



# Point-of-care HIV and hepatitis screening in community pharmacies: a quantitative and qualitative study

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## Abstract

**Background** Point-of-care tests can contribute to earlier diagnosis and treatment of infectious diseases, thereby affording the opportunity to prevent chronic stages and the spread to others. As part of the Fast-Track Cities initiative, a pilot study was initiated in community pharmacies in Portugal.

**Aim** To characterize the individuals choosing to have point-of-care testing or screening for human immunodeficiency virus, hepatitis C, and hepatitis B virus infections in community pharmacies, their risk behaviours and motivations to perform the tests, as well as to understand the facilitators and barriers from the perspective of pharmacists.

**Method** A quantitative and qualitative study was conducted. A survey was applied to test users in pharmacies between May and December 2019, and three focus groups were conducted with six, four, and five pharmacists involved in the initiative. Qualitative data were analysed according to thematic content analysis.

**Results** A total of 210 questionnaires were collected (57.9% response rate). Point-of-care test users were predominantly male, mean age of 35 ( $\pm$  13.0) years, the majority had higher education level, and 22.8% were born outside of Portugal. Almost half of the users were first time tested and the main reason for screening was unprotected sexual intercourse. Pharmacists identified speed, confidentiality, counselling provided to users, pharmacists' initial training to perform the tests, and trust in the pharmacist as facilitators of these tests. Stigma associated with infections, the procedure, logistical conditions, and the referral process were considered as barriers.

**Conclusion** Pharmacies are a screening site with special importance for individuals who are first tested, heterosexuals, and some migrants. Nevertheless, it is necessary to understand and reduce barriers and increase the support to specific groups.

**Keywords** Barriers · Community pharmacy · Facilitators · Point-of-care tests

## Impact statements

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- Community pharmacies are an accessible screening site and point-of-care test availability in this setting enhances access.
- While speed, confidentiality and counselling provided by pharmacists can facilitate service implementation and uptake, key barriers include stigma, the procedure, logistical conditions, and the referral process.
- Knowing the perspectives of main stakeholders is valuable to help define priorities and strategies to overcome main barriers to the service implementation and to increase access to tests, and could also encourage policy-makers to provide funding to extend the screening more broadly.

## Introduction

The human immunodeficiency virus (HIV), the hepatitis C virus (HCV), and the hepatitis B virus (HBV) remain major public health problems worldwide [1, 2], imposing a severe economic burden [3, 4]. In 2020 almost 38 million people were living with HIV [5], 296 million people with chronic HBV infection, and 58 million with HCV [6]. In Portugal the national prevalence of HIV was estimated at 0.40%, and 1.45% and 0.54% for HBV and HCV, respectively [7, 8]. Coinfection is frequent, with 7.4% HIV-HBV, and 6.2% HIV-HCV [4].

In Europe 15% of people living with HIV are undiagnosed [9], above the 10% global target for ending the AIDS epidemic by 2020 [10]. Late diagnosis remains a problem: approximately one quarter of people diagnosed between 2014 and 2016 were at an advanced stage of infection [11]. In Portugal 90.3% of people with the infection have been diagnosed, 91.3% of which are undergoing treatment and 88.2% achieved viral suppression [12]. There are no available data on prevalence of undiagnosed HBV and HCV cases in Portugal, but it is about 7% for HIV, with the highest rate for heterosexual males (13.1%) and the lowest for people who inject drugs (1.4%) [7]. Screening is the main strategy for early detection of these infections, enabling early treatment, reducing the risk of transmission, the progression to chronic stages, and mortality associated with infections, but also contributing to the adoption of preventive behaviours due to the awareness and information given during the tests [13, 14].

International guidelines recommend different types of screening tests such as point-of-care (POC) tests [15, 16]. These tests address the ASSURED criteria being “affordable, sensitive, specific, user-friendly, rapid and robust, equipment-free and deliverable to end-users” [17]. At the community level, pharmacies have been a setting for POC HIV tests in many countries such as the USA, Canada, England, the Netherlands, Spain, and Portugal [18–22].

Portugal has set early identification and diagnosis of HIV, HCV, and HBV infections as a national priority, with tests available at the primary health care centres, hospitals, and civil society organizations, such as non-governmental organizations [7]. In 2017 Portugal joined the Fast-Track Cities international initiative for ending the AIDS epidemic by 2030 [23]. Since August 2018 screening settings have been extended to clinical laboratories and community pharmacies [24], which started performing POC tests for these infections under a pilot initiated in October 2018 as part of the Fast-Track initiative. This pilot was taken in the Municipality of Cascais, a region that presents a high prevalence of these infections.

