Insights, experiences, and perspectives on the rapid diagnosis of tuberculosis, histoplasmosis, and cryptococcosis in people with advanced HIV disease in Porto Alegre, Brazil
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ART</td>
<td>antiretroviral therapy</td>
</tr>
<tr>
<td>CAPS</td>
<td>psychosocial attention center</td>
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<tr>
<td>CFA</td>
<td>correspondence factor analysis</td>
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<tr>
<td>DHC</td>
<td>descending hierarchical classification</td>
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<tr>
<td>ECU</td>
<td>elementary context unit</td>
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<tr>
<td>HR</td>
<td>human resources</td>
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<tr>
<td>LAM TB</td>
<td>mycobacterial lipoarabinomannan test for tuberculosis</td>
</tr>
<tr>
<td>PLHIV</td>
<td>people living with HIV</td>
</tr>
<tr>
<td>RDT</td>
<td>rapid diagnostic test</td>
</tr>
<tr>
<td>SAE</td>
<td>specialized attention service for HIV</td>
</tr>
<tr>
<td>SUS</td>
<td>Brazilian national health system (sistema único de saúde)</td>
</tr>
<tr>
<td>TS</td>
<td>text segments</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</table>
Summary

People living with severe advanced HIV disease are at high risk of developing opportunistic infections, encountering barriers in both diagnosis and treatment. The aim of this study was to elucidate insights, experiences, and perspectives on the feasibility of implementing a package for the rapid diagnosis of frequent opportunistic infections among patients with advanced HIV disease. The objective is to contribute to the development and implementation of policies for HIV care.

Conducted between 30 June and 30 October 2023, the study involved two focus groups with health professionals engaged in the rapid diagnosis intervention (n = 10), four in-depth interviews with health managers dedicated to HIV care policies, and 12 interviews with patients with advanced HIV disease.

Topics explored included perception of the importance of the intervention, experience with the intervention, interdisciplinary collaboration, and challenges and recommendations.

The intervention under consideration was deemed relevant for enabling a more timely diagnosis of diseases that are difficult to investigate. Patient compliance was generally collaborative, particularly in research. However, more vulnerable patients may require expanded psychosocial support. Facilitators included specific training, having a laboratory in the hospital, and the provision of free supplies. Notable barriers included delays in obtaining results, communication challenges between professionals and patients, and a lack of alignment in the flow of exam requests, sample collection, result dissemination, and communication within the extended team.

At the management level, the study highlighted the importance of integrating the intervention into the overall care for patients with HIV. Future investigations should delve into the social determinants of HIV/AIDS mortality to provide valuable insights for enhancing prevention and treatment strategies.
People living with HIV (PLHIV) with severe advanced disease are at high risk of developing opportunistic infections, such as histoplasmosis and cryptococcosis (1–4). The clinical signs and symptoms of these infections are often nonspecific and therefore difficult to accurately diagnose and differentiate from other infections caused by nonfungal pathogens (e.g., tuberculosis) (5–7). Conventional laboratory methods for diagnosing histoplasmosis and cryptococcosis, such as culture and histopathology, require complex laboratory infrastructure, microbiology-trained technicians, and long turnaround times for results (days to weeks) (8–10).

The identification of opportunistic infections through the use of antigen tests has proved effective for patient management. Rapid diagnostic tests (RDTs) are available for detecting antigens for tuberculosis, cryptococcosis, and histoplasmosis. These tests are recommended by current World Health Organization (WHO) guidelines for the diagnosis and treatment of these diseases in PLHIV (11, 12). Several experiences in Latin America have demonstrated the feasibility of using RDTs and good analytical performance (sensitivity and specificity greater than 95%) (13–15).

Furthermore, several of these tests are already available in a point-of-care format, utilizing lateral flow technology. The utilization of RDTs has a direct impact on the quality of patient care and even survival (3, 7, 10, 16–20). RDTs result in an increase in the number of histoplasmosis cases detected (up to three times compared to conventional laboratory methods). The implementation of a combination of RDTs, or these tests individually, has been associated with reduced mortality from opportunistic infections when compared with conventional assays (3, 7, 10, 16, 18–22).

In this context, a project is being developed in the city of Porto Alegre, Brazil, that aims to evaluate the feasibility of a new care model designed to detect and provide immediate care for cases of advanced HIV disease, accelerating the diagnosis and treatment of the most frequent opportunistic infections as a tool which could potentially reduce mortality. The project “Cohort study for the rapid diagnosis of tuberculosis, histoplasmosis and cryptococcosis in people with advanced HIV disease” (CAAE: 63487522.6.1001.5335) is coordinated by the Irmandade da Santa Casa de Misericórdia de Porto Alegre (ISCMPA) and is being carried out in four locations in Porto Alegre: Grupo Hospitalar Conceição, Santa Casa de Misericórdia de Porto Alegre, Hospital de Clínicas de Porto Alegre, and Associação Hospitalar Vila Nova.

The specific objectives of this quantitative project are: describe the prevalence of advanced HIV disease in individuals newly diagnosed with HIV; outline the prevalence of tuberculosis, histoplasmosis, and cryptococcosis among people with advanced HIV disease (including new patients with late diagnosis, people already diagnosed and not linked to care, and people failing to receive antiretroviral therapy [ART]); identify factors associated with opportunistic infections and mortality; determine the feasibility of implementing a package for the diagnosis of frequent opportunistic infections (tuberculosis, histoplasmosis, and cryptococcosis) using rapid tests among patients with advanced HIV disease; and generate and disseminate evidence to support the development and implementation of HIV care policies aimed at improving the national and regional response to HIV.

The hypothesis of the study is that the implementation of a package of RDTs will result in an increase in the number and early identification of cases of tuberculosis, histoplasmosis, and cryptococcosis. This, in turn, will enable the commencement of specific treatment at an earlier stage, ultimately reducing associated mortality. Consequently, exploring the perceptions of users, health professionals, and managers involved may reveal barriers or facilitators for the implementation of the project.

Qualitative health studies play a fundamental role in understanding the experiences and perceptions of key actors regarding health systems. Through
qualitative methodologies it is possible to explore challenges faced by patients, explore the dynamics of interactions between health professionals and patients, and describe the social and cultural factors that influence health. Additionally, qualitative studies can reveal valuable insights into the quality of health services, the effectiveness of interventions, and barriers that impede equitable access to care. This information is essential to inform more effective healthcare policies and drive significant improvements in service delivery, ensuring a more patient-centered approach.

Goal

The objective of this project is to carry out qualitative research to describe insights, experiences, and perspectives around the feasibility of implementing a package for the rapid diagnosis of frequent opportunistic infections, namely tuberculosis, histoplasmosis, and cryptococcosis, among patients with advanced HIV disease. The study aims to generate and disseminate evidence to support the development and implementation of HIV care policies, aiming to improve the national and regional response to HIV in Brazil.
To conduct this study, a protocol was developed and subsequently validated by the researchers who coordinated the clinical cohort study involving the introduction of rapid diagnostic assays for HIV-related opportunistic infections. The protocol was submitted to the PUCRS Ethics Committee and received approval under number 71170123.6.0000.5336.

**Project description and general study plan**

The research aimed to gather insights and perceptions from three groups of participants: patients with advanced HIV, health professionals (including doctors, nurses, community health agents, and laboratory technicians) and public policy-makers from the city of Porto Alegre, state of Rio Grande do Sul. The study involved conducting interviews and focus groups, all online via the Zoom platform or by telephone. The interviews were designed to elicit valuable insights, experiences, perspectives, barriers, and facilitators related to the intervention. Additionally, a focus group was conducted with health professionals. The research used qualitative research methods and thematic analysis to interpret the data collected.

**Study population**

In the initial design, the team planned to conduct 15 interviews with patients: 7 cis women, 7 cis men, and 1 trans woman; AND 7 White persons, 6 Black persons, and 2 racially diverse persons; AND 6 persons with incomplete high school, 3 persons with complete secondary education, 4 persons with complete or incomplete secondary education, and 2 persons with complete or incomplete higher education. Within the pool of 15 patients, the goal was to interview at least 4 individuals who are HIV-treatment naive (have not started ART) and 2 individuals who use drugs. In addition, it was planned to carry out two focus groups with health professionals, with a total of up to 24 participants and envisioning the participation of 8 medical professionals, 8 nursing professionals, 4 laboratory technicians, and 4 primary health care professionals, focusing on community health agents. Finally, four interviews were conducted with public policy-makers, including three HIV coordinators/focal points at the national, state, and municipal levels, and one primary health care coordinator at the municipal level.

**Inclusion criteria**

**Patients**

Patients were nominated by teams at one of the four institutions and must meet the following three criteria:

- **Individuals** aged 18 or over, with HIV infection, who signed informed consent.
- **Patients** with confirmed or suspected advanced HIV disease, defined as:
  - Asymptomatic individuals with CD4 cells <200 cells/mm³ in the last three months or at the time of inclusion, or;
  - Any symptom suggestive of systemic infections in the last 14 days (fever, cough, expectoration, weight loss, night sweats, altered mental status, headache, focal neurological signs, lymphadenopathy, or extensive mucosal or cutaneous lesions), regardless of CD4 count, AND;
- **Individuals** who are not receiving effective antiretroviral treatment, including:
  - Individuals who have not yet started ART, or;
  - Individuals with less than three months of ART with an unsuppressed viral load, or;
  - Individuals abandoning treatment (>3 months), or;
  - Individuals who meet the virological criteria for failure (two consecutive detectable viral loads, with a viral load of at least >1000 copies/ml).
**Exclusion criteria**

- Individuals under the age of 18, or not infected with HIV.
- Individuals who have received active treatment within the past two weeks for both tuberculosis and systemic fungal diseases.

**Health professionals and managers**

Health professionals must be effective members of the care teams for people living with HIV in the hospitals where the quantitative study is carried out, namely: Grupo Hospitalar Conceição, Santa Casa de Misericórdia de Porto Alegre, Hospital de Clínicas de Porto Alegre, and Associação Vila Nova Hospital. Professionals with temporary contracts were excluded.

As for managers, a nominal invitation was extended to individuals holding positions in the HIV/AIDS Coordination at the Ministry of Health, the State Health Secretariat of Rio Grande do Sul, and the Municipal Health Secretariat of Porto Alegre. Additionally, an invitation was sent to the Care Coordinator for primary health care at the municipal level of Porto Alegre. Invitations were conveyed through emails using publicly available contacts on the respective websites. In case of unavailability of the person holding the portfolio, the invitation was extended to permanent employees of the portfolios, who had worked in the technical area for a minimum of four years. This approach ensured the inclusion of individuals with substantial experience in the subject matter, providing a rich source of information.

**Instruments**

First, all participants responded online (or by phone/Zoom) to the informed consent form (Appendix 1) and a standard sociodemographic questionnaire in electronic format (Appendix 2). Subsequently, for patients who provided consent, semi-structured interviews were carried out according to the script in Appendix 2. In addition, interviews were conducted following the semi-structured script in Appendix 2 with health managers. Furthermore, health professionals involved in the original project across the four services were invited to participate in an online focus group, adhering to the script in Appendix 2. The interviews were carried out via the Zoom platform or by telephone, recorded, and later transcribed.

**Ethical procedures**

All interviews and focus groups were recorded and transcribed. The study adhered to all ethical guidelines and regulatory standards for research involving human subjects, as outlined in Resolution No. 510/2016 of the National Health Council. Participants were invited to take part voluntarily and had the option to withdraw at any time. The risks of participation were minimal, and the benefits were the contribution to the implementation of the rapid testing policy for HIV-related opportunistic infections.

**Data analysis**

The corpus was analyzed using Descending Hierarchical Classification (DHC), with IRAMUTEQ, which generates graphical outputs to facilitate visualization of the results (23). DHC enables the creation of categories based on the frequency of words used, semantic affinity, and the context in which they appear. Additionally, it assesses the level of relationship between words through the chi-square test. It is, therefore, an approach considered both quantitative, as it analyzes words forming clusters by frequency and relationship of proximity or distance; and as qualitative, as it is up to the researcher to give meaning to the communities and classes grouped together. Correspondence Factor Analysis (CFA) is another technique employed that allows you to visualize the relationships between words and text segments in a two-dimensional graph. Each point on the graph represents a word or segment, and the distance between them indicates the degree of association or opposition. Proximity signifies more frequent co-occurrence of words or segments; the farther apart, the rarer the co-occurrence. CFA also aids in identifying axes explaining most data variation, interpreted as semantic or thematic dimensions. DHC is a technique that allows text segments to be grouped into classes based on vocabulary similarity. DHC starts from a single class that contains all the segments.
and subdivides it into smaller classes, until reaching a number defined by the researcher or by the stability criterion. Each class is characterized by a set of keywords, which indicate the predominant content of the segments that comprise it. Similarity Analysis is a textual data analysis technique that facilitates the visualization of relationships among the most frequent words in a corpus. IRAMUTEQ is a software that implements this technique, generates graphics that portray words as points on a plane, connected by lines indicating the strength of the association between them. To interpret Similarity Analysis effectively, it is necessary to consider the proximity, direction, and size of the points, as well as the length and thickness of the lines. The closer the points, the greater the similarity between the words. The more in the same direction, the greater the co-occurrence between them. The larger the dot size, the greater the frequency of the word. The shorter the line length, the greater the strength of the association. The thicker the line, the greater the statistical significance of the relationship. Finally, the DHC dendrogram is a graphical representation of the DHC and illustrates the hierarchical structure of classes and the level of similarity between them. Each class is represented by a branch, with the bifurcation point indicating the moment at which it divides into two subclasses. The higher the bifurcation point, the greater the difference between classes; the lower it is, the greater the similarity. The DHC dendrogram allows you to visualize the relationships between classes and identify the main thematic divisions of the corpus.

Results

For the focus groups with professionals, invitations were extended to health professionals affiliated with the four hospitals. Two groups were held, with a total of 10 participants (7 doctors, 1 nurse, and 2 medical students). Additionally, a biochemistry professional was interviewed. Among the professionals, four worked at Santa Casa de Misericórdia, three at Associação Hospitalar Vila Nova, two at Hospital de Clínicas de Porto Alegre, and two at Hospital Nossa Senhora da Conceição.

Concerning interviews with managers, four interviews were carried out involving one representative of the current municipal management, one representative of the previous municipal management, one representative of the state management, and one representative of the federal management, dedicated to HIV care policies.

In the interviews with patients, an initial plan was made to interview 15 profiles representing diverse sociodemographic and clinical histories. However, due to the unavailability of registration databases per hospital, 89 patients were randomly contacted from the four participating hospitals. Twelve interviews were carried out, with 11 patients linked to the Associação Hospitalar Vila Nova and one patient linked to the Hospital de Clínicas de Porto Alegre.

Throughout the contact process, various challenges arose. Forty patients did not answer after three calls; 12 declined to participate, were unavailable during the designated period, or withdrew from participating. Additionally, 12 patients were hospitalized, in serious condition, or had passed away; while 11 contacts were wrong or were service contacts/family members who did not have access to the patient.

