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BRIEFING

What do we know about lateral flow tests and mass testing in schools?

The UK government has made mass testing a key plank of its strategy to reopen schools in England. **Ingrid Torjesen** reviews the questions and concerns over this approach

Ingrid Torjesen *freelance journalist*

How is testing being implemented in secondary schools?

Schoolchildren across England returned to their classrooms from 8 March, but secondary school pupils must wear face coverings in the classroom and get to grips with self-testing for covid-19 using rapid lateral flow devices.

Lateral flow tests (LFTs) are not as sensitive as PCR tests at picking up positive cases, but they are relatively cheap, provide results in less than 30 minutes, and are capable of identifying those with the highest viral loads, who are considered to be the most infectious.¹ School testing uses the Innova test, although the Department of Health and Social Care says that other brands might be used in the future.

Execution of the programme, however, is mixed. Some schools asked pupils to attend school for testing the week before they reopened, so pupils could go straight into their classrooms. Others staggered the return of pupils over the next week.

Pupils took their first tests at schools to familiarise themselves with the swabbing process, and then, like school staff, are provided with two lateral flow device kits per week to self-test at home.² Pupils and staff self-testing at home must report their results to NHS Test and Trace as soon as the test is completed, either online or by telephone, and must share their result with the school to help with contact tracing.

Testing is voluntary but strongly encouraged. Pupils who consented to testing were able to return to face-to-face education after their first negative test result. Children not undergoing testing were supposed to return to school and face-to-face learning at the same time, but there have been some reports of schools banning such children from face-to-face lessons, effectively “blackmailing” parents to consent.³

How frequently are pupils tested?

Most pupils will take three tests at school before beginning home testing, but some schools might choose to do two or four, a spokesperson for the Department for Education told *The BMJ*. “It is about [schools] putting the time into making sure the students have confidence in how the testing works before they start to do it at home.”

After that they will be tested every three to five days. Twice weekly self-testing is probably the maximum frequency needed for “active management, says Tim Peto, professor of medicine at the University of

Oxford, who has led assessments of the tests for the government.

“Once a week is better than once a fortnight, and twice a week better than once a week,” he says, adding that there is little benefit to doing it any more frequently. “The more often you do it after twice a week you get really a very small pick-up rate and it’s probably not worth it.”

What happens if a result is positive?

Anyone who tests positive must follow the government coronavirus infection guidelines and immediately isolate for 10 days with other members of their household,⁴ as must anyone deemed to be a close contact according to government definitions.⁵ This potentially includes a pupil’s classmates, but not the entire year group. The Department for Education says that the school should determine who is a close contact, based on the school’s environment and social distancing arrangements.

Other members of contacts’ households do not have to self-isolate, meaning siblings can continue to attend school.

Should a positive LFT result be confirmed by a PCR test?

This depends on where the test was taken.

The Department for Education says that when a pupil’s LFT has been taken under supervision, at test sites or at school, “the chance of it being incorrect is minimal so there is no need for a further test to confirm the result.”⁶ But there is a “slightly higher chance” of a positive result being wrong if the test was taken at home, so those should be confirmed by a PCR.

Confirmatory PCR is important not only for identifying false positives and tracking their rates, but also because the samples submitted can be sequenced to pick up and track variants of concern. The World Health Organization recommends the practice in low prevalence settings because the “rate of false positives compared to true positive results will be high.”⁷

Up until 27 January, confirmatory PCR testing was available for positive LFTs taken under supervision at test sites in England, including those at schools and workplaces. The Department of Health and Social Care says that this was suspended because of the “high prevalence of coronavirus infections” and advice from Public Health England that in such a situation “the performance of lateral flow devices

and PCRs are broadly comparable for infectivity and expected to be indistinguishable when used at test sites.”

Jon Deeks, who leads the biostatistics, evidence synthesis, and test evaluation research group at the University of Birmingham’s Institute of Applied Health Research, thinks that the real reason was because waiting for a positive PCR was delaying contact tracing. “Cases weren’t counted as being positive real cases on a lateral flow alone, and therefore they weren’t actually going into the contact tracing system, so the benefit of speed of having these test results quickly was completely lost,” he says.

What happens if the confirmatory PCR test is negative?