A systematic review concluded that community pharmacies can conduct POC tests with satisfactory quality and effectiveness [25]. Furthermore, several studies suggest that this setting is a feasible complementary approach to other providers such as primary care centres and hospitals, and have shown that groups with higher risk of infection and groups with lower adherence to screening prefer pharmacies to perform the tests [20, 26].

Nevertheless, there are challenges regarding the implementation of screening tests in community pharmacies. Further research is needed to understand the barriers and facilitators of this type of service, as well as acceptance to a confirmatory test following a positive result, and then followed by treatment [20, 27–29].

## Aim

To characterize the individuals choosing to have point-of-care testing or screening for HIV, HCV, and HBV in community pharmacies, their risk behaviours and motivations to perform the tests, and to understand facilitators and barriers to screening in these settings from the perspective of pharmacists.

## Ethics approval

The study was approved by the Institute for Bioethics of the Catholic University of Portugal (IB-UCP) Ethics Committee (Report 05/2019 for the quantitative component and Report 01/2020 for the qualitative component), complying with the national ethical requirements and legal procedures, General Data Protection Regulation (GDPR). Informed consent was obtained from all participants to take part in the study.

## Method

### Study design

A quantitative and qualitative study was conducted in the community pharmacies in Portugal, consisting of a survey among pharmacy users choosing to be tested and focus groups with pharmacists.

The criteria for inclusion of pharmacies in the study were participating in the Fast-Track Cities initiative, having pharmacists specifically trained to this service, and having a specific room with sound and visual isolation that ensured user confidentiality and privacy.

## Survey

A self-administered, voluntary, anonymous survey was carried out to characterize the users of POC tests for HIV, HCV, and HBV infections regarding their behaviours and motivations to perform the tests in the pharmacy.

Pharmacists invited test users to participate in the study by completing the survey. The participants were adults (aged  $\geq 18$ ) who performed at least one POC test upon request and gave verbal informed consent to the pharmacist. The identity of the person was totally anonymous. Pharmacy users were excluded if they were on medication for HIV, HCV, or HBV, or showed behavioural/psychiatric conditions that would make them unable to provide consent as determined by the pharmacist recruiting the patients. Tests were voluntary, free of charge, and users could choose which test(s) they wanted to do. Data were collected between 4 May and 31 December 2019.

A pre-test was performed with pharmacy test users to validate the study procedures and evaluate the feasibility of the questionnaire. This step allowed for changing domains and rectifying errors such as omissions or ambiguities and identifying aspects to improve the procedures implemented in pharmacies (Supplementary material 1: Survey).

## Data analysis

For the characterization of the users the statistical analysis included central tendency and dispersion measures for continuous variables, and absolute and relative frequencies for categorical variables. To assess the association between sociodemographic factors, the adherence, and the motivations to perform the tests, the Chi-Square test was performed with a 95% confidence interval (95% CI). Spearman's correlation coefficient was used to assess the relationship between the ordinal variables, also with a 95% CI. Dancy and Reidy's criteria were applied to assess the intensity of the associations [30]. All analyses were conducted in Statistical Package for the Social Sciences (SPSS, 26) software.

## Focus groups

A qualitative exploratory study using focus groups was carried out to further understand the characteristics of users as well as the facilitators and barriers from the perspectives of pharmacists who perform the tests. Focus groups are a useful tool for this purpose and can be combined with quantitative methods [31]. Furthermore, this technique is common in research with healthcare professionals and has already been used with pharmacists [32].

Pharmacists in all pharmacies in the project were invited by email to participate in the focus group and the general objective of the study was provided. The number of focus

groups was established by the saturation criteria until new information ceased to emerge [33].

