No cases of asymptomatic SARS-CoV-2 infection among healthcare staff in a city under lockdown restrictions: lessons to inform ‘Operation Moonshot’

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ABSTRACT

Background Leicester was the first city in the UK to have ‘local lockdown’ measures imposed in response to high community rates of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission. As part of this response, a directive was issued by NHS England to offer testing of asymptomatic healthcare workers (HCWs) at University Hospitals of Leicester NHS Trust (UHL) for SARS-CoV-2 infection.

Methods Between 20 July and 14 August 2020, we invited all HCWs at UHL to attend for SARS-CoV-2 testing by nucleic acid amplification (NAAT). We combined the result of this assay with demographic information from the electronic staff record.

Results A total of 1150 staff (∼8% of the workforce) volunteered. The median age was 46 years (IQR 34–55), 972 (84.5%) were female; 234 (20.4%) were of South Asian and 58 (5.0%) of Black ethnicity; 564 (49.0%) were nurses/healthcare assistants. We found no cases of asymptomatic infection. In comparison, average community test positivity rate in Leicester city was 2.6%.

Conclusions Within the context of local lockdowns due to high community transmission rates, voluntary testing of asymptomatic staff has low uptake and low yield and thus its premise and cost-effectiveness should be re-considered.

Keywords asymptomatic, COVID-19, healthcare worker, lockdown, SARS-CoV-2

Introduction

At present, coronavirus disease 2019 (COVID-19) national hospital caseload and mortality rate in the UK is increasing.1 In response, the UK Government adopted a strategy of imposing regional lockdowns in areas with high rates of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has signalled its intent to return to this strategy after the country-wide lockdown that began on 5 November 2020 has been lifted.2

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SARS-CoV-2 transmission. These measures, which include stringent social distancing and enhanced testing, tracing and public health messaging, were brought into force on 29 June 2020 and remained in place until the start of the countrywide lockdown.

Once local lockdown was declared and large-scale community testing was initiated in Leicester, a directive was issued by NHS England to offer SARS-CoV-2 testing to asymptomatic healthcare workers (HCWs).

In this context, we conducted cross-sectional surveillance to determine the prevalence of asymptomatic SARS-CoV-2 infection among HCWs at University Hospitals of Leicester (UHL) NHS Trust during the local lockdown.

**Methods**

Between 20 July and 14 August 2020, we invited all HCWs (including ancillary staff) by email to attend for a nasopharyngeal swab, which was subsequently analysed in the UHL microbiology laboratory by nucleic acid amplification using the Aptima® SARS-CoV-2 Assay (Panther® System, Hologic).

We combined nucleic acid amplification test (NAAT) results with information on age, gender, ethnicity, occupational role and speciality obtained from the electronic staff record. We used residential postcodes to obtain the Index of Multiple Deprivation quintile (a measure of deprivation for small areas of England), using an online tool provided by the UK government. We also determined the number of staff with a residential postcode in the LE2 area, an area with comparatively high rates of community transmission.

All continuous variables were non-normally distributed and are summarized as median and interquartile range (IQR), categorical variables are summarized as count and percentage.

This service evaluation was approved as surveillance by the Tactical Command meeting of University Hospitals of Leicester (Reference Number PCRAST).

**Results**

Results are shown in Table 1. Of a total workforce of more than 15,000 staff, 1,150 (~8%) volunteered for screening. The median age was 46 years (IQR 34–55), and 972 (84.5%) were female; 234 (20.4%) were of South Asian and 58 (5.0%) of Black ethnicity; 42 (3.7%) were employed as doctors, and 564 (49.0%) were nurses/healthcare assistants (HCAs). For comparison, across UHL 77% of staff are female and 36.2% are of minority ethnicity. A total of 13.5% are employed in medical or dental roles, and 45.1% are employed in registered nursing/midwifery roles or clinical support roles (including HCAs).

Of the 1,150 staff who were tested, none had a positive NAAT test. Local public health figures show the average weekly positivity rate in Leicester city over the 4 weeks of our surveillance was 2.6%.

**Discussion**

**Main finding of this study**

In this large, ethnically and occupationally diverse sample of asymptomatic hospital staff, including a significant number who reside in an area of the city with particularly high rates of transmission, we found no cases of asymptomatic SARS-CoV-2 infection.

