ventilation in high risk or poorly ventilated spaces, using existing doors, vents or windows. In some settings, air cleaning using HEPA filters or UV-based technologies can improve poor ventilation and overcome challenges with cold weather, but widespread application of such technologies in a short period of time would be very challenging.
    - Preliminary estimates indicate a high household attack rate so communications should emphasise the **importance of reducing household transmission risk** from all routes of exposure in the home and practical steps that can be taken.
18. Prioritisation of measures should be consistent with an effective risk assessment which uses the hierarchy of control as part of a comprehensive risk management approach, addressing all routes of transmission. This was covered by previous advice from a paper discussed at SAGE 87 [ii], albeit in a

different context. Also, measures are far more likely to be effective when applied in combination; most measures would have a small to moderate impact on population transmission in isolation, but will be more effective when applied as a package.

Higher risk cohorts

19. Particular consideration should be given to settings which could either act as a hub for transmission of Omicron and affect community transmission, or where those affected may be particularly vulnerable to the consequences of infection (e.g. care homes, hospitals).
20. As noted above, there are thus far insufficient data to detect any shifts in age profile (or other predisposing factors) of susceptibility to infection, symptomatic disease and severe disease. **Significant changes to age profiles would potentially require alteration of any package of national measures** – for example even greater enhancement of measures in care homes if the elderly were even more disproportionately affected.

Other contextual factors

21. In considering what interventions may be required to control Omicron in the short term, current contextual factors should also be considered:
    - The effects of winter – not only the pressures on the NHS but also potentially more favourable weather for transmission (with lower indoor humidity); greater loss of thermal comfort from ventilation; and bad weather meaning more people meet indoors. Environmental and behavioural mitigations may therefore be generally less effective and magnify the difficulty of managing Omicron.
    - The imminent holiday season: schools will be closed and people off work, which will eliminate some contacts; but increased socialising and family events involving intergenerational mixing, and linking of other networks that are separate at other times in the year is likely, absent any measures to curtail them, and could potentially enable transmission to more vulnerable groups. This can have a significant impact on transmission – see previous advice from a paper discussed at SAGE 74 [x], although this was written in the context of more stringent measures.
22. The likely adherence to reimposed measures is covered in a previous SPI-B paper discussed at SAGE 96 [xi], but the context in terms of public attitudes, behaviours and levels of trust is different from previous periods of high prevalence. Widespread vaccination and the proximity of the festive season may also affect people's behavioural decisions. Communications requesting changes to behaviour must be consistent, co-designed, provide a clear rationale, and be delivered by trusted voices.

[i] SPI-B, SPI-M and EMG. *Considerations for potential impact of Plan B measures*, 13 October 2021.
[ii] EMG, SPI-M and SPI-B. *Considerations in implementing long-term 'baseline' NPIs*, 22 April 2021
[iii] EMG/SPI-B/SPI-M. *Reducing within- and between-household transmission in light of new variant SARS-CoV-2*, 14 January 2021
[iv] UKHSA. *SARS-CoV-2 variants of concern and variants under investigation in England: Technical briefing 31*, 10 December 2021.
[v] University of Warwick. *Early Omicron results, from SAGE 99*, 13 December 2021.
[vi]N. Ferguson, A. Ghani, A. Cori, A. Hogan, W. Hinsley and E. Volz. *Report 49: Growth, population distribution and immune escape of Omicron in England*, 15 December 2021.
[vii] SPI-M-O. *Consensus Statement on COVID-19*, 07 December 2021.
[viii] SPI-M-O. *Consensus Statement for SAGE, from SAGE 99,* 08 December 2021.
[ix] N. Andrews, J. Stowe, F. Kirsebom, S. Toffa, T. Rickeard, E. Gallagher, C. Gower, M. Kall, N. Groves, A.-m. O'Connell, D. Simons, P. Blomquist, G. Dabrera, R. Myers, S. Ladhani, G. Amirthalingam, S. Gharbia, J. Barrett, R. Elson, N. Ferguson, M. Zambon, C. Campbell, K. Brown, S. Hopkins, M. Chand, M. Ramsay and J. Lopez Bernal. *Effectiveness of COVID-19 vaccines against the Omicron (B.1.1.529) variant of concern*, 14 December 2021.
[x] EMG/SPI-B/TWEG. *Mitigations to reduce transmission of the new variant SARS-CoV-2 virus*, 22 December 2020.
[xi] SPI-B. *Behavioural considerations for maintaining or reintroducing behavioural interventions and introducing new measures in autumn 2021*, 14 October 2021