Again, it depends on where the test was done. If it was taken at home, the PCR result “overrides the lateral flow test” and pupils can return to school, says the Department for Education.⁶ But if the test was taken at school, the LFT result stands and the child, their classmates, and their families must self-isolate. The department says that this is because there is “minimal” chance of an incorrect LFT result if the test is done under supervision.⁸

Yet cases have emerged, with the rule sparking an angry reaction from parents. Rachel Clarke, a palliative care doctor in Oxford, reported that, at her son’s school, 30 pupils were told to self-isolate for 10 days after one LFT came back positive but a subsequent PCR test was negative. Clarke described the policy as “unscientific madness.” “Just because an LFT was taken at school, not home, it doesn’t mean it’s more reliable than PCR,” she tweeted at the education secretary, Gavin Williamson.

Furthermore, a March analysis of the Innova LFT used in the programme concluded that a confirmatory PCR test was not needed. Deeks called this conclusion “bizarre.” A confirmatory PCR would add little cost and most likely reduce false positives to one in a million, he says, while providing much needed evidence on the performance of LFTs in children, for which there are currently no data at all.

What proportion of positive LFT results are likely to be false?

In short, this is unknown. A 2020 analysis by Public Health England and the University of Oxford, led by Peto, estimated the specificity of the Innova LFT at 99.68%.⁹ A more recent analysis, published in March and using data from the test in active use by NHS Test and Trace, estimated a specificity of 99.97%.¹⁰ This is based on data collected at a time when prevalence of infection was high (8.7%). Deeks says that at a lower prevalence (0.5%), around half of positive tests would be false positives, “which would indicate that half of the children, teachers, families, and their bubbles being asked to isolate this week are doing so unnecessarily.”

Over 1.5 million asymptomatic secondary school pupils will have been screened at school in their first week back and more than 600 positive results are expected, which means that around 300 of these would be negative on PCR, estimates Sheila Bird, former programme leader at the MRC Biostatistics Unit at the University of Cambridge.

The reality could be even worse, says Deeks, as LFT positivity rates in schools (as reported by Test and Trace) have never been above 0.37%, which is about one quarter of the rates seen in adults. Most recently they have been only 0.05%. This indicates that performance of LFTs “may be compromised in teenagers,” and “far more false positives than true positives” would be expected among teenagers testing positive in schools, he says.¹¹

Importantly, Deeks points out that knowing the false positive rate alone is inadequate to answer the question of how many of the test

positives are false positives—this depends on how rare true positives are as well.

Why is there a lower rate of positive LFT results from schools?

The “implausibly low positivity rates” might be caused by poor technique or “people hiding or not reporting results they don’t want to report,” speculates Mike Gill, former regional director of public health for the South East of England. He thinks that the reasons for the low rates should have been investigated before the testing programme was rolled out to the whole school population.

A positive result means 10 days’ quarantine for the case’s household and contacts, which is disruptive enough, but being told to self-isolate for a false positive—when there is no need—risks putting parents off consenting to the tests altogether.¹²

Are any pupils exempt from testing?

Asked to clarify the situation, the Department of Health and Social Care says that people testing positive by PCR are exempt from routine re-testing with either PCR or lateral flow device tests for 90 days unless they develop new covid-19 symptoms.

How long will the testing programme in schools run for?

The Department of Health and Social Care says: “The use of [lateral flow] testing remains under constant review, and any changes in our approach will be guided by the science.”

What happens to the data?

Testing data are updated daily on the UK Coronavirus Dashboard, and a breakdown of rapid asymptomatic tests (including in education settings) is published in the weekly NHS Test and Trace statistics reports. These data will be analysed by Public Health England and discussed at the cross government weekly programme board, which includes representatives from the Department of Health and Social Care, NHS Test and Trace, and Department for Education.

How much has the testing programme cost?

The Department of Health and Social Care says: “We cannot provide specific breakdowns of government contracts and costs for commercially sensitive reasons. However, we have been clear from the outset our emphasis on ensuring that public authorities must achieve value for taxpayers and use good commercial judgement when making decisions around procurement to support the programme.”

We do know that the government is spending £100bn (€117bn; \$140bn) on mass testing through its Operation Moonshot programme,¹³ but how much of this will go on testing in schools is unclear. As well as the cost of tests, schools have received additional funding to cover the costs of implementing the programme. Schools have flexibility in how they use the funding: some have brought in private sector providers to help, whereas others are relying on school staff and volunteers. Schools can use the money to pay bonuses to existing staff, for example.

The real question is whether the programme is effective and value for money. If tests cost around £10–20 to deliver, and only one in 1500 comes back positive, that would amount to £15 000–£30 000 to detect one case, which might then be a false positive.

Competing interests: I have read and understood BMJ policy on declaration of interests and have no relevant interests to declare.

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