Due to the COVID-19 pandemic, only the first focus group occurred face-to-face. The remaining sessions took place online via Zoom platform. Focus groups were conducted in Portuguese by an experienced moderator outwith the research team and a co-moderator, member of the research team (IF). To avoid bias all of the focus groups were conducted by the same moderator and co-moderator. Participants gave their written or verbal consent for focus groups and were asked for permission to have the session audio-recorded to facilitate transcription and data analysis. Demographic data about focus group participants were collected at the beginning of the sessions, on paper in the face-to-face session and through forms of Google Forms in the online sessions. A semi-structured guide was created considering the objectives of the study and the available evidence (Supplementary material 2: Semi-structured guide). It was used to conduct the discussion and a pre-test was carried out with pharmacists who participated in the pilot implementation to test the guide. Sessions occurred in March, May, and June 2020 and took approximately 50 min each.

## Data analysis

Recordings were manually transcribed *verbatim* by the co-moderator (IF) and validated by the moderator. Transcripts were not returned to participants for checking. To ensure anonymity the participants' transcripts were de-identified according to a code—e.g.: Group 1, Participant 01, Female (G1P01,F). Themes emerged through the reading of the transcripts and were categorized according to criteria of similarity in the meaning of the speech. Ideas were categorized into themes and sub-themes by the co-moderator (IF) using Microsoft Word and then reviewed and discussed with another research member (SD) until a consensus was reached. Data collected in focus groups were analysed according to thematic content analysis, which included pre-analysis, material exploration and treatment, inference, and interpretation of the results [34].

## Results

### Survey to point-of-care tests users

Out of a total of 41 pharmacies in the Cascais municipality, 21 (51.2%) participated in the initiative with 46 trained pharmacists to perform tests. Among the 21 participating pharmacies, 363 test users met the eligibility criteria and 57.9% ( $n = 210$ ) completed the questionnaire. A total of 393 tests were performed (52.7% HIV, 32.1% HCV, 15.2% HBV) on 210 individuals, with mean age of 35 [SD = 13] years,

63.8% were male and most users had completed a university degree (63.8%) as seen in Table 1. About 23% of the users were born outside of Portugal.

The results in Table 2 show access to first-time test users (38.2% HIV, 45.0% HCV, 50.9% HBV). There was one test with reactive result for HIV, representing a prevalence of 0.5% (0.3% of total HIV tests performed in the pharmacies). In the last 12 months, most respondents had been tested for HIV (51.6%) and HCV (50.8%). In contrast, the majority of HBV users (65.2%) had been tested more than 12 months previously. None of these previous tests reported a reactive result.

Almost all participants (98.6%) performed the HIV test, 60.0% and 28.6% performed the HCV and HBV test, respectively. Taking HIV and HCV tests together was the most common option (36.2%).

The main reasons for taking the tests (Table 3) were unprotected sexual intercourse (49.0%), changed sexual partner (26.2%), and never been tested (23.8%).

Regarding the choice of doing the test at the pharmacy over other testing sites (Fig. 1), more than half of the respondents considered the ‘Reduced waiting time’, ‘Service privacy’, and ‘Confidence in pharmacist advice and competence’ to be extremely important. ‘Lack of knowledge of

other place to perform the test’, ‘Lack of willingness to go to other places’, and ‘Fear of discrimination in other place’ were considered not important at all, and were non-differentiating factors.

As major risk factors 11.7% of users mentioned having had intercourse with people of the same sex and 9.1% had ever been diagnosed with a sexually transmitted infection (Fig. 2).

Chi-square test analysis revealed some statistically significant associations (Supplementary material 3: Statistical tests). Uptake of POC tests’ was greater in men from Portugal (82.4%) compared to women (68%). However, the uptake was higher in women from Africa (14.7%) and America (13.3%) compared to men from these regions (4.6% and 7.6% respectively) ( $P=0.030$ ,  $df=3$ ). Concerning the reasons to take the test, no significant differences were found across age groups, except for the reason of having never been tested ( $P < 0.001$ ,  $df=6$ ), which was more often reported by users between 18 and 24 years (48.0%) and the oldest users above 60 years (30.0%). Most of the youngest users reported unprotected intercourse (59.6%) ( $P=0.047$ ,  $df=6$ ). Having intercourse with someone of the same sex was more reported by men (16.0%) ( $P=0.013$ ,  $df=1$ ).

