

NHS England
NHS Improvement

Paper to Scientific Advisory Group for Emergencies 31 March 2020

Paper Title: Nosocomial Transmission of Coronavirus: Research and management

Agenda item:

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Purpose: To provide an overview of possible nosocomial transmission of coronavirus, outline potential research options and implications for management of findings.

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Recommendation: The Scientific Advisory Group for Emergencies is invited to:

- a. Review the options to further understand the extent of nosocomial transmission of coronavirus
- b. Recognise the potential consequences of the findings on the NHS management of COVID-19 and impact on staff and public confidence and the need for a clear management plan to be determined in advance.

Context

1. Public Health England data demonstrate markedly increasing hospitalisations and numbers of deaths from COVID-19. Staff sickness and self-isolation is increasing, with 89% of NHS staff absences in London reported to be due to COVID-19. At the last meeting of the Scientific Advisory Group for Emergencies (SAGE) the Advisory Group sought to better understand nosocomial transmission of coronavirus in acute Trusts and how to limit it.
2. Measures have been taken to reduce the risk of transmission in the general population, especially in vulnerable groups, including social isolation advice, social distancing measures and enhanced hand hygiene. However, vulnerable populations, by definition, are more likely to require and access healthcare interventions and interact more with healthcare workers (HCW) than the general population. Consequently, an outbreak of infection in vulnerable people could increase the risk of transmission to HCW, who will then pose a risk both to vulnerable and other individuals (in and out of hospital).
3. A key additional risk is transmission of coronavirus from non-diagnosed COVID-19 positive patients or staff, i.e. those who are asymptomatic or pauci-symptomatic.
4. Nosocomial (hospital acquired) transmission can affect HCWs and/or patients. It can take place between HCWs, HCWs to and from patients, and between patients; the scale of these are unknown. It is either caused by exposure of HCWs before they are protected with Personal Protective Equipment (PPE) or due to incorrect wearing of it and lapses in Infection Prevention and Control (IPC) practices. Effective IPC has been challenging in recent weeks with high rates of staff absence amongst cleaning staff. There has been reported confusion over the use of PPE as well as shortages of some critical items.
5. Anecdotal/indirect evidence indicating possible nosocomial transmission of COVID-19 includes increasing staff absence rates (e.g. London Ambulance Service, workforce reports demonstrating 25% of staff in London off sick/in isolation) and the rapid increase in hospitalised cases overall. National surveillance does not currently easily allow the identification of nosocomial cases individually, although some indicators such as the number of hospital outbreaks reported to PHE could be used to inform the assessment.
6. Whilst focussed research on this area could identify new IPC approaches/interventions to minimise nosocomial transmission and improve understanding of risks in this area, which may help to modify rising anxiety levels in HCWs, there are several important issues to consider.

Critical issues

7. There are a number of significant issues to consider prior to understanding how further testing of the workforce could be managed. These include the following:
 - a. Alternatives to the current organisation and management of COVID-19 and non-COVID patients needs further consideration, should high rates of the virus be

found in the workforce. We understand that those hospitals attempting to separate areas between COVID-19 and non-COVID patients are, in general, not maintaining the separation as the virus is transmitted between the areas. In contrast, in London, three hospitals (Royal National Orthopaedic, Royal Marsden, and Bart's Cardiac Centre) have been designated as non-COVID: the effectiveness of this approach will need to be assessed. We cannot include Intensive Care Units in current circumstances; however, this may be possible once we have moved to a maintenance phase of management.

- b. We will want to be clear of the action we will take to address possible findings in advance of undertaking further testing, in order to reassure both workforce and the public, and maintain public confidence in the NHS.
- c. We must consider the public perception and workforce expectations of testing. In most Trusts there remains insufficient testing capacity to test NHS and other critical staff away on sickness absence, with suspect COVID-19 or self-isolating, and all sectors are under significant pressure. With the current pressure on the NHS and social care it could be perceived as inappropriate to prioritise those apparently well.
- d. Significant efforts have been made to support clinical returners and others to the NHS workforce, to meet current levels of anticipated staff sickness and self-isolation. Additional shortfalls due to increased staff isolation levels may however not be met.

