COVID-19 LFD: self-testing experience of blind and partially sighted people

Early in 2021, the home test service was launched by the Department of Health and Social Care to improve access to COVID 19 testing. Exploration of the challenges of PCR home tests faced by those who were blind and partially sighted (BPS) led to the introduction of alternative Instruction For Use (IFU) media formats and the introduction of Be My Eyes live video assistance to help this group of people carry out a PCR self-test more independently.

The requirement for widespread asymptomatic testing using lateral flow devices (LFDs) led to calls from all stakeholders involved in PCR home test improvements to ensure the existing support is extended to aid BPS people in carrying out rapid lateral flow self-tests as independently as possible.

A small-scale pilot was conducted by the UK Health Security Agency (UKHSA) to examine the effectiveness of the current live video assistance service delivered via Be My Eyes app in enabling BPS people to perform COVID-19 self-tests using rapid lateral flow test kits. The test kit chosen to be used in this pilot was one that was widely available for home self-testing and involved nasal-only swabbing with pre-filled sample extraction tubes. These 2 features were believed to simplify the process for BPS people by removing the need for throat swabbing and for filling the sample extraction tube with buffer.

Experiences gathered from BPS participants and Be My Eyes agents would help UKHSA to make informed decisions on introducing service adjustments as part of its ongoing drive to meet equality and accessibility requirements.

There were 2 main elements in determining the effectiveness of this approach:

- collecting user feedback from BPS individuals to understand and recommend where improvements are needed to the LFD live video assistance and to the test instructions
- collecting feedback from the Be My Eyes agents to understand their experiences of supporting BPS participants through the LFD journey

Eliciting suggested improvements to the test kit was not a primary aim of the pilot.

Participant enrolment

The Blind and Partially Sighted Stakeholder Forum, convened by UKHSA, meets regularly to discuss a variety of topics, with a focus on access to testing technologies. This Forum has allowed UKHSA to gain valuable insights into the difficulties experienced by BPS people in their day-to-day lives. Recruitment of volunteers for the pilot was conducted in collaboration with voluntary sector partners involved in this Forum. Volunteers interested in taking part in the pilot were asked to complete a questionnaire which allowed the

selection of individuals with a diverse range of demographic characteristics including the conditions underlying their sight loss. The questionnaire was devised by members of the UKHSA Inclusive Design Team within the Customer, Communications and Innovation directorate, and then tested and reviewed by the voluntary sector partners to ensure the terminology used was suitable as well as verifying the survey format was accessible for various assistive technologies. The voluntary sector partners then used their existing social media networks to inform and facilitate recruitment of suitable participants for the pilot.

Eight candidates were selected. They varied in age between mid-twenties to over 60 with 2 being male and the remainder female. Six were registered as severely sight impaired or blind, one was registered as sight impaired or partial sighted and one was not registered as sight impaired. The project team hypothesised that this last individual may have been unable to register their vision loss status through official channels as a result of the pandemic, but this could not be confirmed. All participants considered themselves to be either moderately or highly confident at using digital media but only 3 had previous experience of using Be My Eyes.

The 8 candidates had a range of vision loss types which included:

- idiopathic intracranial hypertension
- nystagmus optic atrophy
- macular telangiectasia Type 2
- bioptic glioma
- retinitis pigmentosa, and
- age-related macular degeneration

User journey insights and observations

A summary of the testing process as well as an indication of difficulties experienced by users is presented in Figure 1. Levels of difficulty are colour-coded: green represents steps considered easy, yellow represents minor issues and purple represents major issues for participants. The figure describes each step of the testing process which is assigned an overall level of difficulty represented by a colour code and the opinions of each BPS user which are represented by a colour coded square.

Below are the process steps and accompanying levels of difficulty:

1. User receives LFD test kit, overall score for this step was green (no issues), 8 users scored green.
2. User prepares their test area, overall score for this step was yellow (minor issues), 3 users scored green, 4 scored yellow and 1 scored purple.
3. User checks test kit contents, overall score for this step was purple (major issues), 4 users scored yellow and 4 scored purple. Note, 1 participant withdrew from the pilot after this stage.
4. User peels seal off the top of the extraction tube, overall score for this step was purple (major issues), 3 users scored yellow and 4 scored purple.