**Table 1** Sociodemographic characterization of point-of-care tests users at pharmacies

Gender	n = 210 (%)
Female	76 (36.2)
Male	134 (63.8)
Age (years)	n = 210 (%)
18+	10 (4.8)
20–24	42 (20.0)
25–29	37 (17.6)
30–39	48 (22.9)
40–49	42 (20.0)
50–59	21 (10.0)
60+	10 (4.8)
Country of birth	n = 206 (%)
Portugal	159 (77.2)
Other European country	10 (4.9)
African country	17 (8.3)
American country	20 (9.7)
Level of education	n = 207 (%)
None	0 (0)
1° school (4th grade)	1 (0.5)
2° cycle (6th grade)	5 (2.4)
3° cycle (9th grade)	7 (3.4)
College or equivalent	62 (30.0)
University	132 (63.8)

**Table 2** Point-of-care tests users and results by virus (HIV, HCV, HBV)

Tests' results	HIV n=207 (%)	HCV n=126 (%)	HBV n=60 (%)
Non-reactive, fulfil window period	138 (66.7)	56 (44.4)	39 (65.0)
Non-reactive, does not fulfil window period	66 (31.9)	69 (54.8)	20 (33.3)
Reactive	1 (0.5)	0 (0)	0 (0)
Unknown result	2 (1.0)	1 (0.8)	1 (1.7)
1st time tested	HIV n=207 (%)	HCV n=120 (%)	HBV n=57 (%)
Yes	79 (38.2)	54 (45.0)	29 (50.9)
No	128 (61.8)	66 (55.0)	28 (49.1)
Last time tested	HIV n=124 (%)	HCV n=59 (%)	HBV n=23 (%)
In the last 12 months	64 (51.6)	30 (50.8)	8 (34.8)
More than 12 months ago	60 (48.4)	29 (49.2)	15 (65.2)
Result of the last test performed	HIV n=123 (%)	HCV n=62 (%)	HBV n=24 (%)
Reactive, may be infected	0 (0)	0 (0)	0 (0)
Non-reactive, should not be infected	122 (99.2)	60 (96.8)	22 (91.7)
I do not know	1 (0.8)	2 (3.2)	2 (8.3)

**Table 3** Reasons to take the test

Reasons to take the test(s)	n=210 (%) <sup>a</sup>
I had unprotected sex	103 (49.0)
I changed my sexual partner	55 (26.2)
I had never taken the test	50 (23.8)
I need to demonstrate that I am not infected	42 (20.0)
Other	21 (10.0)
I got tattoos and/or piercing	11 (5.2)
I had sex with a person living with HIV / AIDS and/or Hepatitis C virus and/or Hepatitis B virus	9 (4.3)
I was subjected to a transfusion of blood or blood products	1 (0.5)
I had sexual intercourse in the context of using recreational drugs (e.g. Chemsex, party'n'play, etc.)	0 (0)
I shared injection material	0 (0)
Time since the most recent situation that led to test	n=126 (%)
Less than 3 months ago	56 (44.4)
Between 3 and 12 months	60 (47.6)
More than a year ago	10 (7.9)

<sup>a</sup>More than one option possible

Spearman's coefficient of correlation revealed a strong positive correlation between the pharmacy's setting factor to take the test 'I don't feel comfortable going to other health services' and the factor 'I am afraid of being discriminated against if I test elsewhere' [ $\rho=0,816, p < 0.001$ ]. Both had low levels of importance, which seems to suggest that although the choice of the screening site does not depend on these characteristics, compared to other sites, the pharmacy seems to be more appealing.

## Focus groups: Pharmacists' perspectives

### Characteristics of the focus groups participants

A total of 15 pharmacists (32.6%) participated in three focus groups, with six, four, and five participants (Supplementary material 4: Focus groups participant characteristics). Of the 15 participants, 9 performed tests, and 6 participated in the pilot implementation by coordinating the project across pharmacies or providing the initial training to pharmacists.

