What have we learnt from mass testing for COVID-19 in universities?

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Word count (main text, excluding references in superscript): 798

It is clear that SARS-CoV-2 can be incubated and transmitted in the absence of symptoms[1]. Nonetheless, the utility of mass testing (large-scale asymptomatic screening, to prospectively identify cases) has been contested[2 3]. In *principle*, isolation of individuals with presymptomatic or asymptomatic SARS-CoV-2 infection will prevent further infections as a matter of course. In *practice*, it is less clear whether enough infectious individuals can be identified to have a quantitatively important impact on transmission, and whether the direct benefits of enhanced case ascertainment may be outweighed by direct or indirect costs. The debate is complicated by an absence of randomised controlled trial data, and controversy about the suitability of lateral flow tests (LFTs)[4 5].

Students in higher education are at increased risk of SARS-CoV-2 infection, because of their shared accommodation, abundant social contacts, low priority for vaccination, and potential for vaccine hesitancy[6 7]. At the same time, universities have been at the forefront of research on COVID-19. It is therefore instructive to examine how they have sought to control transmission amongst their own students. Strikingly, as well as promoting vaccination, symptomatic testing and contact tracing, many universities in the UK and North America have chosen to implement asymptomatic COVID-19 screening programmes, using weekly or twice-weekly laboratory-based PCR tests. Data from these programmes are now available from institutional websites, pre-prints and peer-reviewed manuscripts. We may therefore ask: what can they teach us about mass testing for SARS-CoV-2?

First, it is possible to sustain high levels of adherence to regular, voluntary asymptomatic screening using nose and throat swabs[8 9]. University-led testing programmes have been strongly supported by students[8 10 11], providing reassurance at a time when student mental health and wellbeing has been severely impacted by the pandemic[8 12].

Second, mass testing can markedly increase case ascertainment, including a substantial proportion of individuals with presymptomatic SARS-CoV-2 infection (before they develop symptoms)[9 13-15]. Remarkably, for some university communities and stages of the pandemic, more students with SARS-CoV-2 have been detected by asymptomatic screening than by symptomatic testing[14-16]. Provided they are supported to self-isolate, it is reasonable to infer a very substantial reduction in ongoing transmission.

Third, PCR testing is ideally suited to *regular screening of defined populations*, where high test sensitivity minimises the risk of “false negatives”, and samples are available for genomic sequencing[17]. In a university context, laboratory and logistical infrastructure can be planned in advance, turnaround time minimised, and swab or sample pooling used to reduce costs and demands on testing capacity (particularly when incidence is low)[9 15 18].

And fourth, the impact of “false positives” on many programmes can be mitigated by a two-step testing strategy, whereby a positive screening test is followed routinely by a second, confirmatory PCR test[9]. Regular, frequent screening is also essential to ensure that infected individuals are detected early, whilst they are still infectious – so that self-isolation is justified.

What, then, are the remaining unknowns – and how can success be measured? Evidence about secondary behavioural changes, which may partially offset the benefits of enhanced case detection, remains very limited. This is a particular concern for programmes based on LFTs, because “false negatives” are more common, and clearly documented examples of sustained, high levels of adherence to twice-weekly home testing are lacking[19]. In addition, the impact on participation of increasing levels of vaccination remains to be determined. As a minimum, it is therefore critical for screening programmes to monitor both participation rates (the number, proportion and frequency of individuals screened) and the fraction of all cases ascertained by mass testing.

Countries with high levels of vaccination are generally rolling back non-pharmaceutical interventions designed to limit case numbers, such as social distancing and face masks. At the same time, the relative benefit of identification and isolation of *contacts* has been reduced, because secondary attack rates are lower when index cases and/or contacts have been vaccinated[20 21]. Nonetheless, the development of novel SARS-CoV-2 variants means that large outbreaks may still occur in vaccinated populations[22]. Compared with other non-pharmaceutical interventions, asymptomatic screening offers a number of advantages. Critically, it is focused on the identification and isolation of *cases*, rather than contacts; provided testing is informed and voluntary, there need be no impact on the freedom of individuals; and finally, the costs are direct and quantifiable on a per programme basis, with few indirect economic consequences.

Presuming *any* measures to control SARS-CoV-2 transmission are required, there is therefore a strong argument for mass testing of populations at high risk of infection – such as students in higher education. Accordingly, faced with spread of the delta variant, many universities have committed to continue their programmes of regular PCR-based asymptomatic screening. When prevalence declines, surveillance testing (regular screening of a proportion of the population) and genomic sequencing (for new variants of concern) may be a proportionate response – and universities will again be ideal laboratories to test the coherence and effectiveness of these approaches.

Acknowledgements

NJM receives funding from the MRC (CSF MR/P008801/1) and NHS Blood and Transplant (WPA15-02). MPW receives funding from the Wellcome Trust (SCF 108070/Z/15/Z). BW receives funding from the NIHR Cambridge Biomedical Research Centre at the Cambridge University Hospitals NHS Foundation Trust. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.

Competing interests

We have read and understood the BMJ Group policy on declaration of interests and declare the following interests: none.

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