Focus groups with healthcare professionals

The analyzed corpus consisted of transcribed content capturing participants’ discourse related to five themes: the perception of the importance of the intervention, experience with the intervention, impact on clinical practice, interdisciplinary collaboration, and challenges and recommendations. Regarding
the treatment given to the content for conducting the analyses, the first step was to clean the database with the transcriptions, to remove mentions of speaker/listener identification, such as “participant,” “speaker,” “facilitator.” The mention of names in the statements was also checked and removed to guarantee anonymity. Some terms related to frequently repeated speech mannerisms were removed, such as “right” and “people.” In the same sense, the verb “achar” was removed in the sense of “I believe that,” remaining only when it was used in the sense of “discover.” Technical terms were also removed, such as camera, link, chat, minutes. The temporal references that actually made up the answer remained; for example, when related to the waiting time for the results of an exam. Compound words were joined using underscores, such as Vila Nova, Porto Alegre, Santa Casa, and TB LAM/TB LAN [sic] (i.e., tuberculosis exam). Finally, the expressions people living with HIV, people with HIV, patients with HIV, and patient with HIV/HIV patient were standardized with the abbreviation PLHIV. In addition, a table was created with the answers to the questions in summary form, as a strategy to facilitate the visualization of the separation of the corpus of questions and answers (Table 1).
<table>
<thead>
<tr>
<th>Profile</th>
<th>FOCUS GROUP 1</th>
<th>FOCUS GROUP 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 – infectious disease specialist. I work at Vila Nova hospital, and I have worked with people living with HIV since 2018, when I entered residency.</td>
<td>Perception of the importance of the intervention</td>
<td>Important, as it allows you to diagnose much faster. Can be treated faster, targeting opportunistic infections. And sometimes, it even manages to avoid hospitalizations, when it is in a more outpatient setting. Or treat faster in a hospital context, especially in hospitals with fewer resources, where there are no other gold standard tests.</td>
</tr>
<tr>
<td>P2 – infectious disease specialist at Santa Casa de Porto Alegre and has worked with HIV for over 20 years.</td>
<td>Important because it allows early diagnosis of potentially lethal opportunistic diseases, the diagnosis of which is usually difficult by traditional means.</td>
<td>It makes all the difference, because the investigation of these cases usually takes a long time, right? Generally, it is not the first attempt at investigation that a diagnosis is reached.</td>
</tr>
<tr>
<td>P3 – doctor, I work at Vila Nova hospital, in the management area. I started treating patients with HIV in 2020, inside prisons.</td>
<td>Fundamental, because it provides a quick diagnosis of diseases, which would require time and invasive exams to be diagnosed, and especially because it excludes diseases that would remain as diagnostic hypotheses. Especially, histoplasmosis because it is a disease that mimics many others.</td>
<td>Fundamental. Testing faster, treats faster. We can minimize sequelae resulting from the infection. Rapid diagnostic intervention allows for more targeted management in earlier stages of difficult-to-diagnose diseases.</td>
</tr>
<tr>
<td>P4 – r3 of clinical infection. Yeah, but I did internal medicine in clinics before, starting in 2019, and since then I've been working with people living with HIV.</td>
<td>In Vila Nova, the delay in carrying out the test is 72 hours and not 24 hours; interpretation difficulties, another diagnostic resource to confirm the result. TB LAN.</td>
<td>Test performance, especially TB LAN, because the interpretation is visual, or when there is false positive data.</td>
</tr>
<tr>
<td>P5 – medical student and the research started more or less in November; it was my first contact with an HIV patient.</td>
<td>TB LAN. That many times we see a positive result and, in fact, the patient has another nontuberculous mycobacterium.</td>
<td>TB LAN. That many times we see a positive result and, in fact, the patient has another nontuberculous mycobacterium.</td>
</tr>
<tr>
<td>P6 – medical student and it was with the beginning of this research, in November, that I had my first contact with patients living with HIV.</td>
<td>What was your experience with rapid diagnostic intervention?</td>
<td>Santa Casa, patient adherence to wanting to take the tests, especially the most seriously ill patient. He's been injected a lot, he's been tested a lot, so he's always a little resistant.</td>
</tr>
<tr>
<td>- Questions and reactions from patients</td>
<td>Collaboration with medical colleagues, cool to participate in a clinical study, difficulty in doubting confidence in the diagnosis. In research every now and then we include a patient. Then, when I was going to test the patient, he was no longer hospitalized.</td>
<td>Suspicion about the TB LAN test, but as for the others, I didn't see any specific comments. It's just.</td>
</tr>
<tr>
<td>-</td>
<td>I think one of the facilitators was the fact that we won the tests. And the fact that we received training. At Vila Nova there is no research history, so patients are sometimes surprised; often, the patient is unable to consent. Because he is a patient, in short, he has a history of drug addiction, a history of a psychiatric illness.</td>
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<td>-</td>
<td>Difficulties in coordinating the routine, because I end up doing the tests when the team signals it, we have a dedicated room for that. So. Certainly in an outpatient routine it must be very different.</td>
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</tr>
<tr>
<td>-</td>
<td>It greatly facilitates the structure of the Santa Casa hospital, the central laboratory. Then, we can do the tests using pipettes, we don’t need to lance the patients' fingers. It's difficult to reconcile this with the hospital routine. The nurses have other things to do, so we often have to visit the patient 2 or 3 times until we can collect the sample.</td>
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</tr>
<tr>
<td>-</td>
<td>Generally calm. We had some patient situations, for example, where both the patient and the patient's husband were illiterate, so this created a little more difficulty in explaining. The family also knew that the patient wanted to do the tests and the family did not want him to do the tests. So this created a conflict between the patient's wishes and the family's wishes.</td>
<td>Generally calm. We had some patient situations, for example, where both the patient and the patient's husband were illiterate, so this created a little more difficulty in explaining. The family also knew that the patient wanted to do the tests and the family did not want him to do the tests. So this created a conflict between the patient's wishes and the family's wishes.</td>
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<tr>
<td>-</td>
<td>Gratifying</td>
<td>Overall, the experience was cool. We were able to have a clinical study, and the patients were guided in the process.</td>
</tr>
</tbody>
</table>
### Table 1. Summary table of focus groups with health professionals (continued)

<table>
<thead>
<tr>
<th>How rapid diagnostic intervention influenced your clinical decision-making or relationship with the patient</th>
</tr>
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<tbody>
<tr>
<td>I'm more in infection control; I don't provide direct assistance. Assistant doctors who are clinicians have the most contact and they deal with patients' reactions after a positive or negative result, but I think it has a lot of potential to improve relationships with patients. Vila Nova, many patients are hospitalized without even understanding their health condition, without even knowing what HIV is, what it causes if it's not treated. When you explain the consent form and the objectives of the research, you are also talking about the current situation. It's an enlightening conversation, perhaps much better and more complete than what he had up until that point with his attending physician. (This impacted adherence to treatment, in the professional's view.)</td>
</tr>
<tr>
<td>I'm an assistant doctor, right? I'm more in infection control, I don't provide direct assistance. Assistant doctors who are clinicians have the most contact and they deal with patients' reactions after a positive or negative result, but I think it has a lot of potential to improve relationships with patients.</td>
</tr>
<tr>
<td>I'm not included in the decision-making, the clinical part.</td>
</tr>
<tr>
<td>I am not included in the decision-making, the clinical part.</td>
</tr>
<tr>
<td>Even for them to also understand that it's not just HIV which is the case with HIV nonadherence to treatment, there may be more hidden things, right?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improvements to be made in the hospitals where you work</th>
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<tbody>
<tr>
<td>Difficulty in requesting these tests. Some difficulty in terms of logistics as it is not a test that is in the system. It's not in the medical record. In the civil approach, some thus need to call psychology to be together. And I think that the difficulties of interdisciplinarity (difficulties in accessing patients in research).</td>
</tr>
<tr>
<td>Leaving the context of the research, if the test was part of the routine, it would be much simpler because the doctor prescribes it, the nurses go there and apply it via digital puncture, it could be directly the test, urine collection, the result comes out in the system, on the same day. In essential practice, I think it tends to work very well …</td>
</tr>
<tr>
<td>In Vila Nova, a lot of work has been done in a multidisciplinary way to conduct the project. I think that for the project itself, the biggest difficulty is reconciling research activities with other activities; the multi team was essential to, for the project.</td>
</tr>
<tr>
<td>Multi team was fundamental, mainly nurses and nursing technicians. But, due to the conditions of the patient, probes are often necessary. Yeah, or bedridden patients in the ICU. Difficulties, being able to introduce this into something that is not in the routine.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Challenges faced when using rapid diagnostic intervention</th>
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<tbody>
<tr>
<td>For expansion is the training of laboratory analysts. So if this became routine, everyone would have to be trained, it's not difficult, they are tests that are easy to interpret and execute. Difficulties? I think it's being out of the routine even because it interferes with the already established work demand of nursing and laboratory professionals. Cost issue and that's it, in general.</td>
</tr>
<tr>
<td>They are minimal in terms of implementation, because it is a noninvasive test. And, it is easy to interpret. But the prospect of expansion involves cost, especially when it comes to national health system. And we need to have clearer cost-effectiveness studies to get an idea of the benefit of tracking these diseases or diagnosing them earlier to convince the administrator and reimbursement from insurance plans, especially in private hospitals.</td>
</tr>
<tr>
<td>Challenge was more related to research methodology. The request is made differently, not through the system, more related to research, not through the exam itself. Because the exams themselves are super easy to take. And in relation to the expansion perspective, it is more related to financial resources, right? People management resource to carry out this implementation, and no, not the exam itself, but in relation to resource management.</td>
</tr>
<tr>
<td>Challenges faced when using rapid diagnostic intervention</td>
</tr>
<tr>
<td>---</td>
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<tr>
<td>Improvements to be made in the hospitals where you work</td>
</tr>
<tr>
<td>Challenges faced when using rapid diagnostic intervention</td>
</tr>
</tbody>
</table>
Table 1. Summary table of focus groups with health professionals (continued)

<table>
<thead>
<tr>
<th>Profile</th>
<th>Perception of the importance of the intervention</th>
<th>Difficulties</th>
<th>What was your experience with rapid diagnostic intervention?</th>
<th>Questions and reactions from patients</th>
<th>Regarding the results obtained in the intervention, you are confident</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOCUS GROUP 2</strong></td>
<td></td>
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</tr>
<tr>
<td>P1 – 33 years old, I am also, I am in the third year of my residency at Conceição. And I've been treating patients with HIV/AIDS for the last 3 years.</td>
<td>Patient survival by being able to quickly diagnose potentially serious illnesses and treat them quickly.</td>
<td>The patient understands a diagnosis of diseases that are so difficult to treat. And they thought that because it was discovered so easily, so quickly, everything was fine (difficulty adhering to treatment); most of these diseases involve long treatments. The specificity and sensitivity of the test.</td>
<td>For the most part, I had no problems. The people understood it correctly and understood how to execute it. And we managed to execute it, which required virtually no infrastructure, other than a sink and, obviously, the material there for execution. It was very peaceful to do the tests here.</td>
<td>(Difficulty) – when we approach the patient to explain what we are going to do, we say “ah, our objective is rapid tests for the three diseases that could be worse for you.” So, we try to bring it this way, but sometimes, how we deal with people who have a social issue – sometimes even education that is not so high.</td>
<td>I think so, right? For everything that was said. Ease of execution, right? No need for laboratory infrastructure, greater speed. And the fact that we execute it ourselves or that people very close to the team execute it. They are tests, like any diagnostic test, they have their characteristics, their sensitivity and specificity. But these are already validated tests. In the literature, there is already a solid basis for the use of these tests in PLHIV. What we are validating is the package of diagnostic interventions. This is what it means for these people living with HIV to offer these three tests together at this time. We will interpret the results on a case-by-case basis, but we have a lot of confidence in the tests.</td>
</tr>
<tr>
<td>P2 – infectious disease specialist. Yes, I'm a professor of infectious diseases. And I am a principal investigator on several projects. Researcher in the area of HIV and serving people for, I don't know, 20 years, more or less.</td>
<td>An antigen test that has good specificity and sensitivity with a positive result, confirming this hypothesis, brought us a lot of security (as a tool for confirming suspicion; but between the lines there still seems to be doubt about the accuracy and specificity of the test). What we hope is that it will reduce the morbidity and mortality of these people with advanced HIV, expanding the diagnostic capacity.</td>
<td>Difficulties when we dealt with patients who were not ours, through consultancy or who were included through other means than ours directly in the research, we often dealt with some other professionals, mainly doctors, who did not initially believe in the potential, in the diagnostic effectiveness of the test, in the parameters of accuracy, sensitivity, specificity.</td>
<td>In general it was very easy. During hospital admission, the patient is often in a fragile health condition and any therapeutic option – diagnostic – is received very well, as a hope of improvement, of a quicker hospital discharge. So I think this was well received by patients. (In the research) We had 2 or 3 situations involving consulting patients with other teams that were like “Ah, what is this story? You are saying that my patient has this, but where did it come from?” But it was basically explaining the protocol, the tests and people understood.</td>
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<tr>
<td>P3 – 28 years old, I am now a final year resident in infectious diseases at Conceição hospital. Worked with HIV/AIDS and these opportunistic infections for at least 3 years formally in residence.</td>
<td>Essential in a context where these diagnoses were not widespread, they often took longer than a month to be processed. Time is crucial when it comes to treating these patients, because they are diagnosed with serious illnesses, with potential progression to adverse outcomes, such as death. Early diagnosis, early treatment, this changes the chain of intervention and provides real access, the possibility of a cure.</td>
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</tbody>
</table>
**Table 1. Summary table of focus groups with health professionals (continued)**

| How rapid diagnostic intervention influenced your clinical decision-making and relationship with the patient | Most of our tests were done on patients who were already hospitalized. And then, as a result of their diagnoses, they had a hospital stay. From what I remember of ours to this day. And I think the main influence on our decision will be whether or not to start treatment, right? For the diagnosis that the test will tell us or not. The results of the study sometimes ended up motivating the patient to be hospitalized for treatment. So this was a consequence that happened in some patients. Likewise, additional investigation, right? So, a patient who is sometimes well, we would not decide on hospitalization, but especially in the case of his toxoplasmosis, we decide to investigate further to see, eventually, if he has any signs of hidden disease that we can detect with further investigation. So, this kind of situation also happened. |
| Interdisciplinary collaboration | We didn’t lose one or two of the segments because they escaped, they left. They didn’t even know what the outcome of their evaluation, their treatment, the way they were, right? Even at the beginning, we were asking the nursing staff and such to collect the samples. Now, in recent times, we go there and collect and do our own collection and it worked. Research is one thing, right? In the research, in our time here, basically, it was the medical team that did it. With some very puntual intersections. But in other centers it was different. I know Gaia was different and Vila Nova. My interaction with professionals on the project was minimal. Eventually some difficulties occurred, there were some samples that were lost, we had to collect them again, but they were isolated things. In general, it went well. Unfortunately they occur a lot in patients with this profile with advanced HIV. Most of the patients there at Conceição were abandonment patients, they had lost segment. With this patient profile, if we want to test whether an intervention will actually impact morbidity and mortality, ideally, it would be nice if we had a truly multidisciplinary intervention. So, if we had a segment of these people, with nurses, social workers, which are many patients who sometimes have important vulnerabilities, right? The pharmacist himself to take care of. So, it is something very common in this population, so, of course, it is outside the scope of the project. But a multidisciplinary intervention would benefit these people. |
| Recommendations | How will this diagnostic package be carried on the basic network? There will have to be training, something. For example, a recently graduated doctor who is working in a post somewhere, in a primary healthcare center and is going to receive a patient who is from his region. And what will be done about it? If we are going to make this diagnosis, we will have to have a hospital back-up, and perhaps we will need to admit these patients, carry out additional investigation and even what will be plausible about this or not? So, I think there is another bureaucratic organizational part that still needs to be considered in relation to this. It’s impossible for us to simply play this test today. The network cannot even absorb HIV patient care well. HIV without severe immunosuppression, HIV that is more controlled, is already difficult, it is no longer possible. Imagine advanced HIV. So, I think this is a challenge that will remain. But I think our role here within the study and what we are trying to fulfill is to inform the scientific community with evidence. |
| Challenges faced when using rapid diagnostic intervention | The patient profile, right? So, we can actually reach all patients who would be eligible. We have a lot of people who are lost in the flows, with advanced HIV, with the disease progressing and who are not having access to hospitals and who are in the program, so I think that for me, from a macro point of view, this is the biggest challenge. We had internal challenges, in relation to teams, collections, but in my understanding these are operational challenges that we will always have in any study. I think the macro challenge here on the HIV issue is to expand access. In expansion, we paint this picture for managers so that the decision can then be taken by more, with more reliable data, right? What’s going on? Who are these people? What does the test impact or not, and based on that, whether it is worth implementing or not. These are neglected diseases, so this negligence is not only conceptual, but we know that it comes from the lower number of public incentives, the greater difficulty in accessing these patients, the social layers that these patients in general are representing. So we understand that there is an access challenge, there is underreporting, even though these tests make it easier for us from the point of view of making a faster diagnosis, of introducing faster therapy. |

**SOURCE:** PREPARED BY THE AUTHORS.
Findings
When analyzing the corpus formed by the transcripts of the focus groups, several key words consistently emerged, reflecting the discussion on rapid diagnostic intervention for the clinical management of individuals with advanced HIV disease. Notable among these words are: patient, test, diagnosis, research, treatment, fast, hospital, illness, team, difficulty, and doctor. The term “patient” is recurrent in participants’ statements, used to emphasize the intervention’s significance for patients or to provide personal examples. The word “test” was used, for example, to illustrate the speed and accuracy of the intervention and the term “team” to refer to the interdisciplinary collaboration related to the intervention. These initial findings underscore the central themes in the discussion, including the patient’s role, the use of diagnostic tests, research, and treatment within rapid diagnostic interventions. The hospital is identified as the environment where the intervention occurs, serving as the setting for professionals’ activities. Additionally, the role of the team in the discussion, the figure of the doctor, and mentions of illness and difficulty are noteworthy aspects.

Figure 1 presents the DHC result. The corpus analysis comprises 281 text segments (TS), retaining 71% of the total (199 elementary context units [ECUs]), which were organized into four classes. The corpus was divided into two subcorpora, one formed by Classes 1 and 3 and the other by Classes 2 and 4.
The DHC dendrogram (Figure 2) is presented with the 10 words having the highest chi-square value that significantly adhered to each of the classes (p < 0.001). The first two classes brought together statements related to concerns about “Diagnostic Specificity” (Class 1) and the importance of “Early Diagnosis and Intervention” (Class 3). The other subcorpora, which were subdivided into two more related classes: “Research and Team” (Class 2) and “Intervention Potential and Challenges” (Class 4).

Class 1, “Diagnostic Specificity,” consolidates statements expressing concerns about the specificity of tests to provide diagnoses (positive or negative.

**Figure 2. Descending hierarchical classification dendrogram of focus groups with health professionals**

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<td>Resultado</td>
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<td>27.82*</td>
<td></td>
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<tr>
<td>Vir</td>
<td>10</td>
<td>19.81*</td>
<td></td>
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<tr>
<td>Negativo</td>
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<td>19.00*</td>
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<tr>
<td>Exemplo</td>
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<td>13.43*</td>
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**Class 3 Early Diagnosis and Intervention**

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<tr>
<td>Tratar</td>
<td>6</td>
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**Class 2 Research and Team**

<table>
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<td>Trabalho</td>
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<td>Ambulatório</td>
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<td>Medicina</td>
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<td>17.30*</td>
<td></td>
</tr>
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<td>PVHIV</td>
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<tr>
<td>Enfermagem</td>
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<tr>
<td>Infecto</td>
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</table>

**Class 4 Intervention Potential and Challenges**

<table>
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</thead>
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<td>Execução</td>
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<td>17.24*</td>
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<td>Realizar</td>
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<td>Sistema</td>
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<td>Desafio</td>
<td>6</td>
<td>14.16*</td>
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<td>Rotina</td>
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<td>Fácil</td>
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<td>Urina</td>
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<tr>
<td>Santa Casa</td>
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<td>12.16*</td>
<td></td>
</tr>
<tr>
<td>Contribuição</td>
<td>4</td>
<td>12.16*</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Prepared by the authors.
results), clinical suspicion due to false positives, providing examples of situations and a description of the impacts of this, such as increased delay in making appropriate decisions in each case. Class 3, “Early Diagnosis and Intervention,” belongs to the same subcorpora as Class 1, indicating that the statements and themes that emerged from these two classes are related. It gathered discourses that highlight the importance of diagnosing the disease for early intervention and treatment and the search for treating opportunistic infections quickly. Participants emphasized the need to base interventions on evidence, discussing its impacts on the therapeutic process.