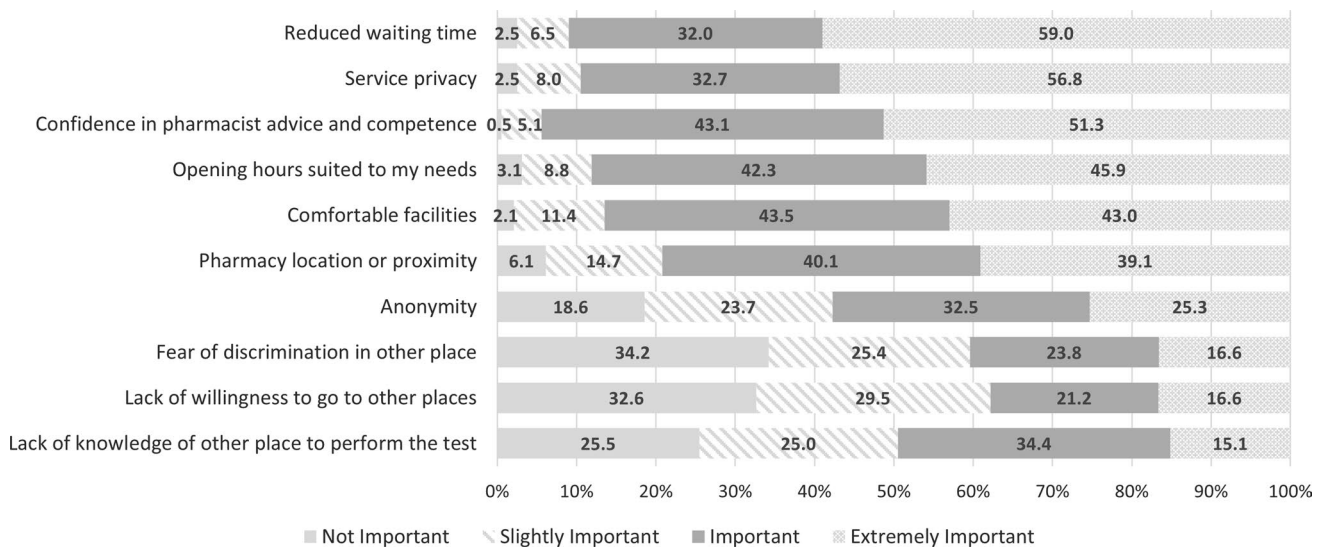


Fig. 1 Evaluation of factors by POC tests users when choosing the screening site

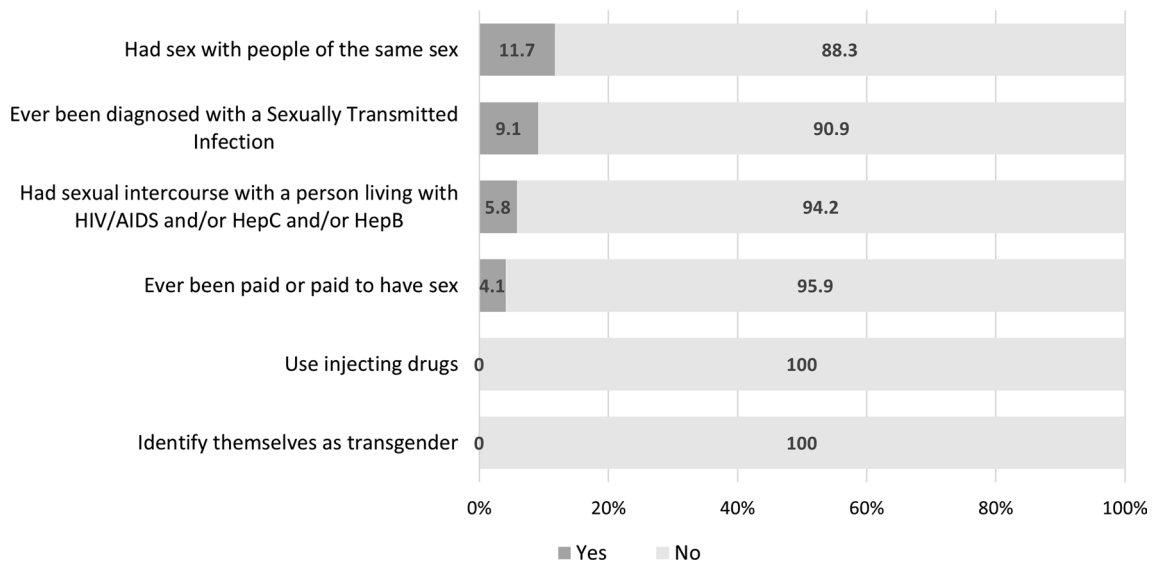


Fig. 2 Factors associated with increased risk of HIV, HCV, and HBV infection among community pharmacy POC test users

Most participants were female (73.3%) and between 25 and 36 years old (46.7%), with mean age of 37.8 years. 20% of the pharmacists had 2–9 years of working experience in pharmacies, with mean work experience of 13 years, and the majority performed POC tests for HIV, HCV, and HBV (66.7%) over 9–13 months (46.7%). Three main themes emerged from the thematic analysis: users’ characterization, facilitators and barriers, and project implementation.