5. User places filled tube into extraction tube holder, overall score for this step was yellow (minor issues), 1 user scored green, 6 scored yellow.
6. User identifies swab and opens the packet, overall score for this step was yellow (minor issues), 2 users scored green and 5 scored yellow.
7. User swabs both nostrils, overall score for this step was green (no issues), 5 users scored green, 2 scored yellow.
8. User transfers their sample from the swab to the extraction tube, overall score for this step was yellow (minor issues), 2 users scored green, 5 scored yellow.
9. User closes dropper tip of extraction tube, overall score for this step was green (no issues), 4 users scored green and 3 scored yellow.
10. User squeezes 4 drops of liquid onto the test cassette's sample well, overall score for this step was purple (major issues), 1 user scored green, 2 scored yellow and 4 scored purple.
11. User waits 15 minutes for result to develop, overall score for this step was green (no issues), 7 users scored green.
12. User interprets their test results, overall score for this step was green (no issues), 7 users scored green.
13. User reports their results, overall score for this step was yellow (minor issues), 5 users scored green, 1 scored yellow and 1 scored purple.
14. User understands the implications of their results, overall score for this step was green (no issues), 7 scored green.

Figure 1. Participant experience of the LFD test process

Step1: Although users were provided with the test kits, this step was considered analogous with the real-world process of ordering and receiving a test kit online. No one reported any issues.

Step 2: Some participants mentioned issues relating to a lack of colour contrast between test kit items and their preferred test area surface.

Step 3: There was often confusion around test kit contents. The split between elements that are bundled together and those packaged separately was not intuitive. Component contrast was a common problem. Items packaged inside other items were often missed.

Step 4: Of necessity the small foil cover on the vial is stuck on very firmly to minimise risk of contents spillage. Removing this foil can prove problematic even for people with standard vision level.

Step 5: Some users found the location of the vial holder hole in the box wasn't ideal.

Step 6: Be My Eyes agents were able to provide support for those users having difficulty in identifying the correct way to open the swab to avoid contamination.

Step 7: Users had few issues with swabbing the sample. The nasal only

swabbing was generally considered as being easier than throat and nasal swabbing required for some other test kits.

Step 8: Users noted issues with aligning the swab with the extraction tube. Agents noted that some users took multiple attempts to insert the swab which could result in sample contamination.

Step 9: Some users encountered issues with closing the dropper tip. Due to the 2-handed aspects to this process, agents were often unable to view this stage.

Step 10: Most users encountered multiple issues applying the sample to the test strip. These included difficulties in being able to distinguish the sample well from the results well and determining whether the appropriate sample volume had been applied. Agents could not witness the number of drops applied by users with any degree of confidence.

Step 11: Users did not describe any issues with this waiting time and the requirement to call back the Be My Eyes service to interpret their results. Users noted no issues with speaking to different agents as part of any live service.

Step 12: Agents had no difficulty in viewing and confirming the test results received by users.

Step 13: Agents described some difficulties in viewing the codes required to register test results. Camera angle, environment lighting and device image quality all impacted on viewing the required information.

Step 14: No issues were noted by users in regard to understanding the implication of their test results and any next steps in the process.

Experience summary

BPS participants and Be My Eyes agents described 3 main areas of difficulty using the test kit, identifying kit components, removing the foil seal from the extraction tube and ensuring the correct sample volume was added in the appropriate fashion to the sample well. Some of these difficulties were in part the result of the Be My Eyes agent being unable to adequately view the activities of the participant during particular steps. BPS participants experienced challenges in conducting the tests while holding their smartphone as some parts of the process required them to use both hands. This required them to prop up their cameras up by other means in unsuitable positions which limited the ability of the agent to observe and provide assistance.

Difficulties identifying kit components derived from a combination of how they were packaged and a lack of visual contrast and tactile differences between them. For example, items such as cassettes were individually wrapped whereas 7 days’ worth of extraction extraction buffer tubes were contained together within a single package. Participants noted the process would prove easier if all the kit components required to conduct a single LFD test were packaged as ‘sets’ within the kit box. Even though agents had the benefit of

having a kit in front of them to assist them in providing descriptive and directional language to participants throughout the testing process, the lack of colour contrast of some components sometimes proved problematic for users as well as agents. Concerns were noted by agents that tactile interaction with kit components by the user could lead to contamination of the test sample and invalidate results. Colour contrast issues were more pronounced if test areas with pale backgrounds were used. During the pilot, BPS participants were generally only advised about preparing and sanitising their chosen test area as well as hand washing.They did not receive prior advice in optimising their testing environment to help minimise colour contrast issues.