In turn, the other subcorpora brought together similar themes around Classes 2 and 4. “Research and Team,” refers in part to the characterization of the participants, their fields of activity, and participation in the research application of the rapid diagnostic test. Class 4, “Intervention Potential and Challenges,” gathers discussions about the ease of using the test, but also about the challenges of its implementation, given its novelty. For further details, Figure 3 presents the Correspondence Factor Analysis (CFA) of the corpus.

The CFA shows that Classes 1 and 3 distinctly differentiate from each other, each forming thematic clusters that are more independent from the others.

**Figure 3. Correspondence factor analysis of focus groups with health professionals**
On the other hand, Classes 2 and 4 formed almost a single block, suggesting that the content of the grouped statements is closely related or even mixed. Within Classes 2 and 4, there is a thematic connection between the content about the team of health professionals (e.g., team, colleague, doctor, infectious disease, medicine, nursing, multidisciplinary) and their places of work (e.g., laboratory, outpatient clinic, hospital, Vila Nova, Santa Casa) connect with the procedures performed (e.g., puncture, work, hospitalization, collection, routine, request), with words about these three contents appearing in both classes. Therefore, the three axes of content are concerns with the efficiency (specificity) of the diagnosis, with the real impact of rapid diagnosis to improve the complex treatment path and with the performance of the professionals involved (professionals, procedures, and spaces).

CLASS 1 – DIAGNOSTIC SPECIFICITY

Class 1, named “Diagnostic Specificity,” constituted 28% of the ECUs. The top 20 words significantly associated with this class (p < 0.05) in descending order of importance, were: positive, result, see/come, negative, example, situation, need, delay, culture, investigation, case, suspicion, confirm, clinic, additional, way, tuberculosis, think, examination, and patient. This class grouped content related to concerns about the diagnostic specificity of the rapid test. The main TS typical of this class exemplify these concerns. For instance, statements from participants 4 and 1 of focus group 1 reflect the challenges associated with the intervention, particularly regarding false negatives:

For me, I think the main thing we have seen in relation to LAM TB, okay? We often see a positive result and, in fact, the patient has another nontuberculosis mycobacteria. We saw more than one case and we saw patients with tuberculosis confirmed in more than one place and the test came back negative, so.

Huh, of course there is the difficulty of negatives, right? But when the positive came back, no one questioned it, so no one doubted the test. [...] Just like I said before, it’s good when the test comes back positive. When the test comes back negative and we have a strong suspicion, we still try to transfer it to other places, then it gets complicated.

These statements convey a sense of confidence when the diagnosis is positive and confirms the team’s suspicion; however, it highlights the difficulty, and, at times, the skepticism when the result is negative despite clinical suspicion. Participant 4 directs his speech to the TB LAM tuberculosis test while participant 1 refers to the dynamics of testing in a more general way. In addition to this theme, there were statements highlighting the importance of the availability of rapid diagnostic intervention for the clinical management of people with advanced HIV infection; for example, in the evaluation of participant 3 of focus group 1:

Huh, I said that it makes all the difference, because generally the investigation of these cases takes a long time, right? Generally, sometimes it is not in the first investigation attempt, the first exam, that a positive result is found, and this could mean a change in the outcome, right?

Therefore, the speech highlights as the main important factor of rapid diagnosis its potential capacity to change the outcome of the long process of treating patients, as, often, the delay in diagnosing hinders the medical team’s investigation, which leads to worse outcomes. Another theme that appears linked to Class 1 was the preparedness of health professionals to communicate results to patients and deal with possible reactions. Participant 1 in focus group 1 discussed how the rapid diagnostic intervention influenced his clinical decision-making. “Uh, general [clinicians], with whom we have the most contact and they … who deal with patients’ reactions after a positive or negative result, right?” So, this concern about the impact of the diagnosis on patients’ lives was mentioned by some professionals, even if it was not something emphasized.

Although neither of the focus groups significantly adhered to this class, the majority of central TS associated with it were participants from focus group 1. Illustrating this, the speech of participant 2 from focus group 2 emphasizes the importance of rapid
diagnostic intervention for the clinical management of people with advanced HIV disease:

[...] Tuberculosis and cryptococcosis, we even had some therapeutic modalities that were faster, which does not necessarily depend on culture, but at least in our center, histoplasmosis changed a lot, and we needed tests that or “would not take time”? and we had a clinical suspicion, but it is still a disease that can mimic others.

The speech is marked by concern about the specificity and accuracy of the diagnosis, but also praises and emphasizes the significance of rapid diagnostic testing. The participant states that opportunistic infections can mimic other diseases (i.e., have symptoms similar to other diseases), making accurate diagnosis challenging and potentially leading to treatment errors, especially in the case of histoplasmosis. The professional states that in the past he needed to carry out longer laboratory tests to confirm the diagnosis, which was a problem, as histoplasmosis is a serious disease that can be fatal if not treated. The rapid test can now confirm the diagnosis more quickly, which allows the patient to start treatment earlier and improve their prognosis. This statement emerges in the context of the professional’s report on how rapid diagnosis is also a complementary tool, providing additional certainty to treatment decisions, particularly in cases where the treatment might be aggressive for the patient. It therefore enables safer treatment decisions in cases where, in the past, drug treatment was initiated without the same degree of certainty.

The speech is marked by concern about the specificity and accuracy of the diagnosis, but also praises and emphasizes the significance of rapid diagnostic testing.

Well, it is not time that we always had available when it came to treating these patients, because they are diagnoses of serious illnesses, with potential progression, to adverse outcomes, such as death. [...] If we don’t institute treatment quickly, then I don’t think the way of looking at advanced AIDS is changing much. When we enable early diagnosis, early treatment, this changes the chain of intervention and enables real access, a possibility of cure.

Another theme that adheres to this class and appears prominently in focus group 2 is the concern
understanding a diagnosis on the patient’s side. It’s him... of what we bump into in this context, participant 1 of focus group 2 commented, doubts, and reactions of the patients were explored. The main experiences, regarding the impact of treatment on the patient. It is essential to emphasize the distinction from Class 1, where statements revolve around the concern for the impact of the diagnosis on the patient, with the health professional’s preparation to communicate and know how to deal with reactions to the diagnosis. Within Class 2, participant 3 of focus group 2 discussed challenges in approaching patients regarding diagnostic interventions. The main experiences, doubts, and reactions of the patients were explored.

(Stated diseases – tuberculosis, cryptococcosis – were not necessarily new to most of our patients). Some had already undergone these treatments previously, they already had a memory, they had already done other tests, so... Of course, there were some patients who were being diagnosed with HIV with these opportunistic diseases, (which, well, it was really the job of explaining since the beginning that, that was it, that perhaps the treatment would be prolonged and everything that came with it, but for the vast majority it was just another hospitalization). The excerpts in parentheses provide the context of the speech that joined the class.

In this context, participant 1 of focus group 2 commented, “It’s just that there is also the side of what we bump into on the patient’s side. It’s him understanding a diagnosis of diseases that are so difficult to treat, or everything else we told him.” The discussions in focus group 2 significantly adhered to this class (X² = 5.71; p < 0.05), therefore being a topic that was most discussed in this focus group. Classes 1 and 3 have as their thematic center the recognition of the importance of rapid diagnosis and patient care, but both bring some tensions. It is possible to state that Class 1, more linked to focus group 1, brought as a differentiating element the concern with the tests’ ability to provide a completely reliable diagnosis. In turn, in Class 3, linked to focus group 2, the concern about how rapid diagnosis improves patients’ treatment experience emerged as a singular theme. In both classes, there is also an emphasis on attention to the patient, so that he understands as well as possible the dimension of what the diagnosis and the seriousness of the treatment represents. Furthermore, it emphasizes that this communication does not represent an additional problem, that it is done appropriately.

CLASS 2 – RESEARCH AND TEAM

Class 2, called “Research and Team,” was formed by 19% of ECU’s. The top 20 words that significantly contributed (p < 0.01) to this class, in order of importance, were: research, doctor, work, team, hospitalization, outpatient, medicine, PLHIV, nursing, infectious, academic, happen, contact, different, good, general, work, experience, AIDS, and segment. The content of this class is related to the execution of the research and the team’s experience, forming their impressions about the implementation of rapid testing. The main TS typical of this class include, for example, the speech of participant 3 of focus group 2 about interdisciplinary collaboration:

And it is important to say that this was very specific to the research, the application of the tests, because if we are going to talk about hospitalization for advanced AIDS, we have the multidisciplinary team in all gaps and all spaces, from the pharmaceutical team, of nursing. [...] Because, I think that if we were to talk about it, we have a nursing team in our outpatient clinic that does specific adherence work and, well, they ended up accepting these patients for research, but I would also welcome these patients if they had been hospitalized for another reason.

Participant 3 mentions encountering problems (e.g., collecting blood and urine) with a health professional who assisted with the research. As a result, the hospital team started to take care of all the processes themselves. So, he justifies that these problems with “sample processing” were something “related to the research, the application of the tests;” because the team responsible “was not a team that was organized by the research.”

Next, other types of content that added to this class were the descriptions of the activities of the interviewed professionals, such as participants 5 and 6 of focus group 1, respectively: “[...] I am a medical student at [...] and it was with the beginning of this research, in November, that I had my first contact with PLHIV. “, and “[...] I am a medical student at [...] and this research started more or less in November, it was my first contact with PLHIV.”

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Another type of content that contributed to Class 2 was that which reinforces the importance of the team's engagement in the research, as in the speech of participant 1 of focus group 1 when asked about his experience with the rapid diagnostic intervention. He said, “I think one thing is different than what I mentioned this time, there was the issue of medical colleagues at the hospital having a good response to the tests and even contributing to research, yes.” In this sense, too, is a statement from participant 6 of focus group 1 thinking about implementing the intervention outside the research context and possible improvements to be made in the hospital where he works:

A multidisciplinary team was fundamental, especially as those who we had the most contact with were nurses and nursing technicians in general. But, due to the conditions of the patients, probes are often necessary. ([..] As difficulties, [..] being able to introduce this into something that is not in the routine, right? So, often, sometimes we end up irritating a lot of people).

[Excerpts in parentheses provide context.]

Thus, the participant comments on the importance of the participation of nurses and nursing technicians in the research but highlights the concern about possible wear on teams when implementing rapid testing within routine procedures. There is a statement from participant 2 of focus group 2 that adds a similar thematic element; when asked about difficulties in the intervention he said:

(What we hope is that it will actually reduce the morbidity and mortality of these people with advanced HIV, expanding the diagnostic capacity. For us here in Porto Alegre, especially, we did not have access, especially for histoplasmosis, to easy access to the diagnosis of this disease. And the study provided this). In fact, we had already had contact with faster methods, but always within the context of research, right? And this time it was no different. What is happening now? (There is a movement that we know is also driven by the evidence that we are building, both of this continuous study of projects and the implementation of these tests in public health).

[Excerpts in parentheses provide context.]

There is a tension in his speech, he is questioned about difficulties, he presents the intervention as something good, he indicates that there is evidence of its effectiveness, but between the lines there seems to still be a doubt about its execution outside the context of the research. Regarding this same question, participant 2 of focus group 1, when asked about interdisciplinary collaboration, said:

I think that leaving the context of the research, if the test was part of the routine, it would be much simpler, because the doctor prescribes it, the nurses go there to apply it, by digital puncture, it could be directly the test, urine collection. The result appears in the system on the same day.

Therefore, the teams still seem to have doubts about implementing the rapid diagnostic test outside the research context, in some cases motivated by bad experiences with collection by professionals not trained for research. However, the majority seem to believe that including testing within routine procedures can be better than what occurred during the research. For this to happen, resources and training for professionals are necessary, in addition to other operational challenges described in the following class.

Class 4 was named “Intervention Potential and Challenges,” comprising 25% of ECU’s. The main terms that significantly joined the class (p < 0.05) were: collection, execution, perform, system, challenge, routine, easy, urine, Santa Casa, contribution, term, oblige, talk, place, request, end, relationship, hospital, difficulty, and have. The content of Class 4 is focused on questions surrounding the execution of rapid diagnostic testing outside the research context. Some examples of the main statements that joined this class were those of participant 1 of focus group 1 about the main challenges faced when using the rapid diagnosis intervention:
So if this became routine, it would be collected in the three shifts of the hospital, so everyone, people would have to be trained, but also that it is not difficult as it has not even been implemented, they are tests that are easy to interpret and execute. (And the difficulties? I think it's being out of the routine even because it interferes with the already established work demand of nursing and laboratory professionals. It's a question of costs and that's it [...])”

[The excerpts in parentheses show the complete speech.] Again, now coming from another participant, the perspective appears that rapid testing may be easier to carry out outside the research context. This is because it would be within the usual system and procedures and it would not require new procedures or a specific system, as was the case during the research. Furthermore, the professional indicates as challenges the financial resources to expand access and, mainly, human resources to make the implementation of the intervention viable.

Finally, participant 2, from focus group 2, when asked about the main challenges faced when using the rapid diagnosis intervention, said:

(So, we can actually reach all the patients who would be eligible. We have a lot of people who are lost in the flows), who are lost there with advanced HIV, with the disease progressing and who are not having access to hospitals and who are in the program, so I think that for me, from a macro point of view, this is the biggest challenge.

[Excerpts in parentheses provide context.] In this way, it adds to the aforementioned challenges the need to reach PLHIV who are outside the care and treatment streams. The same professional continues to say:

We had internal challenges there, I think many have already been commented on by colleagues in relation to the teams, the collections, but in my understanding, these are operational challenges that we will always have in any study. (I think the macro challenge here on the issue of HIV is to expand access. Are we really managing to include all people who have advanced HIV? [...] and that the decision can then be taken by more, with data more reliable, right? What is happening? Who are these people? What does the test impact or not, and based on that, whether it is worth implementing or not).

[The excerpts in parentheses show the complete speech.]
Therefore, in his opinion, the main challenge is to expand access to health care for PLHIV. He seems to question the need to expand testing before having more reliable data and resolving this; for him, the primary issue is to reach people living with advanced HIV disease outside the care network. And only then, to think about whether it is worth implementing rapid testing in the routine of professionals as a health policy.

Despite not appearing among the most recurrent terms, resource management was one of the issues that appeared as a barrier in implementing the intervention. This concern was often expressed through questions and doubts about how it would occur, the feasibility, whether there would be interest in implementing the policy on the part of management, and the cost–benefit quality of making the intervention part of routine health care for PLHIV. Furthermore, even though some claim that the test is simple to perform, there were difficulties with some assistant teams during the research. The discussions in focus group 1 significantly adhered to this class ($X^2 = 37.76; p < 0.001$), therefore being a topic that was heavily discussed in this group.

**Summary**

- **The main difficulty in the intervention revolves around concern about the specificity of the tests.** False positives can lead to unnecessary treatments, imposing considerable costs on the patient. This situation may raise doubts about the advantages of testing asymptomatic individuals. Furthermore, it can lead to a delay in diagnosis, necessitating further investigations. False negatives, especially when there is a strong prior suspicion that the disease is present, also delay diagnosis, hinder the provision of adequate treatment, and cast doubt on the quality of the test.

- **It is advantageous that the test is quick, but the treatment also needs to be.** The proposed intervention, rapid diagnosis, is advantageous (easy to perform, less invasive, etc.). Time is crucial and the existing exams take a long time, with serious consequences. However, it is important to ensure that other treatment processes occur with quality and speed, as the focus is to increase the chances of a positive prognosis for the patient. It is even reinforced that evidence of the intervention is produced in terms of its impacts on morbidity and mortality, thus also providing arguments at the managerial and political level.

- **For this, professionals (human resources [HR]), training, and inputs are needed.**
  
  The inclusion of the intervention in the routine management of patients was considered a challenge due to the current situation of high work demand. To guarantee the quality of the intervention, if it is included in the care routine for PLHIV, it is necessary to guarantee sufficient number of professionals, adequate training so that these professionals can properly carry out the procedures, and that the spaces (hospitals, laboratories, clinics) have the structure and supplies necessary.

**Additional results to highlight**

- **a.** Although for some patients the hospitalization and treatment situation is known, there is value in preparing professionals to communicate in a didactic/simple way about the diagnosis and treatment. This is particularly crucial for the patient or family with lower levels of education. The communication should cover essential aspects such as what is necessary, the severity of the condition, the potential duration of treatment, and other relevant information. This approach becomes even more vital when dealing with advanced HIV infection, as research has shown instances where patients lacked knowledge about it.