### Characteristics of the POC tests users

According to pharmacists’ experience and perception, the uptake of POC tests is greater among people who are not regular customers of the pharmacy in which the test was carried out: ‘(...) the users that I had (...) are all outsiders, it was nobody I knew, (...) and came from far away, (...)’ (G2,P10,F). Professionals also highlighted that the tests are more frequently requested by migrant populations and people generally at greater risk of being infected, such as homosexuals: ‘(...) I had also caught (people) from the homosexual community who usually do these screenings

(...) on a monthly basis and (...) they started to come to the pharmacy as well.’ (G2,P10,F).

On the other hand, some pharmacists commented that older people, especially men, as well as some of the most at-risk populations (e.g., injecting drug users) are less willing to come forward for this service (Supplementary material 5: Quote 1). The need to be at least 18 years old to take the test was mentioned as a factor that could be a potential barrier because young people have multiple risk behaviours. When asked about how users are aware of this project, pharmacists referred to social networks/internet and pharmacies’ advertisement as main sources.

Overall, pharmacists have reported a positive balance of users’ acceptance and test demand.

## Facilitators

### Pharmacists’ role

Pharmacists perceived their role as one of the most important facilitators for POC test users. They value their position in the community as health agents, trusting in their expertise and technical skills to perform the tests: ‘(...) We also have an important role due to the proximity (...) with users, this is undeniable. (...) People feel that they have confidence in pharmacists (...), not only in carrying out this type of tests, (...)’ (G3,P11,F).

Pharmacists expressed a positive assessment of the project’s implementation and mentioned being prepared to perform the tests. Some participants revealed caution in ensuring that trained professionals are available for an extended time and the need of physical conditions to preserve confidentiality.

Additionally, pharmacists’ motivation was a transversal theme across all focus groups, representing an essential element for the project success: ‘(...) We have all the weapons to run well.’ (G2,P09,F).

### Pharmacy’s facilities

Pharmacy accessibility in terms of proximity to people and shorter waiting time for the tests’ attendance, were identified as a key enabler for users when compared to other screening sites: ‘(...) wherever they go, including centres that only exist in urban areas as well, (...) the waiting times are still considerable, and therefore the user here has the opportunity to go to the pharmacy and do... (...) Right away.’ (G1,P01,F)..

In terms of facilities, the existence of a private area that assures confidentiality and anonymity and the fact that pharmacies have an inclusive environment and are a healthcare service, sometimes being the first contact with the health

system, were also valued by users according to pharmacists (Supplementary material 5: Quote 2).

Aspects such as long opening hours, availability of tests on weekends, and being free of charge are other facilitators.

### Tests’ procedures

Pharmacists perceived the pre- and post-test counselling as a facilitator of this service, making the communication of results easier because users handle them better and understand the referral process in the event of a positive result: ‘(...) it also helped that before I took the test, I explained what the next step was. (...)’ (G1,P05,F).

The training that pharmacists received to perform the tests, the existence of a procedure manual to provide guidance, and simple testing procedure were also considered facilitators. Furthermore, the relationship with regular customers was seen as another facilitator because there was a greater receptiveness to the tests and the counselling provided (Supplementary material 5: Quote 3).

## Barriers

### Pharmacy’s facilities

The most likely barrier for users’ engagement with POC tests identified by pharmacists was related to the proximity of people who may recognize users when they are tested, which is often overcome by choosing a distant pharmacy: ‘(...) they don’t know us also makes them more comfortable to share, (...) the reason that leads them there (...), and to feel more comfortable (...) with the result, (...)’ (G3,P11,F)..

### Stigma

The stigma associated with HIV, HCV, and HBV are obstacles for screening and tests uptake, and is a factor experienced in all places that provide screening tests: ‘(...) There is always some stigma when people go to do this type of tests (...) very much related to the discrimination that still exists related to, (...) the disease, (...)’ (G1,P05,F).

### Tests’ procedures

For pharmacists the principal perceived barrier of this new service was the procedure in terms of difficulty in collecting an adequate blood sample with the material that is provided, as well as the lack of psychological training to provide the results, especially if the patient is infected: ‘(...) the materials provided to us, the pipettes, specifically, it is very difficult to collect blood. (...) there is some tension there, (...) users are also a little nervous, (...).’ (G3,P11,F); ‘(...) The

problem is (...) to really get the message across. (...) On the part of psychology (...) we have this gap (...)' (G3,P14,M).