Further investigation of the difficulties experienced by BPS users when removing the foil lid revealed an issue in the manufacturing process that had affected the test kit batch used in the pilot. The machine attaching the foil lids was subsequently recalibrated, resolving the issue and may mitigate any future difficulties experienced by BPS people at this particular step.

In 6 out of the 7 completed tests, Be My Eyes (BME) agents could not confidently witness whether the correct number of drops had been squeezed into the LFD specimen collection well, nor whether contamination of this well or its contents had occurred via touch by the BPS participants. This step was the most challenging for BPS participants and BME agents and was a particular example where the users' difficulty was compounded by the difficulties for agents to direct suitable positioning of the BPS participants' cameras. However, despite these issues, the tests for the 7 BPS participants were all completed in as much as the LFDs displayed a line in the control line region.

Improving existing service delivery

Due to a general anxiety about testing, multiple participants noted they would want to be reassured that their Be My Eyes agent had received appropriate training. Furthermore, both BPS participants and agents mentioned the usefulness of providing some key information for the caller prior to using the Be My Eyes service. These included having a hands-free setup for the BPS participants' smartphone or camera device using either a directional stand, tripod or some other suitable support. Additional information should be supplied about preparing the testing area and guidance about avoiding the use of white or pale testing areas. Using a coloured test area would increase the contrast between the white test components and test surface and make them more visible to both BPS participants and agents on the video link. It would also be useful to explain the end-to-end rapid lateral flow testing process to help set expectations. To this end, further agent training has been provided via briefings and agent scripts have been updated which should enable improvements to the Be My Eyes service and improve usability and confidence for users.

Since the soft launch of the service on 17 January 2022, followed by the full launch 10 days later, 247 calls were received up until 9 September 2022. Figure 2 describes the calls made to the Be My Eyes LFD support service with an additional breakdown of the numbers of calls and their level of satisfaction at the service provided.

Figure 2. Reasons for calling the Be My Eyes LFD support service

Column1	Number of calls	% Customer satisfaction
Reporting a void LFD test result	10	50
Reporting a positive LFD test result	38	100
Reporting a negative LFD test result	122	96
Identifying LFD test kit components	14	No data
Administering a home LFD test kit	61	91
Ordering a home LFD test kit	2	100

Reasons for calling the service include:

- ordering a home LFD test kit – 2 people called, who were fully satisfied
- administering a home LFD test kit – 61 people called, satisfaction level of 91%
- identifying LFD test kit components – 14 people called, no data as to the satisfaction of their service
- reporting a negative LFD test result – 122 people called, satisfaction level of 96%
- reporting a positive LFD test result – 38 people called who were fully satisfied
- reporting a void LFD test result – 10 people called, satisfaction level of 50%

Future developments

Investigations are actively proceeding for new test kit products to improve accessibility by reducing the need for liquid measuring and limiting the requirement for component identification and manipulation. However, there is no quick fix for this situation as any new products will have to be thoroughly tested and validated. Furthermore, processes are also being reviewed to consider how we can improve meeting customer needs by offering tailored journeys, based on their access needs.

Despite these service improvements and future aspirations, there may be some users that find existing testing solutions unsuitable for independent self-use and require some form of physical assistance to perform a rapid lateral flow test successfully. However, we expect that many users will benefit from the introduction of Be My Eyes to support COVID-19 self-testing using rapid lateral flow tests.

Authors

Gary Paterson PhD, Public Health and Clinical Oversight, UKHSA

Heather Simpson, Testing Accessibility Policy Lead, UKHSA

Jamie McCain, Inclusive Design, Customer, Communications and Innovation, UKHSA

Angela Laidlaw, Continuous Improvement Lead, Home Channel, UKHSA

Rob Whiting, Lead User Researcher, Inclusive Design Team, UKHSA

Magdalena Janowicz, Senior User Researcher, Inclusive Design Team, UKHSA

David Barton Test and Trace Delivery Lead – Accessibility, UKHSA

Sarah Tunkel MBBS MRCOG, Public Health and Clinical Oversight, UKHSA

Tom Fowler PhD FFPH, Public Health and Clinical Oversight, UKHSA

Main contact

Angela Laidlaw: Angela.Laidlaw@dhsc.gov.uk