- **b.** Interdisciplinary/multidisciplinary collaboration is important and desired. In addition to doctors, technicians, nurses, and pharmacists must be involved and, if they are responsible for the exams, receive appropriate training. Furthermore, the team involved in a multidisciplinary manner facilitates the feasibility of the intervention, engagement, contact with patients, speeding up necessary procedures, among other things. Social workers and psychologists are also called upon to participate in this collaboration and must be familiar with the intervention, in the sense of cooperation to reach
patients, to act in the management of social and psychological impacts on the patient and family.

c. **Ensure interinstitutional cooperation**, the “hospital back-up,” as this bureaucratic/organizational part can be a threat to the viability and efficiency of the intervention.

d. For some professionals, as the objective of the intervention is the health of PLHIV, a central issue is expanding **access, especially for people living with advanced HIV disease who are “outside the system.”**

**Interviews with managers**

The corpus of this component comprised the transcripts of the speeches of four managers. The interviews lasted around 40 minutes each, following the proposed script to access opinions on five topics: importance of rapid diagnosis intervention; experience with rapid diagnosis policies; political flows related to the diagnosis and treatment of tuberculosis, histoplasmosis, and cryptococcosis; interfederative relationship; and barriers and challenges. Data processing in order to carry out the analyses involved four stages. Firstly, the database underwent cleaning to eliminate mentions of speaker/listener identifications, to correct typing/spelling errors, and to exclude frequent speech mannerisms (e.g., “right,” “people,” “I think”). Compound expressions, with words that must be analyzed together and not separately, were joined using underscores, such as Rio Grande do Sul, Ministry of Health, and point of view. Finally, the expressions “individuals living with HIV/AIDS” and “people living with HIV/AIDS” were standardized with the abbreviation PLHIV/AIDS.

**Findings**

Initially, for a first look at the corpus formed by the content of the interviews with the managers, it is worth highlighting some of the most frequently used words: test, service, health, person, testing, treatment, patient, state, fast, need, achieve, large, professional, attention, individual, result, diagnosis, municipality, and challenge. The words are associated with the five themes proposed for the interview about the intervention and indicate the centrality of the theme of testing and treating PLHIV/AIDS. At this stage, “test,” “testing,” “service,” “health,” and “treatment,” as the most frequent terms, demonstrate the difference in the approach to the subject from a management perspective in comparison with the statements from interviews with healthcare professionals, even though words like “person” and “patient” also appear here as the most frequent.

Some points emerge from this initial overview of the corpus. The first are the challenges of testing and treatment, which are inherent to the complexity that public health requires in terms of resources and infrastructure. Testing is essential for diagnosing diseases and monitoring the response to treatment. In this sense, the contrast between the advantage of the speed of the intervention and the concern about its feasibility and accessibility seem to be central points in the participants’ statements. The words “achieve,” “great,” “challenge,” and “need” emphasize this concern, indicating that some actions need to be taken to implement the intervention as a health policy, seen as a major challenge. The words “health,” “person,” “patient,” and “individual” also appear prominently, which suggests managers’ concern/commitment to people-centered public health, focused on individual needs. They refer to the importance of individual attention, and although the feasibility of implementing the intervention is the center of the managers’ speech, this connects with the statements about concern for patients and their individual needs. The terms “state” and “municipality” appear prominently, which reflects the discussion about the relationship between the Union, states, the Federal District, and the municipalities, as coordination between the different federative entities and the differences in priorities between them is another challenge related to implementing the intervention. They also refer to the role of federative entities in public health; in this context, the government is responsible for financing and providing health services, thus, there is a concern in terms of cost–benefit and maintenance from the possible implementation of the policy.

Next, **Figure 4** presents the result of the Similarity Analysis. In the figure, it is possible to identify two
thematic axes, each formed by four communities. At the top, in light blue, is the community about rapid testing, linked to the HIV/AIDS communities, health and health professionals, and health services. Below is the “test” community linked to the themes of treating people/patients, peoples’ needs, and time for results.

Figure 4. Similarity analysis of interviews with managers

SOURCE: PREPARED BY THE AUTHORS.
Starting with the thematic set at the top of the image, terms are organized that indicate a concern, a major challenge, or the biggest challenge for the implementation of rapid testing, and the availability of resources, financial and human – something that also seems linked to the concern with the cooperation between different federative entities. The HIV/AIDS community groups speeches about the managers’ professional experience in caring for PLHIV, the fields of activity, and participation in pilot research on the intervention. The communities in the upper right corner are almost merged. The set of words grouped in the community in dark blue seems to highlight the agents involved in the issue of testing implementation, the municipalities, the state, the Ministry of Health, the specialized attention service (SAE), and the users. The community group in purple indicates statements about the health system, health professionals, and the teams’ point of view on what should be offered to the public/population.

Additionally, the four communities at the bottom of the image are more clustered than those at the top around the word “test.” The set of terms signals descriptive statements about the test as a new resource to diagnose people/individuals, and that for the test to reach primary care it is necessary to invest in training. Another focus of the discussion was people/patients, the concern about high demand and the risks to their lives, and the expectation of the possibility of a treatment/protocol that reduces costs and reduces the use of medication as a result of the implementation of rapid testing, for this strategy allows testing/searching for diseases in patients with advanced HIV infection. Finally, the set of terms linked to the time of the result provided by the test seems to refer to the positive impacts of this, especially in relation to patients with low CD4 count or who seek a reduction in viral load.

Next are the DHC results, in Figure 5. The analysis included 417 TS, retaining 76% of the total (315 ECUs), which were organized into three classes. The corpus was divided into two subcorpora, one formed by Classes 1 and 3 and the other by Class 2.
Figure 5. Descending hierarchical classification result of interviews with managers

<table>
<thead>
<tr>
<th>CLASS 2</th>
<th>30.8%</th>
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<tr>
<td>municipio</td>
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SOURCE: PREPARED BY THE AUTHORS.
Figure 6 presents the DHC dendrogram of the interviews with managers, containing the 10 words from each class with the highest chi-square value (p < 0.001). Two classes brought together speech related to concerns about the “Patient–Professional Relationship” (Class 1) and “Quality of Treatment” (Class 3), linked, mainly, to the respective statements of manager 1 and manager 4. Another set of terms referring to “Feasibility and Interfederative Cooperation” of the testing circuit formed Class 2, mainly the speech of managers 2 and 3.

Class 1, “Patient–Professional Relationship,” grouped statements that raise questions about the relationship between patients and health professionals, and their points of view on testing and health care. In addition to the technical training for carrying out the testing, which is important, the statements highlight the ability to communicate the result appropriately, considering the possible impacts of the news on the patient. Additionally, Class 3, “Quality of Treatment,” brought together words that relate to the improvement of the treatment offered, which can encompass a wide range of factors, from the speed of treatment after diagnosis to the patient’s personal issues linked to treatment adherence (e.g., social vulnerability, substance abuse). These statements seem to emphasize this concern in cases of patients with a high viral load and low CD4 count.

Class 2, “Feasibility and Interfederative Cooperation,” brought together opinions about concerns related to the feasibility of introducing testing into the healthcare circuit (e.g., logistics,

Figure 6. Descending hierarchical classification dendrogram of interviews with managers
financial; “possible bottlenecks”), mainly with human resources. They mention the role of federative entities in this process and the importance of the pilot promoted by the Ministry of Health, carried out in five states and some municipalities. Another transversal point was the criteria for identifying priority municipalities for implementing the intervention; in this sense, they point to municipal data on mortality as a path. Next, Figure 7 presents the CFA of the corpus.

Figure 7. Correspondence factor analysis of interviews with managers

![Correspondence factor analysis of interviews with managers](source_url)
The CFA (Figure 7) shows that the classes formed in this stage of the interviews with managers differ more from each other than those in the focus group stage. The clusters have a clearer independence, being well delimited, and even Classes 1 and 3, despite being close, do not merge, while Class 2 appears well differentiated from the others. Therefore, it can be assumed that the three classes summarize the main themes of the managers’ speeches. The topic of quality of treatment is related to the relationship between health professionals and patients, but in both cases other content restricted to each class appears in the managers’ statements to differentiate, for example, other aspects of the quality of treatment in addition to the patient–professional relationship. Furthermore, concerns about cooperation between federative entities are in fact more dissociated from the issues of the other two classes.

CLASS 1 – PATIENT–PROFESSIONAL RELATIONSHIP

Class 1, called “Patient–Professional Relationship,” was formed by 43% of ECUs. The top 20 words that joined significantly (p < 0.001) to this class, in order of importance, were: individual, professional, point of view, testing, health, want, form, positive, result, achievement, say, measure, challenge, unit, rapid, hepatitis, test, example, negative, and win. This class brought together discussions concerning the relationship between healthcare professionals and patients, linked to rapid testing. The main typical TS of this class include, for example, manager 4’s speech about training or regulatory requirements to be implemented in relation to professionals:

But it is mandatory, therefore, that a health unit must carry out training to make testing available, whether in an outpatient setting, from the point of view of rapid testing, for example, for tuberculosis, which was the point of view of testing mobile testing, from testing at the health center using rapid, more traditional tests.

So, the challenge from the point of view of implementing a public policy that involves rapid testing, whether it be any of these, these diseases, these pathologies, there is the challenge of working with the professional and there is the challenge of serving the patient, the user, right? (In this challenge, one depends on the other, right? As long as you have a well-qualified professional, you have well-qualified service for this user).

[Excerpts in parentheses provide context.]

Again, even with a different triggering question, his speech focuses on the concern with the training of health professionals. In this case, however, he expands the idea presented in the previous speech, by indicating that the root of this concern is the patient–professional relationship, providing training to professionals so that they can provide qualified care. The manager continues his reflection, still on the same topic:

(As much as we have an idea that today testing fast for certain diseases, but it is fast in the sense of bench execution, right?) But it should not be fast from the point of view of user care, patient care, respect for that patient. For us to have friendly environments to welcome certain populations, for us to welcome individuals who are looking for rapid testing.

[Excerpts in parentheses provide context.]

The idea concludes with the emphasis on patient care, by stating that the speed of testing should reflect better quality of care and not rush, with training being a possible way to try to have this control. Next, a statement from manager 4 stands out when asked about points of care, services, or processes that should be involved or even strengthened, to ensure integration or continuity in care for PLHIV diagnosed with tuberculosis, histoplasmosis, and cryptococcosis:

Perhaps still very timid from the point of view of health management, of monitoring these professionals. We still have a logic that the health system incorporates these challenges in a very automatic, right? (But this is not true.
These professionals, they have their suffering, they have their own, their paradox in relation to the delivery of tests.

[The excerpts in parentheses show the complete speech.]

With this speech he closes the idea he developed, the other pole of attention in the patient–professional relationship. In the previous speech, he highlighted the need to ensure the training of professionals to provide quality care for patients. And now it ends by bringing the other side, which is the care of health professionals, who are also affected by the daily dynamics of testing, such as the relationship with the patient and their family, communication of the diagnosis, and decisions about the treatment.

This class represents, almost exclusively, a mapping of manager 4’s speech ($X^2 = 146.93; p < 0.001$). However, it is worth highlighting a statement from manager 3, who joined this class and deals with the patient–professional relationship; specifically, the perspective on which professional should be responsible for testing patients.

(Well, our concern is not about tests, right? Today we have one, a supply provided by the Ministry of Health, obviously this supply can even generate a concern, right? Because it also has to be very tied up in legal form as policy in the Ministry so that we can receive it and it is not something temporary, something restricted to one management, okay?) But who should do the tests as long as they are trained, in our point of view, are nurses, pharmacists, the same professionals who perform rapid tests for HIV, syphilis, hepatitis B, hepatitis C, they already have the ability to carry out this test as long as they undergo training.

[Excerpts in parentheses provide context.]

Similar to the contribution of manager 4, manager 3 indicates his concern about the training of professionals to carry out the testing, especially the technical aspect. For him, it is the professionals who already carry out other tests, such as nurses and pharmacists, who should be responsible for rapid testing of the diseases that are the focus of the intervention. Furthermore, it is worth highlighting the context section in which it indicates that there are no problems in terms of test availability in the research context, but that there is a concern regarding the continuity of the provision of supplies, especially in the management changes of the Ministry of Health.

CLASS 3 – QUALITY OF TREATMENT

Class 3 was named “Quality of Treatment,” comprising 26% of ECUs. The main terms that joined the class significantly ($p < 0.001$) were: patient, Guaíba, seek, treatment, CD4, load, medication, PrEP, viral, test, improve, better, start, understand, participate, TB, index, event, accept, and evolve. This class had some aspects related to Class 1, and its content fundamentally deals with topics related to the quality of treatment, mainly for HIV. It also brings together speech about the treatment of opportunistic infections and coinfected patients, as well as the impact of rapid testing on the treatment process. Therefore, talk about the treatment of opportunistic infections, but also the treatment of HIV, is intertwined. Manager 1’s statements ($X^2 = 124.95; p < 0.001$) were those that most adhered to this class; however, it also comprised statements of the other managers. The following are some examples of the statements that most represent this class.

Starting with the contribution of manager 2, when asked about mechanisms for monitoring and evaluating policies and hospitalizations, he said: “We really need to expand latent tuberculosis infection testing coverage in the country as we realize that on a daily basis, those with a CD4 lower than 350, who should do this treatment, don’t do it, and then the patient starts developing tuberculosis, right?” The content of the speech reveals concern about the reach, supply, and quality of testing and treatment, especially for patients with a high viral load and low CD4 count. Specifically, the manager suggests the use of SIMC (Clinical Monitoring System for People Living with HIV/AIDS) as a powerful tool to carry out active searches. Manager 1 brought something similar when responding about monitoring or evaluating work related to rapid testing:

Where was it confirmed, right? That there is a late diagnosis, that these patients diagnosed late are coming in very sick. These are patients who already have a very high viral load, a very low
CD4 and who are really patients who already have AIDS, right?

So, as in the previously mentioned statement from manager 2, there is a concern about the quality of treatment for patients due to late diagnosis, many of them with a high viral load and low CD4 count. At another time, the same manager 1, when commenting on the importance of rapid diagnostic intervention, said:

So, the patients [...] they show exactly the situation of these people who come seek the service with an advanced illness, right? We already realize that they [...] the results we had later when the laboratory tests for CD4 and viral load came, they concluded exactly with the diagnosis of an advanced disease.

The focus of the speech is the patients and the ability to respond quickly to provide quality treatment, especially when dealing with coinfected patients, diagnosed with advanced disease (low CD4 count, high viral load). The transversal content is to point out the advantage of the rapid test, as something great, as it is a way to quickly start treatment.

Another point related to treatment appears in the same manager’s speech: adherence. Commenting on points of care, services, or processes that can be strengthened to ensure integration and continuity of care for PLHIV diagnosed with tuberculosis, histoplasmosis, and cryptococcosis, he said:

(Yes, unfortunately, in Guaíba, the tuberculosis service is part of the SAE. Tisology in Guaíba works at another address, at another service. Of course, if everything worked together), it would be much better, right? But we are always in contact with patients [...] we are always in contact with information about patients who are infected, whether they are maintaining treatment or not. So we try to apply. [...] “I work directly with the pharmaceutical company. In terms of patients who are abandoning themselves, which patient is not coming to get medication? Why isn’t he coming? So we also plan some things like this to make it easier for them to adhere to treatment. (So, for those who live in more distant locations, we try to offer DOT [directly observed treatment], we provide antiretroviral medication, right? We try to follow exactly what the Ministry determines, right?).

[The excerpts in parentheses show the complete speech.]

After mentioning that tests for opportunistic diseases are conducted in a separate space at his workplace, hindering direct contact with patients, the speaker expresses a continuous effort to address patient adherence to HIV treatment. For instance, the team actively monitors patients who fail to collect their medication and endeavors to facilitate access to treatment.

Therefore, for this manager, ensuring patients’ adherence to treatment for HIV and opportunistic infections is crucial for guaranteeing the quality of treatment and a favorable prognosis for patients. He even gives an example of the success of this strategy with the treatment of congenital syphilis. Another important element at the beginning of his speech is the indication of a priority population for this care that facilitates adherence, people who use drugs, as they tend to face greater difficulties. To achieve this, the manager emphasizes the importance of maintaining a positive relationship and communication with the Psychosocial Attention Center (CAPS) and other services in the healthcare network.

A final theme that differs from this central thematic axis of the class, emerges from manager 1’s speech and connects with the content of Class 1. When discussing processes that can be strengthened or involved to guarantee integration and continuity of the care for PLHIV diagnosed with tuberculosis, histoplasmosis, and cryptococcosis, the manager states:

We filed all the documentation and started PrEP in May … We want to start changing this culture. We want to start by setting up a training project, where there are indications of those technicians who have a better profile and who like to work with this, to do it in a serious, correct way.

[The excerpts in parentheses show the complete speech.]
Subsequently, the manager introduces the theme of the importance of training health professionals to carry out testing, aligning with Class 1. Here he included, in addition to nurses and pharmacists, as in the speech of other managers, the possibility of technical professionals composing the team responsible for carrying out the testing.

To conclude the descriptions of this class, insights from other managers (2, 3, and 4) are presented, delving deeper into the central thematic axis. Starting with manager 2, he discusses the anticipated benefits of the intervention for the organization and functioning of the health system, especially primary health care:

CD4 less than 200 and/or WHO clinical stage 3 or 4 is what we are calling advanced HIV disease, are patients who interrupted treatment (or who didn’t even start, discovered the infection, but never even started HIV treatment. Patients who have it, live in contexts of very serious social vulnerabilities, right? That goes beyond the health sector. [...] “They’re looking at me, right? They care about me.” And so, they are vulnerable patients, and this can also make a difference in relocation, in rescuing treatment, in adherence to this treatment.