The referral process was highlighted as another challenge because of its complexity and duration, which can discourage the uptake of the confirmatory test. The referencing may also be especially hard for migrants who have more difficulty navigating through the health system (Supplementary material 5: Quote 4).

The lack of information regarding the users' continuum of care in other healthcare services following a reactive test is seen as a barrier because pharmacists are not informed if patients had a confirmatory test or had already initiated treatment.

Logistics were also perceived barriers for pharmacists since screenings take a long time, notably the referral process in the event of a positive result, and the professionals need to coordinate this service in the pharmacy workflow (Supplementary material 5: Quote 5).

The availability of other alternatives such as the HIV self-test also seems to be a factor that reduces the uptake of POC tests in pharmacies.

With respect to the COVID-19 pandemic, pharmacists reported difficulties performing this service and carrying it out during the lockdown (Supplementary material 5: Quotes 6 and 7).

## Suggestions

Pharmacists also highlighted the way the service is advertised as a factor for the success of this project. They consider the reinforcement of the project's awareness and presenting advantages of the screenings as valuable ways to improve the uptake of the tests. They also highlighted the importance of identifying groups with more restricted access and extending the project to more pharmacies.

Thinking about extending the project to other regions, pharmacists emphasized possible inequalities in access between rural and urban areas. Participants suggested having a direct link to the hospital as a way to simplify the referencing process. The accuracy of the tests was also mentioned as something that may influence test uptake. The sustainability of the project was also emphasized in terms of costs and financing of the tests.

## Discussion

To the best of our knowledge this is the first study conducted in Portugal on the use of point-of-care tests for HIV, HCV, and HBV in the community pharmacies setting seeking to identify facilitators and barriers that are influencing the uptake and success of the screening tests and site.

As observed in previous studies, both genders revealed a high acceptance to this service, although users looking for these tests were more likely to be male, with mean age of 35 years [20, 35], who have completed a secondary/equivalent or higher education level [26, 28, 36]. The majority of men were heterosexual, which indicates that pharmacies have proven to be a valuable setting for a group that is difficult to reach and that is characterized as having the highest number of late diagnoses according to the literature [20]. On the other hand, although most users were natives, a higher rate of uptake by migrants was observed in this study compared to earlier research [20, 27], which suggests that pharmacy testing has improved the access for this population. Pharmacists highlighted migrants as one of the groups that most seek out the tests because they find easier access to health care in the pharmacy and because they know this context better.

The HIV test was the most requested POC test and in conjunction with the HCV test the most common choice, which is in line with evidence that the joint availability of several tests contributes to increased adherence to the HIV screening [36]. Of the 210 users tested, only one showed a reactive HIV result, a rate similar to the national prevalence of the infection (0.40%) [7]. Most users were HBV tested for the first time, and for the HIV and the HCV tests the values were also high. As observed in other studies, having unprotected sex, changing sexual partners, and having never been tested were the main reasons that motivated the screenings [27, 37]. Having sex with people of the same gender was the most frequent risk behaviour reported (predominantly) by men, which converges with several studies that indicate that the pharmacy has attractive conditions for groups that are at greater risk of infection [20, 28].

This study also showed that users under 18 years old are not covered by the project, and elderly people, who adhere less, are two groups that also present various risk behaviours and may need a greater focus. Drug users (recreational or injectable) and people who identify themselves as transgender also had no adherence, demonstrating that they still have difficulty in accessing screening tests.

The results of both the quantitative and qualitative components revealed that the proximity, rapidity, comfort, confidentiality, and trust in pharmacists are some of the main facilitators to the users of POC tests in this setting, as in previous research [18, 35, 38].

In the pharmacists' perceptions, the stigma, the referencing process, and the proximity to the pharmacy may be barriers for users, although the last factor can also act as a facilitator for accessibility. Literature also highlights the time needed to take the test and stigma as the main barriers for users [26, 39].

