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Abstract

COVID-19 has devastated care homes. Point of care tests (POCTs), mainly using Lateral Flow Devices (LFDs), have been deployed hurriedly without much consideration of their usability, impact on workflow or health economic factors. Even after the pandemic POCTs, particularly multiplex tests, may be an important control against spread of COVID-19 and other respiratory infections in care homes by enabling identification of cases. They should not, however, replace other infection control measures such as barrier methods and quarantine. Adherence to LFDs among care home staff is suboptimal. Other tests – such as point of care polymerase chain reaction and automated antigen tests – may be more easily accommodated into care home workflows and hence associated with better adherence. The up-front costs of POCTs are straightforward but additional costs, including staffing preparation and reporting processes and the impacts of false positive and negative tests on absence rates and infection days, are more complex and as yet unquantified. A detailed appraisal is needed as the future of testing in care homes is considered.

Article

COVID-19 has been devastating for the care home sector in the UK and internationally. The number of care home deaths as a proportion of all COVID-related deaths, from the beginning of the pandemic to February 2021, ranged from 8% in South Korea to 75% in Australia[1]. In the UK, care home residents have comprised 34% of all COVID-related deaths – more than 35,000 people.

Respiratory disease outbreaks, for example due to seasonal influenza, have long affected care home residents. These will re-emerge as life normalises post-pandemic. In addition, residents will remain vulnerable to COVID-19 as it becomes endemic, with localised outbreaks occurring in vulnerable populations[2]. Although SARS-CoV-2 vaccination has been introduced, the duration of immunity is unclear, and variants will pose risk as the virus mutates.

Care home mortality slowed in the UK during the second wave of the pandemic[3], implying that Infection Prevention and Control (IPC) measures - implementation of personal

protective equipment (PPE), and restrictions on visiting and freedom of movement - had some effect. The trade-offs involved with these measures are well documented: PPE can impair communication, particularly when residents have sensory or cognitive impairment[4]; and visiting restrictions can contribute to loneliness, and cognitive and physical deconditioning[5] among residents, while increasing the care burden for staff[6].

SARS-CoV-2 testing has been introduced to reduce harmful restrictions but has limitations. Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR) tests are highly sensitive and specific but have problems with lingering positivity after acute infection has passed[7]. They can take days to return from laboratories, during which time new outbreaks can occur. Point-of-care Lateral Flow Device (LFD) tests, a mainstay of care home testing in the UK, return results within minutes but may not identify infectious individuals in the first few hours of their 4–8-day transmission window[8].

As multiplex technologies, that can test for other pathogens alongside COVID-19, become available, we must learn the lessons from SARS-CoV-2 testing about how testing strategies can protect against future outbreaks of COVID-19 and other respiratory pathogens in care homes.

First, testing can reduce risk of transmission of respiratory infections by enabling isolation of infectious individuals[9]. Testing provides one control with respect to the hazard from the virus and can complement other IPC measures. There is, though, no evidence that it should replace them

Secondly, as with other complex systems in health and social care, implementation of testing is shaped by human and organisational factors[10]. We have shown that care homes engaged in an early LFD-testing pilot had poor adherence to testing and did not experience a reduction in outbreak rates[11]. No test can be effective if it is not used, or its results are not acted upon appropriately. Staff are busy, have multiple demands on their time and are exhausted by the pandemic. Tests generate complex workflows which include detailed preparation and reporting. These are different in care homes than in hospitals or primary

care settings[12]. As with all innovations, staff and residents must value and trust a test result sufficiently to prioritise conducting it when faced with competing demands[13].

Our evaluation of several COVID-19 testing technologies in UK care homes – point of care PCR[14] and automated antigen tests[15] – revealed that their integration into existing workflow was key to designing protocols adhered to by staff and enabling them to attach value to conducting the test. For example, those technologies able to batch test enabled simultaneous processing of multiple staff samples[14] whilst rapid turnaround, single-person tests were better suited to individual staff members arriving at work[15]. The workflow implications of the widely used LFD and laboratory-processed RT-PCR tests are still to be evaluated.

Thirdly, up-front costs of tests vary widely, but the complex systems in which they are used mean that their economic impact is not straightforward. Staffing costs associated with widespread roll-out of testing have not been separated from broader public expenditure on IPC. Costs associated with complex preparation and reporting algorithms could rapidly escalate, even if the test involved has low initial outlay. The financial impact of false negatives (e.g., infection days) and false positives (e.g., staff absences, additional staffing requirements associated with zoning and quarantine) need to be factored into evaluations. The opportunity costs, including what staff tasks remain undone when supporting testing, also needs to be considered when developing future testing policies.

In summary, while testing in care homes offers an opportunity to assist in protecting residents from morbidity and mortality associated with respiratory infections, implementation of testing is complex, and many considerations are different in care homes from other care settings. National testing policies should consider the whole local NHS and social care system cost, including the total cost of implementation. Such systematic approaches have not generally characterised the decisions made around new testing policies and test procurement but will be required going forward.

Conflicts of interest

JT has been contracted to provide epidemiological support to Liverpool City Council during the COVID-19 pandemic. The other authors have no conflicts of interest to declare

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