[The excerpts in parentheses show the complete speech.]

Several noteworthy points emerge in the manager’s speech. First, the manager underscores a synergistic effect of the pilot, stating that the training provided for the research and the inclusion of the rapid test in the care chain strengthened the crucial process of following the point-of-care stages, which are often neglected. From the patient’s perspective, rapid testing, by streamlining care processes, strengthened adherence to treatment, especially for those with advanced disease. Thus, the speech highlights the two central points of this class: access to testing for people living with advanced HIV disease; and adherence to treatment, especially for patients in socially vulnerable situations. Rapid testing connects these two themes, in his report, by functioning as a sign of respect for patients (due to its agility), which can end up bringing patients who had abandoned or never started HIV treatment back into the care network.

In this sense, manager 4’s speech, when commenting on mechanisms for monitoring policy and interventions, was as follows:

And that is perhaps the biggest challenge, when the individual reports that he has a positive HIV result, when he enters the health system and then it would be necessary, immediately, to ask for viral load and CD4 and carry out the first tests to make the diagnosis. Staging, right? The disease, right? The disease AIDS if you have it, right? A staging of HIV.

The speech refers exclusively to the issue of the quality of HIV treatment. The staging of HIV infection mentioned is a classification used to describe the progression of the disease (i.e., acute infection, clinical latency, early symptomatic infection, and AIDS). This classification is based precisely on some of the factors mentioned in the statements of managers in this class, such as viral load and CD4 count. Patients with advanced HIV disease are more likely to develop opportunistic infections. The manager’s comment is closely connected with the initial points highlighted in this class, emphasizing the crucial need for speed in diagnosis. It also aligns with the content of Class 1, reinforcing that rapid testing should have an impact on the quality (and speed) of the treatment of opportunistic infections. These statements also extend this need for speed and quality of treatment for HIV and other healthcare processes for PLHIV.

Finally, a notable portion of manager 3’s speech stands out when responding about points of care to be strengthened to ensure integration and continuity of care for PLHIV diagnosed with tuberculosis, histoplasmosis, and cryptococcosis:

(Example: there is a user who presented to the primary care system with a positive smear microscopy, will have to start tuberculosis treatment, it is necessary to undergo rapid testing). Once the rapid test is done, there must be a CD4 viral load, it turns out that this CD4 viral load is below 200. He needs to get to a specialized assistance service quickly, the tests were carried out, that is, crypto, TB (no need, because he already has a TB diagnosis. Crypto was performed, we need it, so, somehow, we need to be able to confirm this crypto diagnosis. He will need a lumbar puncture, this
lumbar puncture, it has to be available as soon as possible, right? And if there is a need for hospitalization for the treatment of this crypto, he has to be hospitalized as soon as possible in a high-performance place of excellence, right? So this entire network has to be very tightly knit, so going through specialized primary care, regulation, surveillance and the municipality’s hospital board and coordination).

[The excerpts in parentheses show the complete speech.]

Manager 3’s speech is a noteworthy example of the interconnection of themes grouped in this class, specifically focusing on testing, diagnosis, and treatment of opportunistic infections and HIV. The speech underscores the positive impact of the rapid test but highlights that the other stages of the care circuit must also be quick. To achieve this, the coordination of the care network is the central point.

**CLASS 2 – FEASIBILITY AND INTERFEDERATIVE COOPERATION**

The content of the discourse in the interviews about feasibility and interfederative cooperation made up this class, having been formed by 31% of the ECU's. The top 20 words that joined (p < 0.001) to Class 2 were: municipality, state, circuit, pilot, mortality, identify, need, bring, AIDS, achieve, area, see, resource, service, technology, perceive, primary, careful, available, and powerful. Below, the first example of the main TS typical of this class is what manager 3 says about the policies and rapid diagnostic interventions already implemented in his scope of action:

At this first moment, as we are working with a pilot, the national policy of the Ministry of Health brings to five states and some eligible municipalities in the states, the pilot of the advanced AIDS circuit. We do not have a wide availability of inputs. For us, it is just another technology inserted within the circuit [...]  

The provided excerpt emphasizes the pilot experience as the result of cooperation between the federative entities and introduces the issue of resource limitations within this context. The mention of resource constraints is noteworthy, especially considering that the same manager had previously mentioned that there was no concern during the research stage regarding the supplies provided by the Ministry of Health (in typical Class 1 TS). Nevertheless, it is evident that this is a point of concern, particularly for the implementation of testing outside the pilot context. Toward the end of his speech he asserts that rapid testing is just another technology within the care circuit. This point appears to align with other statements within this class, which pointed to the scarcity of human resources as the bottleneck for providing quality health services. In summary, there is uncertainty about whether rapid testing will make a significant difference or have an impact on the care circuit, given the limitations in terms of resources, mainly human resources.

In this sense, manager 2 is positioned when responding about additional resources – human, financial, material, etc. – he would like to see available to facilitate the implementation of rapid testing:

Human resources always. States and municipalities and services always present human resources as one of the bottlenecks in not being able to get things done, right? [...]  

(There are states that have a lot of difficulty with human resources, hiring doctors. So, we have made a lot of progress, placing nurses as major protagonists in this process of care for PLHIV/AIDS, considering that doctors are a scarcer resource. But so, many states have been posing a need. And then we realize that there are some states that have some international organizations that operate within them and that provide a back-up with a workforce. They hire human resources for them and place them within the service).  

[The excerpts in parentheses show the complete speech.]

For this manager, human resources are the main resource to facilitate the implementation of testing. He also mentions that nurses have been the protagonists in the care of PLHIV and
that some states have professionals hired by international organizations to try to address this bottleneck. The manager continues to comment on these professionals contracted by international organizations, who can be available to accommodate spontaneous demands:

And then we also notice, sometimes that the human resources hired by this organization, who is in the same physical environment as the other, who is a municipal or state employee, is able to provide a workload, he is available to accommodate a spontaneous demand that arises. The municipality without tying up this HIV/AIDS care and the state with this, this company that was contracted to provide this service. So, we realize that in these contractual instruments there are not many indicators there.

Manager 2 raises various points, including financial considerations: “So, I think it can be a strategy and the needs are infinite. Resources are finite.”; and material (e.g., improving physical structure, guaranteeing machines/resources for exams, health transport), but the point emphasized in his speech regarding the feasibility of testing is human resources.

In addition to the resource-related challenges, strengthening the network and promoting interfederative cooperation are crucial for the care circuit to function seamlessly. According to the opinion of manager 3, who sums up the point of interfederative cooperation well when answering a question about which points of care or processes should be strengthened to guarantee the integration and continuity of care for PLHIV diagnosed with tuberculosis, histoplasmosis, and cryptococcosis:

So, the regulation in the municipality that is responsible for the referral flow, by looking at these referrals, also needs to be sensitive and organized to identify the biggest bottlenecks within the process circuit to facilitate users’ arrival at the points of the care network they need. [...] So, this entire network has to be very tightly knit, passing through specialized primary care, regulation, surveillance, and the city’s hospital management and coordination. There is no way to do a circuit of this magnitude without the interfederative.

Manager 3 perceives the entire interfederative connection as indispensable, encompassing for the supply of inputs. He underscores the crucial role of the pilot’s success to support the implementation of rapid testing as a national policy. The speech further advocates for the actions of the Ministry of Health and indicates data on mortality as a criterion for choosing priority municipalities for implementing the program.

The statements of managers 2 ($X^2 = 56.08; p < 0.001$) and 3 ($X^2 = 42.87; p < 0.001$) were those who most adhered to Class 2; however, it is worth highlighting one of the statements of manager 1 who adhered to this class, about the expectation of a new moment of interfederative cooperation to combat HIV/AIDS through information campaigns:

(It seems like we spent a few years sleeping. Few material to publicize, I think few campaigns. And I think all of this made people seem like they left it aside. So much so that the state has the highest rates, right? And you can’t download it.) So, I think that now another moment will begin, we even had a meeting last week, where it was stated that we will start with many campaigns, resources will come and I think that it is this work that the state has to do it together with the municipalities.

The same manager comments on the main challenges and opportunities for intergovernmental cooperation, highlighting the importance of this in the past, such as for the pilot’s articulation:

But I believe that the Ministry of Health, the Department was very fortunate when it launched this pilot circuit of areas in these five capitals, so no, this interview and the knowledge that we have today about advanced AIDS would not be possible if it were not a federal manifestation, which then, following the hierarchical process of the single health system, is passed on to the state secretariat, which also identifies its priority municipalities for implementing the circuit. So, yes, we see the federal sphere as the trigger for this process, identifying its main states and capitals that have had their mortality rates changed and maintained for many years, but also the state as the organizer and evaluator of this process, right?
Thus, feasibility and interfederative cooperation emerge as the central themes grouped in this class, underscoring the interconnectedness between the two. The understanding is that cooperation between federative entities is indispensable for the successful implementation of rapid testing. Furthermore, the availability of financial, material, and, above all, human resources were common points. Resources and a robust network enables rapid testing to contribute to the provision of quality treatment, serving as one integral stage within the care circuit. Without these essential elements, there is a legitimate concern about the potential magnitude of the impact of rapid testing on the treatment of PLHIV.

Summary

- **Training must be mandatory.** A qualified professional ensures a qualified service for the user.
- **It is imperative to uphold quality in the patient–professional relationship.** Training must include, in addition to technical issues, aspects such as reception, communication, and humanized care.
- **Professionals must exercise caution and be mindful of the impacts of the patient–professional relationship on professionals.**
- **The intervention must assure quality control.** It is important to ensure that the chain of care initiated by rapid diagnosis is followed by quality treatment (which includes, but is not limited to, speed), especially for people with advanced HIV disease. When diagnosed with any of the opportunistic infections, people with advanced HIV disease must reach a specialized assistance service quickly. Swiftness is essential for other necessary procedures, hospitalization, and additional examinations as required.
- **To achieve this, the “network must be very well-coordinated,” with interfederative cooperation.** Interfederative cooperation is emphasized as fundamental to ensure that rapid diagnosis results in quality treatment. Articulate specialized primary care, regulation, surveillance, management, and hospital coordination in the municipality. There is no way to implement a circuit of this magnitude without interfederative cooperation.
- **It is crucial to expand access and strengthen adherence to avoid late diagnosis.** It is necessary to prevent patients from reaching an advanced stage of the disease. This involves targeting those not currently undergoing HIV treatment and extending the coverage of latent tuberculosis testing. The Clinical Monitoring System for People Living with HIV (SIMC) can play a pivotal role in conducting active searches. This proactive approach also involves collaboration with various health professionals, including pharmacists and psychologists, as well as professionals from other areas such as social workers and institutions like CAPS. The social, economic, and health vulnerability of some patients is recognized; strategies should be considered to avoid treatment abandonment/facilitate adherence, such as sending medication and providing transportation.

Additional results to highlight

a. There appears to be uncertainty regarding the impact of rapid diagnosis on treatment, given the bottlenecks in terms of human resources. Financial resources also appear as an issue, as this is linked to human resources. This is reinforced by the statement that “needs are infinite, resources are finite.” From a logistical point of view, material resources are also mentioned, such as improving the physical structure of spaces of health facilities (hospital, laboratories, clinic), guaranteeing machines and resources for exams and transport facilities for health matters.

b. High mortality is an important criterion for defining which municipalities should be prioritized.
Interviews with patients

Table 2 shows the general characteristics of the patients. It is important to highlight that in the initial phase of the interviews, four patients withdrew when starting the interview, two declined the invitation, five stopped attending after the first contact, and one was not reachable.

Table 2. General characteristics of patients

<table>
<thead>
<tr>
<th>#</th>
<th>Gender identity</th>
<th>Gender assigned at birth</th>
<th>Sexual orientation</th>
<th>Education</th>
<th>Occupation</th>
<th>Ethnicity</th>
<th>Monthly family income (BRL)</th>
<th>Year of HIV diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Cis man</td>
<td>Male</td>
<td>Heterosexual</td>
<td>Incomplete high school</td>
<td>Construction worker</td>
<td>White</td>
<td>1 750</td>
<td>2010</td>
</tr>
<tr>
<td>P2</td>
<td>Cis man</td>
<td>Male</td>
<td>Heterosexual</td>
<td>Complete elementary</td>
<td>Cab driver</td>
<td>White</td>
<td>2 000</td>
<td>2023</td>
</tr>
<tr>
<td>P3</td>
<td>Cis woman</td>
<td>Female</td>
<td>Heterosexual</td>
<td>Complete elementary</td>
<td>Takes care of her home</td>
<td>White</td>
<td>No income</td>
<td>2023</td>
</tr>
<tr>
<td>P4</td>
<td>Cis woman</td>
<td>Female</td>
<td>Heterosexual</td>
<td>Complete elementary</td>
<td>Day laborer</td>
<td>White</td>
<td>1 300</td>
<td>2000</td>
</tr>
<tr>
<td>P5</td>
<td>Cis woman</td>
<td>Female</td>
<td>Heterosexual</td>
<td>Complete high school</td>
<td>Factory salesperson</td>
<td>White</td>
<td>1 500</td>
<td>2007</td>
</tr>
<tr>
<td>P6</td>
<td>Cis man</td>
<td>Male</td>
<td>Homosexual</td>
<td>Complete high school</td>
<td>Event promoter</td>
<td>White</td>
<td>2 800</td>
<td>2016</td>
</tr>
<tr>
<td>P7</td>
<td>Cis man</td>
<td>Male</td>
<td>Heterosexual</td>
<td>Incomplete elementary</td>
<td>Truck driver</td>
<td>White</td>
<td>2 000</td>
<td>2014</td>
</tr>
<tr>
<td>P8</td>
<td>Cis woman</td>
<td>Female</td>
<td>Heterosexual</td>
<td>Incomplete elementary</td>
<td>Unemployed</td>
<td>Black</td>
<td>2 204</td>
<td>2012</td>
</tr>
<tr>
<td>P9</td>
<td>Cis woman</td>
<td>Female</td>
<td>Heterosexual</td>
<td>Incomplete elementary</td>
<td>Unemployed</td>
<td>Black</td>
<td>800</td>
<td>2009</td>
</tr>
<tr>
<td>P10</td>
<td>Cis man</td>
<td>Male</td>
<td>Heterosexual</td>
<td>Incomplete elementary</td>
<td>Mechanic</td>
<td>White</td>
<td>2 035</td>
<td>2023</td>
</tr>
<tr>
<td>P11</td>
<td>Cis man</td>
<td>Male</td>
<td>Heterosexual</td>
<td>Incomplete high school</td>
<td>Gardening assistant</td>
<td>Brown</td>
<td>1 200</td>
<td>2023</td>
</tr>
<tr>
<td>P12</td>
<td>Cis woman</td>
<td>Female</td>
<td>Heterosexual</td>
<td>Incomplete elementary</td>
<td>Domestic</td>
<td>White</td>
<td>3 000</td>
<td>2011</td>
</tr>
</tbody>
</table>

Source: Prepared by the authors.
The corpus was composed of the content of the interviews with 12 participants; two of the interviews were carried out with relatives of the patients who accompanied them during hospitalization and testing, and one interview had technical problems and was summarized by the interviewer and not transcribed. The interviews were carried out via audio call, lasting around 40 minutes, and dealt with the five themes proposed in the script: previous diagnostic experiences, perceptions about the rapid diagnosis intervention, perceived benefits, barriers and challenges for implementation, and recommendations for improvement. Data processing to carry out the analyses followed the standardization of compound words by joining them using underscores (e.g., Rio Grande do Sul, Vila Nova), the exclusion of expressions and speech mannerisms (e.g., “nê,” “then,” “thing”), and the term “postão” was standardized to post. Three of the participants had a much greater amount of speech than the others, and in these cases, an attempt was made to reduce repetition, confusing speech, and some digressions, to avoid overlapping these interviews in relation to the others. In some cases it was necessary to leave part of the question from the interviewer in the corpus to anchor a short answer from the patient; for example, yes or no answers when asked about a previous diagnosis of an opportunistic infection. In addition, a table was created with the answers to the questions in summary form, as a strategy to facilitate the visualization of the separation of the corpus of questions and answers (Table 3).
## Table 3. Summary table of interviews with patients