Feasibility of directly determining the level of nosocomial transmission of coronavirus

8. Studies including swabbing and serology testing of HCW are underway in some sites, including asymptomatic staff. This does not, however, prove transmission of coronavirus between patients and HCW. There is limited evidence that can be used to inform the risk assessment of PCR-positive results in HCW who are asymptomatic or pre-symptomatic or those who have already completed 7 days of self-isolation for an acute respiratory illness. Furthermore, it will be difficult to ascertain transmission chains, although genomic investigations may provide some support in due course, if particular genetic signatures exist.
9. It would be possible to imply transmission in a healthcare setting, by monitoring development of COVID-19 in non-COVID patients who have been hospital inpatients for over 14 days (the incubation period for the infection). It has been highlighted to hospitals that they should perform tests for COVID-19 if patients develop a compatible clinical syndrome. Measuring possible transmission between HCW and patients in primary care would be extremely difficult and would not likely be representative of risks in hospitals.
10. Alongside attempting to determine nosocomial transmission (Table 1 overleaf) we must use this opportunity to improve our understanding of practices, such as strengthening IPC interventions as appropriate (as outlined in Tables 2 and 3 below) in future.

Table 1: Surveillance and research options

Type of surveillance/ research	What will be determined	What cannot be determined	Feasibility	Potential impact / consequence
National reporting of healthcare associated clusters	Daily overview of the number of healthcare associated clusters in NHS facilities	The proportion of cases in the clusters are completely attributable to healthcare associated infection	Would follow national SitRep arrangements	Critical to situational awareness. If resource limited, suggest prioritising critical care settings initially before implementation more widely.
Surveillance of sickness absence for acute respiratory illness	Rates of sickness absence by trust and by staff group	Whether sickness absence is exclusively attributable to COVID-19	Requires sufficient data quality from ESR and support from information teams	Low impact. Provides more detailed information on trends in sickness absence
Surveillance of sickness absence for laboratory confirmed COVID-19	Rates of sickness absence by trust and by staff group	Absence among healthcare workers which has not been tested for COVID-19	Requires sufficient data quality from ESR and support from information teams	Low impact as HCWs already isolated. Provides more detailed information on trends in sickness absence
Positivity of COVID-19 testing of staff and inpatients	Proportion of those tested in each group who have positive laboratory results for COVID-19		Requires support from NHS laboratory informatics	Accounts for trends in testing activity
Convenience swabbing of HCW and/or asymptomatic patients	Current asymptomatic COVID-19 infections rates in HCW and/or patients	Will not determine levels of nosocomial transmission but will provide actionable data to reduce transmission	Currently underway in Bristol. Need to select further sites: those close and not close to peak activity.	<p>Will require increase in testing, availability of testing consumables, lab capacity.</p> <p>If staff identified as positive, will require HCW to self-isolate for 7 days, further impacting staffing levels but possibly reducing spread of COVID-19 to others.</p> <p>If asymptomatic patients identified as positive will further impact on IPC/isolation precautions.</p>

(Table 1 continued)

Type of surveillance/ research	What will be determined	What cannot be determined	Feasibility	Potential impact / consequence
Serological testing of HCW	Antibody presence and possible immunity within HCW (IgG antibodies will imply immunity and lack of infectiousness: but not yet known [needs further research]. IgM [early] antibodies may/not mean lack of infectiousness.)	Will not determine levels of nosocomial transmission but will provide actionable data to reduce transmission.	Currently underway in Manchester, PHE proposing 4 further sites in London. Need to consider including sites not close to peak activity.	<p>Will require increase in testing, availability of testing consumables, lab capacity. Serological capacity in PHE labs, not all NHS labs.</p> <p>We cannot assume staff identified as 'immune' can return to work, if self-isolating due to COVID-19 contact, without completing lengthy quarantine.</p> <p>If self-isolating because of symptoms, can return to work once resolved.</p> <p>Possibly, 'immune' staff could be asked to work in more exposure prone settings. Needs further research</p>
Environmental sampling	Presence of COVID-19 in hospital settings, particularly in proximity of vulnerable patients – this research would offer new understanding of SARS-CoV-2.	Will provide a proxy data on levels of risk of nosocomial transmission.	Currently underway by PHE Porton. Detection of virus either by qPCR or culture (more difficult). This approach does not impact on local COVID-19 test availability.	<p>If find SARS-CoV-2 on surfaces around non-COVID-19 patients, this implies significant asymptomatic shedding: need to extend PPE.</p> <p>If find on frequent touch sites, then will clean / decontaminate more frequently in line with IPC guidance (and consider how to reduce contamination risk).</p>
Data linkage	Proportion of healthcare onset and healthcare acquired cases by acute trust	This can be done through data linkage of COVID19 tests and SUS/ HES data with NHS Digital	Requires data science resource and appropriate information governance	<p>Hospitals with high rates of infection would be subject to a detailed investigation of behaviour, cleaning analysis, PPE assessment. Could be used to prioritise healthcare testing.</p> <p>Needs real time admission to hospital data.</p>

(Table 1 continued)

