Appendix I

After an initial email contact, potential participants were asked to sign a consent form. Each participant was interviewed by an expert in Human Factors (MM) and notes were taken by an expert in process modelling (TH). They were interviewed individually and remotely, using videoconferencing tools (Zoom, Zoom Video Communications, Inc.). Interviews were semi-structured, lasted 30-60 minutes, were recorded with permission and transcribed (not verbatim). The interview schedule covered staff training and experience, and current COVID-19 testing processes. Framework analysis was used to analyse transcripts against initial themes of perceptions about gaps within and needs arising from, current pathways. Codes were added to transcripts in Microsoft Excel and categories; themes were refined through a repeated analysis conducted by a second analyst (PK) – Table 3. Participants were contacted by the research team upon completion of preliminary analysis to verify findings. No discrepancies between findings and feedback from participants were reported.

Table 2 Description of participants taking part in the study

Interviewee's role	**Identifier**	**Area**	**Nursing Home**	**Residential Home**	**TOT number of beds**
Owner	CH1	Nottinghamshire		x	25+
Care Home Manager	CH2	Nottinghamshire	x		50+
Care Home Manager	CH3	Derbyshire	x		50+
Nurse	CH4				
Managing Director	CH5	Nottinghamshire		x	140+
Project Improvement Officer	CH6				
Care Home Manager	CH7	Nottinghamshire	x		50+
Operations Director	CH8	Yorkshire	x	x	100+ and 50+ apartments
General Manager	CH9	Yorkshire		x	40+ and 40+ apartments
Head of Operations	CH10	Yorkshire and Oxfordshire	x	x	400+

Table 3 Description of four themes identified with illustrative quotes

Theme	**Description**	**Illustrative quotes**
Infection prevention measure	Consisting of precautions taken to prevent the virus from spreading in care homes, including new admissions and visitors' policy, and relocation of suspected cases in dedicated areas	*"[following the] BushProof guidance, we have converted the whole place in cohosting zones and move people around. Red, amber and green areas where created." (CH2)* *"Extra hygiene measures and cleaning precautions taken for each room; social areas were rearranged to preserve social distancing, group activities suspended and visits from healthcare professionals (i.e.: physiotherapists, speech therapists, district nurses, dieticians, GPs) were temporarily moved to a remote modality. No visitors were allowed since March; however, we have put with PVC walls [between residents and visitors]" (CH3).* *"We have designated a separate staff room is to keep red team separated and to store uniforms." (CH8)*
Preparatory steps	Lists of required tasks to prepare the care home, the personnel and residents to get ready for the test. These tasks include ordering testing kits, arranging courier, setting up the required environment to test residents (i.e. a	"Nurses and senior staff members (managerial level) did the test. Video training conducted. More efficient [than symptomatic test], results come back within 24 hours. The manager was inserting patient details into the portal. Not a difficult process, but time consuming. Courier arranged from 4pm till night. It worked quite well (in early days they did not turn up)". (CH2)

	dedicated room as opposed to in-room testing) and to train personnel	"We struggled to get access to tests at the beginning -COVID was already in home, 3 suspected residents" (CH5) For nursing staff, managing the procedure hasn't been an issue: *"Training video was factual, succinct, straight to the point, easy to follow".* Swabbing procedures *"are not necessarily above the abilities of non-trained staff, unless training is followed properly and conducted precisely"*. (CH4)
Swabbing procedure	Tasks required to collect a specimen from a resident and process it ready for transfer to a laboratory	*"The registration portal is a link after a link, it can be a nightmare". (CH3)* *"The Digital Portal is very easy and straightforward [however] it is very time-consuming uploading test results and then once back, re-uploading them to the care plan system and communicate results to the system". (CH5)* *"Very difficult testing dementia residents; we adopt distraction techniques, gamification techniques". (CH2)* *"We had to employ a great deal of reassurance for dementia residents; It is very important that tests are conducted by familiar faces. They trust individuals in their own spaces […] No external individuals can pretend residents are concordant with the testing timing". CH4* *"Out of the pandemic context, we would be told not to do something unless trained to do so - are you competent to do these things?" (CH9)*
Management of residents	Consisting of measures, treatment and isolation decisions taken upon test results and whilst waiting on test results	The isolation has a very bad effect on residents. In some cases, *"isolation is worse than the virus…". (CH7)* Treating each resident as suspected (following the guidance) is not ideal: *"If a negative resident is considered a suspected case, he may end-up isolated with positive residents". (CH10)*

Appendix II

Table 4 summarises the nine gaps in the pathway identified by participants in the study, followed by potential mitigation strategies and opportunities for POCT as envisaged by the authors. Residual measures (improved training and interoperability with test and system) were also considered, as these are expected to improve the usability of testing kits and to mitigate risk in the process.

Table 4 Summary of gaps in the pathway and potential mitigation strategies

Gaps in the pathway	**Potential mitigation strategies and opportunities for POCT**
1. Residents walking with purpose can't be effectively kept in isolation	Measures to protect residents: • A regular ***screening test,*** conducted at the front door on asymptomatic visitors and new admissions, will prevent the virus spreading in the home. • A ***diagnostic test*** for symptomatic residents would support a prompt isolation of positive cases.
2. Delays in getting testing kits delivered	• Implement the care homes' testing capability with POCT.
3. Tampered testing kits	• Require IFU (Instruction for Use) with content description and materials specification (e.g.: standard material).

4. Swabbing technique learnt through demos	• Require face-to-face training with trained healthcare professionals with competency assessment. • Require risk assessment on testing kits and environment of use.
5. Residents with challenging behaviour	• Consider alternative sampling techniques (i.e.: saliva testing). • Consider a ***diagnostic approach*** to rule-in COVID-19 in symptomatic cases and to inform isolation or zoning decisions.
6. Excessive administrative workload	• Results automatically sent to a central system (interoperability issues: interconnected devices to be considered).
7. Delays in getting results back	• Consider POCT in home that delivers results in a timely manner. • Results automatically sent to a central system (interoperability issues: interconnected devices to be considered)
8. Results not directly sent to GPs	• Result automatically sent to a central system (interoperability issues: interconnected devices to be considered)
9. No support to escalate/de-escalate care	• Consider a ***monitoring approach*** for confirmed COVID-19 cases to promptly take escalation/de-escalation of care decisions. • Consider ***re-testing*** for suspected symptomatic cases.