<table>
<thead>
<tr>
<th>Profile</th>
<th>Diagnosis time and conditions</th>
<th>Opportunistic infections</th>
<th>Difficulties and expectations about the intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 - 25 years old, male, heterosexual, no information on marriage and children</td>
<td>13 years.</td>
<td>Tuberculosis.</td>
<td>The biggest problem related to patients with HIV is the lack of respect from healthcare teams? (Again, a patient responds focused on the HIV/AIDS experience, not the test.)</td>
</tr>
<tr>
<td>P2 - 58 years old, male, heterosexual, married, has children</td>
<td>Less than a year.</td>
<td>None.</td>
<td>I didn’t worry about that, exams. (The participant focuses his answers on the impact of discovering he is HIV-positive and leaves aside the issue of rapid testing.)</td>
</tr>
<tr>
<td>P3 - 54 years old, female, heterosexual, widow, has children</td>
<td>27 years. She doesn’t know how she got it. Friend suggested testing because they were doing testing while she was taking care of her grandmother in the hospital.</td>
<td>Tuberculosis.</td>
<td>She doesn’t remember when she took the exam.</td>
</tr>
<tr>
<td>P4 - 70 years old, female, heterosexual, widow, has children</td>
<td>20 years. A companion had it. Then, she found out she had it, saw an advertisement and decided to take the test to confirm. She started treatment 5 years ago.</td>
<td>Histoplasmosis.</td>
<td>No.</td>
</tr>
<tr>
<td>P5 - 28 years old, female, heterosexual, no information on children</td>
<td>At 12 years old. She was hospitalized with low immunity. Transmission occurred from mother to daughter, it seems that she was born with the virus.</td>
<td>No. Tuberculosis was suspected, but it was negative. He doesn’t know anyone who has had it.</td>
<td>Tuberculosis. The tuberculosis I had is the one that doesn’t spread to anyone, it’s from the lungs.</td>
</tr>
<tr>
<td>P6 - 37 years old, male, homosexual, divorced, has children</td>
<td>2–3 years. He got sick, lost weight, and was diagnosed at the hospital.</td>
<td>Human papillomavirus.</td>
<td>No. Pneumonia.</td>
</tr>
<tr>
<td>P7 - 60 years old, male, heterosexual, single, has children</td>
<td>9 years. Exams due to cancer.</td>
<td>Pneumonia.</td>
<td>Tuberculosis.</td>
</tr>
<tr>
<td>P8 - 34 years old, female, heterosexual, single, has children</td>
<td>11 years. She was going to have surgery to remove the tube in Conceição. She wasn’t being treated.</td>
<td>Meningitis.</td>
<td>Meningitis.</td>
</tr>
<tr>
<td>P9 - 44 years old, female, heterosexual, single, has children</td>
<td>16 years. The partner had it, so she got tested.</td>
<td>Tuberculosis.</td>
<td>The tuberculosis I had is the one that doesn’t spread to anyone, it’s from the lungs.</td>
</tr>
<tr>
<td>P10 - 37 years old, male, heterosexual, married, has children</td>
<td>This year he discovered in an exam that he had to pull out a tooth. Doctors reported that he has probably been living with the virus for more than 10 years.</td>
<td>If it never was. She had tests done when she was hospitalized, she doesn’t remember.</td>
<td>No. Not being able to walk, not being able to see your children, Vila Nova does not allow children to visit, lung pain. (Patient reported difficulties, but not about testing.)</td>
</tr>
<tr>
<td>P11 - 38 years old, male, heterosexual, married, no children</td>
<td>15 years. He got it from his first wife. She found out when she tested trying to get pregnant, he took the test soon after.</td>
<td>- No.</td>
<td>- No.</td>
</tr>
<tr>
<td>P12 - 54 years old, female, heterosexual, divorced, has children</td>
<td>Approx. 10 years.</td>
<td>Tuberculosis.</td>
<td>Not about the exam, about the treatment, difficulty adapting to the medicine and being able to eat.</td>
</tr>
<tr>
<td>P13 - 45 years old, male, heterosexual, no information on marriage and children</td>
<td>-</td>
<td>Tuberculosis.</td>
<td>- Not with the service itself.</td>
</tr>
<tr>
<td>P14 - 50 years old, female, heterosexual, married, has children</td>
<td>-</td>
<td>None.</td>
<td>Health difficulties (convulsions, starvation).</td>
</tr>
<tr>
<td>P15 - 60 years old, male, heterosexual, single, has children</td>
<td>-</td>
<td>My stepson had tuberculosis.</td>
<td>Wasn’t treated for many years, it’s... immunity was very low.</td>
</tr>
</tbody>
</table>

**Results**: 50
Table 3. Summary table of interviews with patients (continued)

<table>
<thead>
<tr>
<th>Did the rapid diagnosis take time?</th>
<th>Symptoms and time from first symptom to diagnosis</th>
<th>Clear and sufficient information about the intervention</th>
<th>Influence on treatment and quality of life, benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is unaware of the intervention. I didn’t know, I found out later. Don’t remember. Yes. 2–3 days of delay in the results -</td>
<td>No symptoms. Paralytic (toxoplasmosis). “Symptoms of a flu.” 5 days until you have all the test results. It had been bad for a few days. After having the flu, which developed into pneumonia, he was at home self-medicating. Shortness of breath, a lot of pain in my back, a lot of pain in my chest” (pneumonia). 3 months. He went to three hospitals before being diagnosed in Vila Nova. (I think he is referring to the HIV/AIDS diagnosis here.) “Very severe headache.” He went to UPA, went to Vila Nova, was dismissed and got worse at home. It was at Conceição, where he was hospitalized for 30–40 days. In Vila Nova he caught COVID, spending another 20–30 days in hospital. Pumping out blood, lung pain, not walking, organ damage. Two weeks at the Bom Jesus station, several tests, but for tuberculosis only in Vila Nova. In the hospital, a week until being informed of the diagnosis, 2–3 months hospitalized. Intracranial pressure, vomiting, headache; I couldn’t open my eyes, move or get up (meningitis). Postão da Cruzeiro, a week in the emergency room, then Vila Nova. It was already very bad before I went to the clinic, I don’t know how long it was.</td>
<td>Yes. Yes. The doctors spoke to the children. Yes. (I believe the answers refer to the HIV/AIDS diagnosis.) Yes. Yes, but he didn’t receive, nor was he able to get the results of the tomography. Yes. Yes, but they spoke to her children, relatives and daughter-in-law, she was unconscious in the ICU, unresponsive (meningitis). Regarding the three diseases, he says he took tests at the Cruzeiro station, but it was always negative. Yes. Yes. Yes. Yes.</td>
<td>PLHIV should have a faster flow, as soon as they are diagnosed, without “popping up.” Monitoring, assistance, care. Every consultation you make, you wait to hear something good, a reaction. I don’t know. “I no longer have any expectations, I live today, because I don’t know if I’ll be here tomorrow.” “It’s good, because then it’s faster to fight.” The faster the result, the faster the concern can be resolved (if the result is negative) or progress toward treatment. -</td>
</tr>
<tr>
<td>No. Yes. (Saturday to a Sunday) No</td>
<td>Yes, received the results. Yes. No. Yes, I didn’t know. I found out later. - Don’t remember. Yes. No. Yes, received the results. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes. Yes.</td>
<td>He had no symptoms, they did tests because he was thin. 21 days admitted to Vila Nova.</td>
<td>Two days at the Bom Jesus gas station. Approx. 50 days in Vila Nova hospitalized.</td>
</tr>
<tr>
<td>Difficulty accessing, performing, or receiving results</td>
<td>Treatment could be more isolated, the biggest barrier is shame...</td>
<td>No. “For me, there are no longer any barriers to the type of life I’m living, okay?”</td>
<td>No. I wouldn’t know how to answer you.</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>Concerns about the intervention</td>
<td>None. I don’t know.</td>
<td>With the family. (How will she receive the result.)</td>
<td>No.</td>
</tr>
<tr>
<td>Difficulties implementing intervention in the health service</td>
<td>-</td>
<td>I don’t know.</td>
<td>No. (From the beginning of the hospital to the end of [...] CAPS and the health center it’s a... It’s a group that worked together with us, together with the patient, understand? It went really well. It was wonderful.)</td>
</tr>
</tbody>
</table>

Recommendations to improve intervention

- Regardless of the tests, the first improvement is the qualification of professionals to provide better care, with more respect for patients, with more agility, and with more accurate information regarding referrals. There is no point in having a diagnosis if there is no appropriate treatment.

- The Brazilian health system is not very effective, but the number of doctors who work there is good. But they don’t have what we can do anymore; you know, there’s nothing else to do.

- I would trust more in professionals specialized in this part of well, STIs or infections. Doctors, nurses, everything related to health care.

- God it would be my grandchildren, my children, my husband, my mother, my mother-in-law. (About improving quality of life for PRHVI)

- From what I remember. “I have always been treated well.” Where would you prefer to be tested? Suddenly in the house? “Look, the way I feel today, I wish it were at home. I have such a trauma that I don’t want to go out on the street. For me it would be great.”

- I believe that there could also be smaller clinics, other health units. Without a predilection for professionals, “our system is very overloaded.” “If this were more easily available in any position, it would be enough.”

- “I was well taken care of. I have always been treated well.” Where would you prefer to be tested? Suddenly in the house? “Look, the way I feel today, I wish it were at home. I have such a trauma that I don’t want to go out on the street. For me it would be great.”

- “I had, I wanted there to be a more effective treatment, you know. A more effective treatment for this disease. And that it wouldn’t get in the way of my daily life.”

- “I don’t know if it’s necessary to take as much medicine as I do. I take 15 pills.”

- “I don’t know, I was treated well in the hospital.”

- “What a pill. Could there be an injection? Oh, it’s my dream.” (Refers to HIV/AIDS treatment.)

- “No. I don’t know, I was treated well in the hospital.”

- “It’s a group that worked together with us, together with the patient, understand? It went really well. It was wonderful.”

- “I was well received, it was great. I trust nurses, doctors.

- “I had to be more of a psychologist.” (Most of the patient’s responses are about the recent discovery of HIV/AIDS; in this case, for example, he talks about the suffering of discovering the diagnosis and the importance of the psychologist).

- “They are doing a very good job.” “This part of the rapid test, that’s it, I was impressive, impressed to see the rapid test there that he did in front of me, with the nurse at the station. It went really well. So now I feel fulfilled and very, very happy! For me it’s great, it’s a 10 for them.”

Results 37

SOURCE: PREPARED BY THE AUTHORS.
Findings

The initial descriptive data in the corpus reveals a set of frequently used terms, including: stay, give, talk, take, treatment, hospital, diagnosis, rapid diagnosis, day, post, tuberculosis, doctor, Vila Nova, health, and exam. Firstly, the main verbs highlighted in the corpus refer to healthcare processes by professionals in the field, reports of experiences about rapid diagnosis, but also about the discovery of their HIV-positive status and other occasions of care or exams. The words hospital, post, and Vila Nova, refer to places where health services are provided, places where the reported experiences occurred, exams, hospitalizations, and treatments. Terms such as treatment, examination, diagnosis, and rapid diagnosis indicate precisely the care procedures they underwent, with the specific expression “rapid diagnosis” being the central thematic focus of the questions. The fact that examination and diagnosis appeared as synonyms and dissociated from the compound expression “rapid diagnosis” indicates that some of the patients’ statements referred to other examinations and diagnoses (again, such as the HIV-positive status discovery process itself) other than those of the intervention. The figure of the doctor appears as the health professional most present in the reports, with the terms professional and nurse appearing less frequently. The word day is probably related to the duration of healthcare procedures, exams, hospitalizations, and treatments; it can also refer only to an expression regarding a moment in a story (e.g., “on the day I was discharged from the hospital”). Finally, tuberculosis appears as the opportunistic infection most commonly mentioned in interviews.

The Similarity Analysis was divided into two sets of communities, one grouping terms related to questions and the other to answers. Thus, for example, the first set brought together terms such as rapid diagnosis, benefit, improve, expectation, concern, difficulties, receive, result, prison, health, and monitor. All these descriptive words made up the questions about the experience, barriers, concerns, and suggestions about rapid diagnosis. The second grouping brought together words such as diagnosis, tuberculosis, histoplasmosis, time, delay, week, hospital, Vila Nova, doctor, and nurse. Most of them also related to questions about the diagnosis of opportunistic infections, symptoms, delay in diagnosis from the first symptoms, and responsible professional. The information that went beyond the terms that made up the questions referred to stay, person, child, hospitalize, day, and talk; and say, service, look, work. They seem to refer to difficulties faced by patients when hospitalized, receiving visitors, people staying with children, and communication of the diagnosis by health professionals. Finally, the term home appears alongside hospital and Vila Nova, probably as a suggestion of a place, an alternative, for healthcare procedures to take place. Due to the analysis not adding important information to the discussion, it was decided not to add the result figure.

Figure 8 presents the results of the DHC; the analysis included 394 TS, retaining 78% of the total (307 ECUs), which were organized into four classes. The corpus was divided into two subcorpora, one formed by Class 4 and the other by Classes 3, 1, and 2. This second subcorpus was divided again, opposing Class 3 and Classes 1 and 2. And this last subcorpus was divided once again, into Classes 1 and 2, which are the closest.
Figure 8. Descending hierarchical classification result of interviews with patients

CLASS 4
26.7%

CLASS 3
18.6%

diagnóstico_rápido
resultado
vida
receber
informação
expectativa
suficiente
realizar
acompanhar
método
qualidade
procedimento
acessar
tratamento
influençar
recurso
ótimo
claro
relação
benefício
mental
sentar

CLASS 1
25.7%

tuberculose
ano
histoplasmose
criptococose
diagnóstico
hiv
suspeita
razão
doença
graça
definitivo
guri
quadro
época
conhecer
exame
início
descobrir
tempo
deus
mês
abrir
síntoma

dizer
vila_nova
posto
paciente
procurar
alto
ver
enfermeiro
médico
maior
equipa
confiar
teste
saúde
casa
entrer
atendimento
próprio
maravilhoso
escarro
bagulho
lugar
conseguir

CLASS 2
27%

tomar
remédio
usar
conversar
medicação
sozinho
noite
mundo
cama
ajudar
camisa
banho
dia
dormir
dar
filho
enexergar
diminuir
surto
deitar
clínica
amoxicilina
acontecer

SOURCE: PREPARED BY THE AUTHORS.
Next, in Figure 9, the DHC results are organized into a dendrogram. It contains the four classes formed, with the corpus of interviews with patients, containing the 10 words from each class with the highest chi-square value ($p < 0.001$). One of the classes grouped the contents of the questions asked by the interviewers and which, as they were answered by the patients objectively, remained in the corpus to anchor simple answers, such as yes and no. It was the most independent of the other classes and was named “Rapid Diagnosis.” Another set of statements referring to “Opportunistic Diseases” formed Class 3 and grouped themes relating to the diagnosis of opportunistic infections, specifically tuberculosis, histoplasmosis, and cryptococcosis. Finally, Classes 1 and 2 organized content related, respectively, to “Experiences with the Health System” and “Health–Disease and Drug Treatment.”

**Figure 9. Descending hierarchical classification dendrogram of interviews with patients**

![Dendrogram showing four classes: Rapid Diagnosis, Opportunistic Diseases, Experiences with the Health System, and Health–Disease and Drug Treatment.](source)

<table>
<thead>
<tr>
<th>Class</th>
<th>Words</th>
<th>Freq</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 4 Rapid Diagnosis</td>
<td>D. Rápido, Resultado, Vida, Receber, Informação, Expectativa, Suficiente, Realizar, Acompanhar, Método</td>
<td>30</td>
<td>66.35*</td>
</tr>
<tr>
<td>Class 3 Opportunistic Diseases</td>
<td>Tuberculose, Ano, Histoplasmos, Criptococose, Diagnóstico, HIV, Suspeita, Razão, Doença, Graça</td>
<td>20</td>
<td>44.90*</td>
</tr>
<tr>
<td>Class 1 Experiences with the Health System</td>
<td>Dizer, Vila Nova, Posto, Paciente, Procurar, Alta, Ver, Enfermeiro, Médico, Equipe</td>
<td>22</td>
<td>45.77*</td>
</tr>
<tr>
<td>Class 2 Health–Disease and Drug Treatment</td>
<td>Tomar, Remédio, Usar, Conversa, Medicação, Sozinho, Noite, Mundo, Camar</td>
<td>22</td>
<td>42.37*</td>
</tr>
</tbody>
</table>

Note: * $p < 0.001$; + Diagnóstico Rápido.
Class 4, “Rapid Diagnosis,” brought together statements related to questions about the intervention, receipt of results, possible impacts on the quality of life of PLHIV, whether there was clear and sufficient communication, difficulties in carrying it out, which professional monitored, additional features and services, and suggestions for improvements. Furthermore, it also brings some terms that indicate clues about the answers, beyond yes or no, such as the word “great” linked to a positive evaluation of the intervention and the centrality of the concern with treatment beyond testing. Patient 2 was most closely linked to this class, which may indicate that he was the one with the shortest answers, as the words here mostly refer to questions answered objectively (e.g., yes or no) or not answered (e.g., I don’t know, I just have to thank you). Furthermore, Class 3, “Opportunistic Diseases,” grouped topics relating to the diagnosis of opportunistic infections, specifically tuberculosis, histoplasmosis, and cryptococcosis. Reports about the discovery of positive serology or diagnosis of HIV are also grouped in this class. Patient 9 was the one whose statements most represented this class, probably because the discovery of HIV occurred in parallel with a suspicion of tuberculosis, therefore uniting the two central axes of this class.

Class 1, “Experiences with the Health System,” brought together reports of experiences with the health system, especially rapid diagnosis; the Vila Nova hospital and health posts appear as reference places in health care for PLHIV, and doctors and nurses as the professionals responsible for providing this care. The statements of patients 7 and 8 represented this class more. Class 2, “Health–Disease and Drug Treatment,” grouped speech whose content refers to treatment with drugs, the impacts of these and other experiences on the health system (medicines, exams, hospitalizations), and the impacts on mental health and relatives. The content of the interview of patients 10 and 12 represents this class more. Next, Figure 10 presents the CFA with the arrangement of words according to the DHC.