According to pharmacists the counselling provided and the relationship with users seem to increase the receptivity to



the information transmitted and positively influence the way users manage the tests results, as the test is an opportunity for them to become aware of these infections and to learn how they should proceed in the event of a reactive case, making it easier for pharmacists to communicate the result and users to manage it. It was found that counselling can reduce the anxiety of the diagnosis by demystifying ideas and educating users about prevention, diagnosis, treatment, and quality of life for patients with these infections [40]. These benefits highlight the importance of a counselling phase and offer an advantage over the self-test. The initial training provided for the application of the screenings and the protocol by which pharmacists can be guided to perform this service also facilitate their task [18].

However, pharmacists reported having difficulty in using the materials that are provided, mainly for hepatitis tests, since a larger blood sample is needed. Darin et al. [37] point to the same barrier and recommend the use of lancets with a larger diameter. Professionals do not have information about the user's confirmatory test or adherence to treatment, which is identified by some authors as a limitation and one of the aspects to change in the future [20, 21]. Another barrier identified was logistics regarding the resources, permanent availability of trained professionals, and managing the time to perform the tests within the pharmacy workflow [41]. Other studies also mention fear of becoming infected and costs for the tests as barriers [18, 41]. Additionally, there exists a latent and niche group of consumers interested in POC tests in community pharmacies who are younger and in general willing to pay more than the general population for this service [42].

Pharmacists highlighted the lack of funding and the need to create conditions to ensure project sustainability, because the number of tests performed at each site differed, which suggests that the implementation of this service may not be realistic for all pharmacies [26]. The accuracy of the tests, as well as the way in which the project is publicized were also mentioned in focus groups and in the literature [18, 37, 43]. Pharmacists recognize the importance of the project and are motivated to perform the service, which are factors also described in the literature as conditions for a greater project engagement and success [18, 44].

The COVID-19 pandemic created an additional barrier to screening tests in all settings as a consequence of the restrictions implemented. However, the pandemic also highlighted the potential of pharmacies to perform POC tests [45].

As suggested by pharmacists and other studies [37, 46, 47], interventions such as destigmatizing infection screenings with routine testing, creating community partnerships with doctors and key informants from the least-adhering groups, reinforcing the project's visibility, and the possibility of scheduling tests could contribute to the elimination

of some of the barriers identified, thereby increasing tests' uptake.

## Strengths and limitations

Focus groups are a powerful research tool in the realm of health care, especially in the areas of patient compliance, customer behaviour, patient-provider collaboration, health literacy, and disease management [24]. The transcription of the focus groups recorded, and the thematic analysis made by the moderator and co-moderator increased the study's validity. The fact that this study used quantitative and qualitative methods contributed to a better overall understanding of the potentialities and challenges of the implementation of screening tests in community pharmacies.

This study offers insights to improve POC testing, showing satisfactory results by users, and sharing greater responsibility for the screening and patient's care with other health professionals. This contributes to early diagnoses and to the adoption of preventive behaviours arising from more information and awareness during the tests. Additionally, the results may encourage policy makers to provide funding to extend the project to more pharmacies and to bring screening tests to a larger number of people.

Future studies should seek to identify the reasons for refusal to participate, the difference in the tests' uptake between viruses and between pharmacies, and determine the cost-effectiveness of the service.

The improvements of the screening tests in community pharmacies should include an easier linkage to confirmatory testing services and follow-up care, which are critical for patients' outcomes and to provide value to the healthcare system.

The results must be considered in light of some limitations. Pharmacies were located exclusively in the Municipality of Cascais, and the results are therefore not generalizable for all pharmacy users in the country. There may also be a selection bias since, for convenience in recruiting, participants may have different characteristics from the pharmacy users that were not recruited. There is a potential bias related to self-report information, which can compromise data validity and could implicate measurement bias with misunderstanding of some questions, memory bias with temporal confusion regarding risk behaviours and previous tests, and the Hawthorne effect, considering that the questionnaire was applied in community pharmacies.

The method of online focus groups could also be a limitation since it implies the use of technological facilities/resources, a greater effort of the moderator to unify the group, and greater difficulty in analysing the non-verbal language. However, this method could facilitate participants' adherence, provide richer testimonies by being more informal, and the reduced time involved in organization [48].

## Conclusion

The study revealed that performing point-of-care tests in the community pharmacies seems to improve the population's access with relevance for those who are first tested, heterosexuals, and some migrants. Although it is necessary to understand and reduce barriers and promote POC tests' uptake among specific groups, pharmacies proved to be a feasible complementary site for HIV, HCV, and HBV screenings. This study offers important insights to enhance adherence to these tests in the future.

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