**What is already known on this topic**

There is evidence to suggest that healthcare workers (HCWs) face a higher risk of SARS-CoV-2 infection than the general population. Recent work conducted in a population of HCWs at UHL has demonstrated anti-SARS-CoV-2 IgG (a marker of prior SARS-CoV-2 infection) seroprevalence to be ~11.0%; higher than estimated community seroprevalence rates at the time of the study. Such observations raise the possibility that infected HCWs may pose a risk to their colleagues, community contacts and patients. Indeed, previous work has demonstrated nosocomial transmission of SARS-CoV-2 to be responsible for 12.5% of hospital COVID-19 cases. Compounding these concerns is the observation that a significant proportion of those infected with SARS-CoV-2 may be asymptomatic/pre-symptomatic, and this may be more likely in a younger population (such as those actively employed). This has led to calls for routine screening of asymptomatic staff for SARS-CoV-2, although such programmes have produced variable results. A UK study at the peak of the pandemic reported the prevalence of asymptomatic infection among HCWs to reach 7.1%, although this decreased significantly over the four following weeks to 1.1% leading the authors to suggest a staff testing strategy linked to epidemiological surveillance, where asymptomatic staff screening is offered during new infection waves. Screening of asymptomatic hospital ancillary workers in Singapore revealed a prevalence of <0.1% and the authors suggest that asymptomatic screening programmes should not be necessary in hospitals with adequate PPE provision and training, comprehensive sickness-surveillance systems and universal mask policies.

**What this study adds**

Our findings indicate that, within the context of local lockdowns due to high community transmission rates, volun-
Table 1 Description of screening participants

| TOTAL, n 1150 |
|-------------|
| Age, median (IQR) 46 (34–55) |
| Sex, n (%) |
| Female 972 (84.5%) |
| Male 175 (15.2%) |
| Missing 3 (0.3%) |
| Ethnicity, n (%) |
| White 777 (67.5%) |
| South Asian 234 (20.4%) |
| Black 58 (5.0%) |
| Other 51 (4.4%) |
| Missing 30 (2.6%) |
| Occupation, n (%) |
| Doctors 42 (3.7%) |
| Nurses/HCAs 564 (49.0%) |
| Allied health professionals/pharmacy 50 (4.4%) |
| Admin/executive 259 (22.5%) |
| Radiographers 42 (3.7%) |
| Healthcare scientists 29 (2.5%) |
| Estates 78 (6.8%) |
| Other 25 (2.2%) |
| Missing 61 (5.3%) |
| Speciality, n (%) |
| Emergency department/acute medicine 95 (8.3%) |
| Medicine 218 (19.0%) |
| Surgery 260 (22.6%) |
| Paediatrics 48 (4.2%) |
| Haematology/oncology 60 (5.2%) |
| Radiology/imaging 126 (11.0%) |
| Obstetrics & gynaecology/maternity 27 (2.4%) |
| Anaesthetics/ITU 40 (3.5%) |
| Laboratory-based (inc histology/microbiology) 23 (2.0%) |
| Estates/facilities 22 (1.9%) |
| Admin/executive 51 (4.4%) |
| Other clinical services (inc pharmacy) 70 (6.1%) |
| Other 49 (4.3%) |
| Missing 61 (5.3%) |
| IMD quintile, n (%) |
| 1 (most deprived) 183 (15.9%) |
| 2 234 (20.4%) |
| 3 222 (19.3%) |
| 4 261 (22.7%) |
| 5 (least deprived) 250 (21.7%) |
| Postcode, n (%) |
| LE2 area 176 (15.3%) |
| Outside LE2 area 974 (84.7%) |
| SARS-CoV-2 NAAT result, n (%) |
| Positive 0 (0.0%) |
| Negative 1150 (100.0%) |

Reasons for such a low infection prevalence in our setting may include mandatory use of fluid repellant surgical masks for all staff at all times, social distancing measures and provision of personal protective equipment.

Provision of asymptomatic screening programmes may provide some reassurance to patients and HCWs, but given the likelihood of a low yield, this has to be balanced with the significant resource implications involved. However, should hospitalized cases of COVID-19 rise dramatically then this will need to be re-evaluated.

Our findings are of critical public health and operational relevance. Firstly, to inform responses to spikes in COVID-19 transmission and subsequent local lockdowns in other areas of the UK. Secondly, to sound a note of caution ahead of the newly announced UK government initiative ‘Operation Moonshot’, a £100bn expansion of SARS-CoV-2 testing which includes plans for regular testing of HCWs and others in high risk occupations.12

Limitations of this study
Our data are from a single centre. Although our sample size is large, it represents <10% of the entire workforce of UHL. Participation was on a voluntary basis, which may have introduced bias.

Author contributions
DRJ, PP, NJB, KK and MP conceived the idea for the service evaluation. CG and PP collected the data. CAM analysed the data and wrote the first draft of the manuscript. All authors contributed to planning and management, data analysis and revision of the manuscript and were in agreement to submit it for publication.

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Conflict of interest
KK is the Chair of SAGE Sub-group on Ethnicity and COVID and a Member of Independent SAGE. MP reports
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