Figure 10. Correspondence factor analysis of interviews with patients

SOURCE: PREPARED BY THE AUTHORS.
The results indicated the corpus was organized into four classes. Class 4 is made up of the largest number of words, with few terms highlighted and focused on rapid diagnosis. Class 3 is the smallest and most independent of the classes (far from the others), focused mainly on opportunistic infections, but also on the report of the discovery of the HIV diagnosis. Classes 1 and 2 are the most mixed with each other, composing a single subcorpus, with verbs as highlighted words, respectively, to say and to take. The verb say, from Class 1, refers to the centrality of describing reports of the patients’ experience in the health system; and the verb take, to drug treatment. Class 4 and Class 1 also have a certain proximity, which makes sense since Class 4 refers to questions and Class 1 to the main answers. Class 2 also represents a set of responses, but it was more secondary, which may indicate that sometimes participants began their responses by commenting on their experiences in the health system and then made reference to drug treatment. Therefore, there is a centrality of Class 1, as it connects the other classes.

CLASS 4 – RAPID DIAGNOSIS

Initially, the class descriptive data indicate the most representative words, with the top 20 being (p < 0.001): rapid diagnosis, result, life, receive, information, expectation, sufficient, perform, monitor, method, quality, procedure, access, treatment, influence, resource, great, clear, relationship, and benefit. The class mainly grouped the interviewers’ statements, which served to anchor simple answers, such as yes or no.

For example, the short answers from patients 12 and 11 are among those that joined this class. The interviewer asks, “And thinking about, in the diagnosis, did you receive clear and sufficient information about the procedure and the results?, “ to which patient 12 responds “Yes.” To the same question, patient 11 responded “Yes, yes, of course. Well explained ...” Thus, it is possible to see that the organization of the class occurred in relation to the key terms of the questions, especially those with direct answers. Because of this, the summary table of objective responses (Table 3) is more informative than what can be inferred here – whereas here, participants indicate that they received clear and sufficient information about procedures and results.

Other excerpts that joined the class were the following from patients 9 and 3, respectively:

Interviewer: And did you face any difficulties in accessing, performing, or receiving the results of the rapid diagnosis method? Patient: No, no. It was all very fast.

Interviewer: Did you have any concerns about this whole intervention? Patient: I had it with my family, right?

Interviewer: Have there been any benefits so far? Patient: [communicates with head-shaking] ... Look ... I don’t know.

Interviewer: Did you face any difficulties in accessing, performing, or receiving the results of the rapid diagnostic method? Tell me about them. Patient: No, I didn’t find any difficulty with that.

Again, these are short answers to indicate that there were no difficulties in accessing the diagnostic results. Furthermore, patient 9 reveals concern about the diagnosis in relation to his family; and patient 3 is unable to organize a response about possible benefits of the intervention. Likewise, for the same question about difficulty in accessing results, other statements from the interviewer with short answers adhered to this class, such as the “No” from patients 1 and 10. Regarding the question about concerns with the intervention, patient 1 responded “There aren’t any, actually,” and patient 10 said the following:

In fact, my only concern is that as soon as I started the treatments, I became a little allergic to them, so what? Then they explained that it could really happen and then it went away for a while. That was the only concern, either I was too weak and the medicine is too strong and something could end up going wrong. But after a while they explained everything, everything is fine.

Patient 10’s report refers to an allergic reaction at the beginning of HIV treatment and not a concern with the intervention. Therefore, it is clear that, in short, the information in this class was limited to confirming some contents that are better organized.
in the summary table. Even the result that patient 2’s contribution significantly adhered to this class ($X^2 = 13.07; p < 0.001$) is only an indication that this was probably the conversation in which the interviewer spoke more than the patient.

**CLASS 3 – OPPORTUNISTIC DISEASES**

In Class 3, the top 20 words that represented the content of the participants’ statements were ($p < 0.001$): tuberculosis, year, histoplasmosis, cryptococcosis, diagnosis, HIV, suspicion, reason, disease, grace, definitive, kid, picture, time, know, examination, beginning, discover, time, and god. The speech of this class also brought together strongly objective answers to the interviewers’ questions; in this case, essentially, about previous diagnosis of opportunistic infections. For example, the statements of patients 2, 4, and 5, who only answered “No” to whether they had previously been diagnosed with tuberculosis, histoplasmosis, or cryptococcosis. Patients 2 and 4 answered the same question about whether they knew someone who had already been diagnosed with these diseases. Patient 5 replied “No, there’s someone I know, but it looks like she had tuberculosis.” As an example of a positive response to a previous diagnosis of one of these diseases, patient 6 said, “I was admitted to the hospital with this disease, histoplasmosis.”

The patient whose response most adhered to this class was patient 9 ($X^2 = 8.75; p < 0.01$), due to her report of hospitalization with suspected tuberculosis. Few of the patients’ statements provided additional information beyond objectively yes or no, such as the statements by patients 11 and 9 about the threat of tuberculosis, respectively:

Interviewer: [...] other diseases such as tuberculosis, histoplasmosis, or crypto ...

Patient: My son had it first, my son was 14 years old at the time, 17 years old at the time, he had it. And I had cancer, I had low immunity. I must have caught things like that, the ... Having contracted tuberculosis and [...]. In the meantime, now, 5 months, 6 months ago, I went for the diagnosis, exam, and I found out that I was threatened with tuberculosis.

**CLASS 1 – EXPERIENCES WITH THE HEALTH SYSTEM**

For Class 1, the top 20 terms that most represented the content that formed this grouping were ($p < 0.001$): say, Vila Nova, post, patient, look for, high, see, nurse, doctor, bigger, team, trust, test, health, home, understand, care, own, wonderful, and sputum. These words refer to reports of experiences with the health system, especially with rapid diagnosis, but also other healthcare contacts (e.g., exams, treatment).

The responses that most adhered to this class were those of patients 8 ($X^2 = 10.02; p < 0.001$) and 7 ($X^2 = 7.83; p < 0.01$). Thus, the main contribution represented by this class was that of patient 7 on problems related to PLHIV. The patient suggested that the biggest problem related to patients living with HIV is disrespect from healthcare teams. He said no one ever took care of him, no health professional. He always went to emergency rooms and hospitals. Generally, he was sent “from one side to the other, like a dizzy cockroach.” This statement connects, for example, with the management’s concern with the quality of health care for PLHIV and adherence to treatment, as well as with the suggestion of actively searching for patients “absent” from treatment.

Another report was that of patient 4, who, when asked which professionals he trusted to carry out the test, indicated that he trusted any health professional and suggested that, preferably, they specialized in infectious diseases. Similar to patient 7, patient 4 vents about a bad experience, saying, “So, I didn’t want a doctor that I got from Vila Nova, now. That says I have diabetes, that I have high cholesterol. Dust! My diabetes, I bought a device to do it, gives me 75 every day.”

**Results**

Interviewer: Have you ever experienced any of these illnesses? Patient: I almost had tuberculosis, right? Which came back negative.

So, just like in Class 4, Class 3 adds little; it just confirms some of the information that has already been better gathered in the results summary table.
In turn, patient 8 indicates that he was not confident when he was tested for HIV at the clinic, but was referred to Vila Nova hospital. For him, the hospital gave a greater sense of confidence in the results of the tests that diagnosed the disease. His response, which emerged as a cross-sectional report based on the question about how he discovered his HIV-status, was as follows: “Then I went to Vila Nova, the health post must be a lie, then in Vila Nova he underwent other tests there and saw that he had his blood tested, and that’s what happened, you know? Then they gave me that information.”

In contrast, patient 6’s report about his experience with the health system was positive. When asked about his preference for health professionals to perform the test, he said: “Look, there is no specific one. The doctor who treated me at Vila Nova was very young. I was treated very, very well because I was able to go home with few consequences. I trust nurses, because my son is a nurse.” Likewise, the statement from patient 12’s mother about her experience with the rapid diagnosis method: “‘Doctor, yes, he is HIV-positive, now I wanted to see if I could do more’, so he said ‘no’. Then it was there where he ... walked faster, everything was treated for syphilis, treated for ... Look, the service, I’ll tell you, was very quick, it was correct, it was wonderful.”

In the report, the patient’s mother describes that when seeking care, she informed the team about her son’s serology and the procedures were expedited, with the patient being tested for several diseases. A statement from patient 10 who joined the class was in relation to his preference for a place to be tested:

In fact, nowadays it would be today. Today, for me it is independent. He, I was well looked after there. I could be tested there, just as I also received care at home from people at the clinic, mine, the community where I live. So, a few times the nursing technician, nurse, even the doctor at the station, came to my home to see how I was doing, to see what the allergy situation was like, you know? So they think, like for me it’s independent, nowadays I can be. At home, or it could be in the hospital, for me, everything is OK.

For this patient, the home, the clinic, and the hospital are all good options for a place to carry out the test. The professionals he mentioned as preferred to carry out the test were the nursing technician, the nurse, and the doctor. This statement shows that the availability of testing in multiple spaces is ideal, as patients have different contexts and needs. For example, even for patients who usually do not have difficulty moving around, eventually, if they become ill, testing at home will be preferable.

### CLASS 2 – HEALTH–DISEASE AND DRUG TREATMENT

Class 2 brought together statements relating to health–disease processes and drug treatment, including reports about illness due to opportunistic infections. The 20 most frequent words in this class were (p < 0.001): take, medicine, use, talk, medication, alone, night, world, bed, help, shirt (condom), bath, day, sleep, give, son, see, decrease, outbreak, and lie down. The patients whose speech most adhered to this class were patient 10 ($\chi^2 = 8.01; p < 0.001$) and 12 ($\chi^2 = 5.09; p < 0.05$). Thus, the main report representing this class was that of patient 10 about drug treatment and the diagnosis of opportunistic infections:

I went to some doctors before I had this diagnosis, and they didn’t say I had pneumonia. So, I was treated for pneumonia too. Antibiotics too, amoxicillin, I took other medicines they gave me, I took Benzetacil a lot of things and it wasn’t decreasing, you know? Then it was important at the Vila Nova hospital where I went last and where they diagnosed tuberculosis.

It is possible to see the connection between Class 2 and Class 1; patient 10’s report is also a report of the experience of contact with the health system. However, here there is an emphasis on health and disease processes and drug treatment. The patient reports the difficulty of diagnosis and, possibly, a late diagnosis. In addition, he describes the consumption of several medications, without improvement. Only at Vila Nova hospital was he able to be sure of the diagnosis of tuberculosis. His speech reinforces the importance of rapid testing and connects it with interviews with managers and focus groups with professionals. For example, it relates to topics such as quick/late diagnosis, the difficulty of an accurate
diagnosis, the administration of medicines that can negatively impact the patient’s health, the confidence and competence of different professionals, and spaces to provide the diagnosis, among others.

Patient 3’s report was about continuing or adhering to HIV treatment; he said: “I even took my medication correctly, but how, right? Using serum, freaking out, that was making me sick. It made me sick and I stopped taking it. I know you can’t, but I stopped taking it.” This is a description of abandonment of HIV treatment. It is not possible to identify the period in which this experience took place, but changing medications could have facilitated adherence or closer monitoring by health professionals. Active search, as suggested in interviews with management, could also have reduced the possibility of discontinuing treatment. Another aspect is that communication between health professionals and patients, perhaps providing direct information about the expected effects of using medicines, could mitigate the problem. These are possible strategies to increase the likelihood of treatment adherence. Another response of a patient who joined is also related to the adverse effects of drug treatment; patient 11 talks about this when answering a question about improvements in rapid diagnosis:

Interviewer: What do you think could be done to improve rapid diagnosis, make it more suitable for your needs?

Patient: I wish, I wish there was a more effective medicine, you know. A more effective treatment for this disease. And that it wouldn’t interfere with my day-to-day life, right? I, I used to take medicine, the first medicine I took was for, for my first illness ... Yes, it was very strong, it left me, I had insomnia, I had … I didn’t sleep well, I had a headache. This other type of medicine that they give me is not that strong, isn’t it …”

Apparently, the disease that the patient mentions that he would like to see more effective treatment for is meningitis. The patient described this fact, of being diagnosed with meningitis, his experience when seeking care in the health system, and how the disease affected his life. So, the end of his speech is this transcribed excerpt, that the side effects of the medication were strong and that he wished there

was a more effective medicine. Another theme that emerged was the impact of all these health–disease processes and drug treatment on patients’ mental health, as in the speech of patient 12’s mother, specifically, about the impacts of the discovery of his HIV-status on the patient. She said, “I’m taking the medicine correctly, but I really needed it, it was ... treatment ... um, psychiatric, right, because ... I’m just a nursing technician, not a psychiatrist, but I talk a lot, huh?”. The excerpt is an account of the psychological support she gives to her son, and, between the lines, her own suffering also appears in having to deal with her son’s health situation (physical and mental) and the impacts of this on her own mental health.

Patient 6’s response brings together the themes evoked in previous responses. The anguish of a life permeated by health–disease processes and drug treatment, by HIV, by opportunistic infections, by other health problems, by the impacts of all of this on your mental health. All this arises from the report of one of the opportunistic infections, histoplasmosis, within its context of fragility, with several other health problems:

“I had a psychotic break […] I didn’t know what it was. I was nervous [...] everything bad that happened to me in those days, I didn’t remember anything, you know? [...] Because I’m a wheelchair user, right? [...] My son got married and I was alone, in a wheelchair alone. Then my immunity dropped a lot. I have pain, I take sleeping pills, black stripes, I’m taking another one that’s helping a lot. The pain is chronic, right? This pain I have in my hip is horrible. I can’t walk, I can even stand, but walk. Then all of this helped me stay the way I am. Then my immunity dropped, I ended up relaxing with the medications too. But I think that now […] it’s only now [...] I had the stroke together, I got the aftereffects, when I get nervous I stutter.”

Just as in some of the TS in Class 1, in Class 2 some of the statements refer to the period of discovering the HIV diagnosis, in these cases, associated with self-medication to mask symptoms before seeking medical care, as in patient 2’s statement:

It started with back pain, back pain, and I thought it was muscular, the pain and everything ... Taking medication, then there came a time when I couldn’t take the pain
Insights, experiences, and perspectives on the rapid diagnosis of tuberculosis, histoplasmosis, and cryptococcosis in people with advanced HIV disease in Porto Alegre, Brazil

anymore. I went to Porto Alegre, got there and then it started ... Some blisters appeared under my arm on my back. Then it was herpes, that Zoster. And then I went to the hospital, then I went to them, they did a lot of tests, I didn’t think so, I didn’t think so. Then they did this test and saw that my immunity was low. She said so.

Summary

• Most patients were diagnosed with HIV 10 years ago or more; only two were more recent, one of them 2–3 years ago and the other less than a year ago.

• Only two patients responded that they had not become ill due to the diseases that were the focus of the intervention or other opportunistic diseases. Among the others, four had tuberculosis (in addition to a suspicion) and one had histoplasmosis (in addition to a suspicion), but diseases such as chickenpox, toxoplasmosis, meningitis, pneumonia, and human papillomavirus were mentioned.

• No specific difficulties with the intervention were reported. However, some difficulties regarding HIV treatment and health processes were reported, such as: health difficulties (seizures, starvation, not being able to walk, lung pain), disrespect by health teams, not being able to see their children because they are not allowed visits from children when hospitalized, and difficulty adapting to the medicine and eating. Some reported not remembering having undergone the exams because they were not conscious when admitted.

• For HIV treatment, one reported shame (could be more isolated), another had an allergic response to medication and two reported a permanently serious health condition, with limited mobility.

• Regarding the delay in rapid diagnosis, some did not remember because they were not conscious. Three reported a delay (all tuberculosis): from Saturday to Sunday, 2–3 days, and another a week after arrival at the hospital.

• In general, there were already a few days of symptoms before the patient sought help, from two days to more than a week, except in cases of testing without symptoms.

• The majority reported having received clear and sufficient information, personally or from their family (patient was not conscious), except for one case.

• Some did not know how to identify possible benefits of rapid diagnosis. Among those who responded, referral for rapid treatment appeared a few times (as well as a faster flow) and treating the disease at a less severe/early stage. Psychological aspects of relief also appeared, phrases such as “hearing something good,” “getting better,” “knowing you are fine,” and “resolving the worry.”

• No one reported difficulty accessing the results.

• In general, there were no concerns about the intervention. The two affirmative answers may be more related to the diagnosis of HIV than to opportunistic infections. They indicated the discovery of the diagnosis by third parties and the impact of the diagnosis on the family.

• Regarding improvements in the intervention or even the quality of life of PLHIV, many praised the health service and had no suggestions, and others spoke about aspects beyond the health system (such as faith and social support from family and friends).

• The suggestions that were to some extent within the scope of health care, even if extrapolating the intervention to other health issues for PLHIV, were:

  a. Treating HIV with injections instead of pills, a more efficient medicine (it seems to refer to meningitis and not necessarily HIV or opportunistic infections), fewer pills to take (“I take 15 a day”), and medicines with fewer side effects that get in the way day to day.

  b. Have specialized professionals (infectious disease) leading the intervention.

  c. Many indicated that it would make it easier to make tests and medicines available in
more places (such as clinics and other health units), because the system is overloaded.

d. Availability of home treatment, as appropriate.

e. Psychologists to help deal with the impacts of living with HIV.

f. “Professionals to provide better care, with more respect for patients, with more agility and with more accurate information regarding referrals. There is no point in having a diagnosis if there is no appropriate treatment.”
The research team documented key insights following each interview or focus group, thereby enhancing the qualitative understanding of the process.

Health professionals have identified multiple challenges associated with access to a rapid diagnostic intervention for PLHIV. These challenges encompass factors such as the availability of supplies and human resources. Additionally, the importance of early detection of opportunistic infections, especially in advanced disease cases, underscores the complexity of the process. Effectively communicating with patients about various aspects of health care, including the significance of tests, the communication of diagnoses, adherence to treatment, and post-diagnosis guidance, poses a significant hurdle.