Type of surveillance/ research	What will be determined	What cannot be determined	Feasibility	Potential impact / consequence
Genomic sequencing	Presence of >10 circulating SARS-CoV-2 lineages in the UK, more expected to emerge. Can define the circulating lineages within a hospital to give a dynamic view of new Vs existing circulating strains, could help determine where IPC measures are best targeted	Often insufficient information in the SARS-CoV-2 genomes to currently permit transmission events to be reconstructed.	COG-UK will include clinical trials at multiple locations across the UK that will specifically address how effective sequencing is to track and prevent nosocomial transmission	Provides an effective and rapid way of helping test epidemiological hypothesis: i.e. to 'rule out' transmission. For example, if a healthcare worker is suspected of being the source of transmission to a patient, it would be possible with some confidence to disprove this if the SARS-CoV-2 lineages from a HCW was different to the patient

Limitations

11. There are a number of caveats to the above research options:

- a. Testing may enable Regions to tackle increasing nosocomial transmission. Although the opportunity to make a significant impact may have already been missed in London, it would be helpful for non-London healthcare systems or help inform learning and policy options for future outbreaks.
- b. There are concerns regarding the accuracy (sensitivity / specificity) of the serology tests, which are under evaluation.
- c. Testing capacity is a significant concern; any increase in research-based testing needs to be balanced against reduced availability for symptomatic patients.

Speed of obtaining new data is clearly important but may be limited in current pressures.

Potential interventions to reduce nosocomial transmission

12. Entire prevention of nosocomial transmission of coronavirus is not feasible. What will need to be determined are practicable methods to minimise this route of transmission, both in this and any subsequent waves of COVID-19 infection.

Table 2: New interventions underway to reduce transmission

Intervention		Detail	Feasibility / Challenges
1	Increased use of masks/PPE by all HCW: in line with latest PHE guidance	Use fluid-resistant (Type IIR) surgical masks to reduce risk from asymptomatic staff and patients, or FFP2/3 or N95 mask in higher risk procedures.	Underway in some London Trusts. PPE capacity, storage and distribution, severely impacts ability of some Trusts to deliver. Need to reinforce latest PPE messages: training underway. Will markedly reduce PPE stocks.
2	Enhanced decontamination	In line with latest IPC advice	Shortages of cleaning staff in many Trusts

Table 3: Further interventions to explore

Option		Detail	Feasibility / Challenges
1	Test sample of asymptomatic ED patients	Test medical non-COVID, 100-200 patients	Test in a London site and a small sample. Seek atypical patients who would not be considered high risk COVID-19, could inform symptom profile beyond cough/fever. Could inform COVID/ non-COVID designation approach for sites. Need to plan impact on future isolation advice for NHS sites and public.
2	Increase testing capacity to include all inpatients	Ideally should isolate patients until results returned	Capacity to test further a major challenge. Not feasible to isolate all patients until test results known, due to scale. Currently Trusts stream patients into confirmed, suspected or unlikely. A negative test on admission does not predict future symptoms within the 14-day incubation period, thus subsequent transmission in non-COVID areas. However, should we reach a 'maintenance phase' where we return to baseline levels with serology testing available, may be feasible to trial different approaches e.g. triaging to different locations.
3	Universal use of surgical masks by patients	For all patients, regardless of presentation, where they can comply	Mask availability, storage and distribution, limit this option. Will require patient training and compliance. Not suitable for all patients, particularly those requiring oxygen, the very young and the elderly. Wearing masks for prolonged periods can cause pressure sores around the ears. Insufficient mask stock to deliver this; they would need to be changed when damp (likely 4 hourly)
4	Send all COVID-19 positive staff home to isolate, including asymptomatic	Following testing of all staff	Capacity to test all HCW a major challenge. Sending asymptomatic home will drastically impact on workforce, and the amount of transmission from asymptomatic is unknown. Patient outcomes will be impacted due to reduced workforce. Will not reduce patient-to-patient spread.
5	Further enhanced decontamination	Informed by enviro study e.g. i. frequent touch sites ii. around known and unknown COVID-19 patients	Limited facilities staff/capacity. PHE has an ongoing study to look at environmental contamination; early evidence from four hospitals who cared for initial patients demonstrated minimal to no hospital contamination, but this was in specialist units with high cleaning standards.

13. All these options will potentially reduce nosocomial transmission; however, the scale of their impact is unknown and cannot be measured. It is likely a combination of measures will be required to have the most significant impact.

Recommendation

14. SAGE is asked to review the options to further understand the extent of COVID-19 within HCW, in light of the potential implications of the research.

Evidence sourced and accurate up to: 30 March 2020