In this context, research plays a fundamental role in understanding and expanding access to intervention, as it allows testing to be carried out under the umbrella of a scientific project that facilitates having exclusive teams and materials. Furthermore, research contributes to highlighting the relevance of quickly diagnosing diseases in PLHIV, such as histoplasmosis, which can lead to hospital admission and increased morbidity and mortality. However, rapid diagnostic interventions also face obstacles related to the difficulty of communicating with patients and the adherence of professionals from the interdisciplinary team. Study participants reported that there is difficulty in understanding various aspects of the delicate healthcare process, such as the importance of carrying out tests, communicating diagnoses, the importance of adhering to treatment, what to do after receiving a diagnosis, among others. This communication issue affects the construction of the professional’s relationship with patients and can compromise the success of the intervention. Another noteworthy challenge is the integration of professionals from outside the research context into rapid diagnostic intervention. Often, the professional diagnosing is not the same person involved in treatment. This creates potential gaps in responsibility and awareness within the care continuum. While the intervention primarily focuses on medical procedures such as testing and diagnosis, the full access to health for PLHIV depends on the collaborative involvement of various professionals across the interdisciplinary team.

The managers’ key insights highlight various challenges and initiatives concerning the care of individuals with advanced HIV disease in Brazil. Challenges include integration with the care continuum, encompassing not only testing but also effective follow-up, referral, and counter-referral. Additionally, challenges involve ensuring the availability of medicines and beds, as well as clinical monitoring. The text underscores the need for robust interfederative coordination to ensure the consistent implementation of clinical protocols. This involves expanding professionals’ responsibilities, improving access to supplies, and enhancing the reach of the hospital network. Another challenge is the comprehensive training of the interdisciplinary team, prioritizing the care of those with advanced HIV disease to enhance overall quality of care and communication.

Moreover, the text emphasizes the importance of welcoming patients with multiple vulnerabilities, relying on services beyond health, such as social assistance. Timely and adequately referred interventions can be instrumental in rescuing these individuals. The text also mentions initiatives, including a point-of-care testing pilot conducted by the Ministry of Health in five states with a previously high mortality rate. Finally, the text underscores the significance of disseminating research results to both management and the involved services.

In the patient group, we can highlight the following insights. Patients who participated in the tuberculosis treatment intervention presented heterogeneous perceptions about their experience. Some were highly satisfied with the treatment and were aware of the rapid test, which enables a quicker and more accurate diagnosis. However, others faced challenges and demonstrated a low level of information about the intervention, its benefits, and its procedures.
Among the challenges encountered, patients highlighted more the aspects related to reception and stigma in health services, adaptation to treatment, family reaction, and the severity of the health condition than the aspects related to the intervention itself. Some patients reported that they arrived at the hospital with severe symptoms, which may have made it difficult to understand the intervention. Others said they were unaware that they had undergone a rapid test, or that the result took more than 24 hours to be available. Some patients expressed the expectation that the rapid test would help them to be quickly referred to appropriate treatment, but there were also reports of hopelessness in the face of the disease. Despite the challenges, some patients expressed satisfaction with the treatment and with the Brazilian national health system, but also suggested improvements in the care network, such as expanding service points and training professionals to care for patients with tuberculosis, including home care. Additionally, some patients wished the medications had fewer side effects.

**Study limitations and research gaps**

Conducting interviews within a short time frame was a challenge that limited the diversity of research participants, resulting in less than comprehensive data collection. Furthermore, the difficulty of engaging professionals from interdisciplinary teams in focus groups emerged as a significant obstacle during the research process. The reluctance to participate could be attributed to factors such as time constraints, privacy concerns, and a lack of motivation to contribute to the study. It is important to note that the study faced constraints in observing the diversity of hospitals and sociodemographic profiles. This limitation was attributed to the restricted availability of registration bases per hospital. Additionally, the fact that almost 50% of telephone contacts went unanswered suggests another layer of complexity in participant engagement and recruitment during the research.

Furthermore, the identified research gap, as indicated by professionals and managers, underscores the necessity for cost-effectiveness studies. This emphasizes the importance of evaluating the benefits of disease tracking or early diagnosis while taking into account the associated costs. It is crucial to recognize that the use of telephone or Zoom interviews may serve as a barrier for patients from low economic backgrounds and with high social vulnerability, characteristics shared by the individuals interviewed.

Another notable bias to consider is that almost all patients included in the study originated from Vila Nova Hospital. This concentration of participants from a specific hospital introduces a potential limitation, potentially impacting the generalizability of the findings to a broader population.

**General recommendations**

The intervention exhibits significant strengths, notably the provision of necessary inputs, early access to treatment, and a dedicated and well-trained work team. These factors contribute to the overall effectiveness of the intervention, ensuring the delivery of essential care and enhancing the quality of life for the patients involved. However, there are also critical points that require attention for optimizing the intervention. The ephemeral nature of the process, challenges associated with engaging external professionals (particularly in distinguishing between testing and care), and communication issues
with patients are areas that require improvement to ensure sustainability and long-term success. There seems to be a perception that services and management might regard the provision of inputs and human resources as perpetual, potentially undermining the development of strategies aligning networks and lines of care. Another challenge is the incorporation of health education strategies in order to inform patients about the need and benefit of testing for HIV-related opportunistic infections and subsequent care strategies.

Furthermore, the question of how to effectively incorporate the intervention into the line of care already established in the municipality, as well as integration with Primary Health Care (PHC) and other health services that takes into account the perceived vulnerability of patients, such as the social assistance unified service (SUAS), is an essential challenge to be faced. Intervention in a general hospital, in the context of decentralization of care, must be carefully planned and implemented to ensure a smooth transition and effective coordination of health services. Finally, the question of the social determinants of HIV/AIDS mortality and whether rapid testing for HIV-related opportunistic infections can be an effective solution is a critical issue that requires in-depth investigation to provide valuable insights into improving prevention and treatment strategies.

Conclusion

In conclusion, this document provides an in-depth analysis of the feasibility of implementing a package for the rapid diagnosis of opportunistic infections in patients with advanced HIV disease in Porto Alegre, Brazil. By conducting interviews with health professionals, managers, and patients, it was possible to identify the primary challenges faced by patients in obtaining a rapid diagnosis, as well as the recommendations of health professionals and managers for the implementation of HIV care policies in the region.

From the information presented herein, it is evident that the implementation of a package for the rapid diagnosis of opportunistic infections in patients with advanced HIV disease stands as a crucial measure to enhance the quality of life for these patients and reduce associated mortality.

Furthermore, interdisciplinary collaboration between health professionals, managers, and patients is fundamental to the successful implementation of HIV care policies in Porto Alegre and other regions of the country. Additionally, the evaluation of the implementation of this package faces both challenges and facilitators. Difficulties include resistance from health professionals not directly involved in the intervention, limitations in participant diversity, and a lack of motivation to contribute to the study. Conversely, the facilitators include the ease and speed of executing the rapid diagnosis intervention, along with the perceived importance of the intervention by health professionals and managers.
References


APPENDICES

APPENDIX 1

Free and Informed Consent Form (TCLE)

INSIGHTS, EXPERIENCES, AND PERSPECTIVES ON THE RAPID DIAGNOSIS OF TUBERCULOSIS, HISTOPLASMOsis, AND CRYPTOCOCCOSIS IN PEOPLE WITH ADVANCED HIV DISEASE IN PORTO ALEGRE

Please read and, if appropriate, express your consent to participate in this research before starting by selecting the I AGREE option presented at the end of this term.

Please, if you have any questions before, during, or after your participation, send an email to angelo.costa@pucrs.br.

If you have any questions regarding your rights as a research participant, please contact the Research Ethics Committee of the Pontifical Catholic University of Rio Grande do Sul (CEP-PUCRS), Av. Ipiranga, 6681/prédio 50 salas 703, CEP: 90619-900, Bairro Partenon, Porto Alegre – RS, e-mail: cep@pucrs.br, Monday to Friday from 8am to 12pm and from 1:30pm to 5pm. The Ethics Committee is an independent body made up of professionals from different areas of knowledge and members of the community. Your responsibility is to ensure the protection of the rights, safety, and well-being of participants through review and approval of the study, among other actions.

CONSENT TO PARTICIPATE IN RESEARCH

You are being invited to participate in a survey developed by Ângelo Brandelli Costa called Insights, experiences, and perspectives on the rapid diagnosis of tuberculosis, histoplasmosis, and cryptococcosis in people with advanced HIV disease in Porto Alegre from the Postgraduate Program in Psychology at PUCRS.

The objective is to describe insights, experiences, and perspectives around the feasibility of implementing a package for the rapid diagnosis of frequent opportunistic infections, namely tuberculosis, histoplasmosis, and cryptococcosis, among patients with advanced HIV. The study aims to generate and disseminate evidence to support the development and implementation of HIV care policies, aiming to improve the national and regional response to HIV.

You must read the information below and, if you do not understand or have any further questions, you can contact us by email at angelo.costa@pucrs.br, before deciding whether or not to participate.

The following discomforts or minimal risks may occur: discomfort regarding the topic in the case of previously experienced negative experiences, fear of exposing personal information, and fatigue during the interview/focus groups. At any time you can ask for a break or withdraw from participating.

You have the right to request compensation for any harm that is proven to result from your participation in the study.

In case of any problem related to the research, you will be entitled to free assistance that will be provided by the PUCRS Psychology School service, to which you will be referred with the assistance of the researchers responsible for this project.

“In addition to the discomfort you may feel due to the responses to this interview/ focus group, it is possible that, unfortunately, your connection fails or is slow, making your participation difficult. In these cases, do not hesitate to contact researcher Ângelo Brandelli Costa.”
This authorization is free of charge, covering the use of your image, (and voice), and testimony) throughout the national territory and abroad, which may be displayed in partial and end of said project, in its audiovisual presentation, in scientific and academic publications and disseminations, as well as those made available in the image bank resulting from the research and on the Internet, with due credits being included. As this is the expression of my will, I declare that I authorize the use described above without there being anything to be claimed in terms of rights related to my image or any other, and I sign this authorization in two copies of equal content and form.

The benefits we expect from the study are to contribute to improving the response to HIV and share experiences with the research team and other participants.

Participation in this survey is voluntary and you have the right not to respond to any item and to discontinue your participation at any time for any reason.

Interviews will last around 30 minutes and focus groups will last 3 hours.

You will not receive any rewards for this.

No identifying information about you will be included in publications that may result from this research.

Information collection for this project will be completed in October 2023 and all information obtained will be stored securely for a period of five years after this date or until completion of the written work.

By continuing this research, you agree that any questions you had have been adequately clarified and you agree to participate in the study.

I understand the procedures described above.

( ) I AGREE
( ) I DISAGREE
APPENDIX 2

Semi-structured interview/focus group script

Q. 1. How old are you?

Q. 2. What is your designated sex on civil records (birth certificate)?
   a) Female
   b) Male

Q. 3. Regarding your gender, how do you identify today?
   a) Female
   b) Male
   c) Other___________

Q. 4. What is your sexual orientation?
   a) Heterosexual
   b) Homosexual
   c) Other____________

Q. 5. What is your marital status?
   a) Single
   b) Married
   c) Divorced
   d) Widower

Q. 6. Do you have children?
   a) Yes
   b) No

Q. 7. Considering your family’s monthly income, which economic class do you belong to?
   a) A (above 20 minimum wages)
   b) B (between 10 and 20 minimum wages)
   c) C (between 4 and 10 minimum wages)
   d) D (between 2 and 4 minimum wages)

Q. 8. Do you live in the capital of Rio Grande do Sul or in the interior?
   a) The capital
   b) Interior (enter the name of the city)
Q. 9. What is your education?
   a) Complete primary education
   b) Incomplete primary education
   c) Complete secondary education
   d) Incomplete secondary education
   e) Higher education
   f) Postgraduate

Q. 10. What is your race/ethnicity?
   a) White
   b) Black
   c) Yellow
   d) Brown
   e) Indigenous
   f) No declaration

GUIDE TOPICS FOR SEMI-STRUCTURED INTERVIEWS WITH PATIENTS

Open-ended presentation question, addressing how many years you have lived with HIV.

Theme 1 - Previous diagnostic experiences: Investigate the experiences of patients with a previous diagnosis of tuberculosis, histoplasmosis, or cryptococcosis. What services were consulted? How long did it take to receive an accurate diagnosis? What were the challenges and obstacles faced during the process?

Theme 2 - Perceptions about the rapid diagnostic intervention: Inquire about patients’ opinions regarding the rapid diagnostic intervention. What were your expectations regarding this method? What was your experience with rapid diagnosis like? How do they believe rapid diagnosis can impact their treatment journey and quality of life?

Theme 3 - Perceived benefits: Investigate the benefits that patients expect to obtain/have obtained with the rapid diagnostic intervention. Do they believe this could lead to a faster, more accurate diagnosis? How do they believe it can improve their health and quality of life? What are your hopes for this intervention?

Theme 4 - Barriers and challenges: Explore potential barriers or challenges that patients anticipate facing during implementation of the rapid diagnostic intervention. What are your concerns regarding accessibility, availability, or costs? What obstacles have they experienced/believe that may impact the successful implementation of this intervention?

Theme 5 - Recommendations for improvement: Solicit suggestions from patients on how the rapid diagnostic intervention can be improved to better meet their needs and expectations. What additional features would they like to see available? What aspects of the diagnosis and treatment process do they believe can be improved?
GUIDE THEMES FOR SEMI-STRUCTURED INTERVIEWS WITH MANAGERS

Open-ended presentation question, addressing how many years you have worked with HIV policies.

Theme 1 - Importance of rapid diagnostic intervention: Inquire about the perception of policy-makers regarding the relevance of rapid diagnostic intervention in combating the diseases in question. How do they see the impact of this intervention on public health and health indicators?

Theme 2 - Experience with rapid diagnosis policies: Investigate the experience of policy-makers in monitoring the implementation of the rapid diagnosis intervention. What are the existing policies and interventions? What are the main challenges faced in incorporating this approach into health policies?

Theme 3 - Development of policy flows: Explore how rapid diagnostic intervention can influence the development of policy flows related to the diagnosis and treatment of tuberculosis, histoplasmosis, and cryptococcosis. What changes can be made to existing guidelines and protocols? Which points of attention/services should be engaged?

Theme 4 - Interfederative relationship: Investigate how rapid diagnostic intervention can impact the relationship between different levels of government (federal, state, and municipal) in the implementation of health policies. What are the challenges and opportunities for intergovernmental cooperation? What strategies can be adopted to promote coordination and sharing of responsibilities?

Theme 5 - Barriers and challenges: Explore the possible barriers or challenges that managers anticipate facing during the implementation of the rapid diagnosis intervention. What are your concerns regarding accessibility, availability, or costs? What obstacles do they believe could impact the successful implementation of this intervention? What additional features would they like to see available?

GUIDE THEMES FOR FOCUS GROUPS WITH HEALTH PROFESSIONALS

Open-ended presentation question, addressing how many years you have worked with people living with HIV.

Theme 1 - Perception of the importance of the intervention: Inquire about the professionals’ perception regarding the relevance of rapid diagnostic intervention for the early and accurate diagnosis of these diseases in patients with advanced HIV. What were your previous experiences? What are the main benefits they see in this approach?

Theme 2 - Experience with the intervention: Investigate the experience of professionals in using the rapid diagnosis intervention. What strategies did you use to communicate the intervention with patients? What have been the results observed so far? What are the main challenges faced during implementation? What were the main lessons learned?

Theme 3 - Impact on clinical practice: Explore how the rapid diagnostic intervention affected the clinical practice of professionals. What changes have they observed in the detection and treatment of the diseases in question? How has this approach influenced clinical decision-making? Was there any change in the relationship with patients or in the acceptability of the intervention by patients?

Theme 4 - Interdisciplinary collaboration: Investigate how the rapid diagnostic intervention promoted interdisciplinary collaboration between healthcare professionals. What are professionals’ perceptions about the importance of collaboration between different health professionals for the success of the intervention? How does collaboration occur between health levels?

Theme 5 - Challenges and recommendations: Ask professionals about the main challenges they faced when using the rapid diagnosis intervention and their recommendations to improve its implementation. What are the main barriers faced? What are your suggestions for improving the effectiveness and efficiency of the intervention?
People living with HIV (PLHIV) with severe advanced disease are at high risk of developing opportunistic infections and may face barriers related to diagnosis and treatment. The objective of this study was to describe insights, experiences, and perspectives around the feasibility of implementing a package for the rapid diagnosis of frequent opportunistic infections among patients with advanced HIV disease, in order to support the development and implementation of HIV care policies. The study was carried out between June and October 2023, comprising two focus groups with health professionals involved in the rapid diagnosis intervention (n = 10); four in-depth interviews with health managers dedicated to HIV care policies; and 12 interviews with patients with advanced HIV disease. The intervention in question was considered relevant for allowing a more timely diagnosis of diseases that are difficult to investigate. Patient compliance was generally collaborative, especially in research hospitals, but more vulnerable patients may require expanded psychosocial support. Among the barriers, delays in results and communication challenges between professionals and patients were highlighted, as well as the lack of alignment in the flow of exam request, collection, results, and communication for patients and the extended team. At the management level, the importance of integrating the intervention into the line of care for patients with HIV was highlighted. It is relevant to investigate the issue of social determinants of HIV/AIDS mortality in the future to provide valuable insights into improving prevention and treatment strategies.