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A mixed-methods pilot study mapping clinical haematology services in South Africa

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Abstract

Background

Access to clinical haematology services in South Africa is inequitable, and there are limited data describing service availability, readiness, and accessibility. Accurate data are necessary to inform healthcare planning and policy development. This pilot study evaluated procedural feasibility, study instrument usability and acceptability, and data completeness prior to an overarching service mapping study.

Methods

A mixed-methods pilot study was conducted between May and July 2026 at one public tertiary haematology department and one private haematology practice in Cape Town. Two administrative staff completed facility surveys, and three healthcare providers and two patients participated in semi-structured interviews. The pilot assessed recruitment, informed consent, survey and interview completion times, participant burden, and the completeness and quality of data obtained. Quantitative data were analysed descriptively. Thematic analysis was performed on the qualitative data.

Results

Nine participants were approached, and seven recruited, with no withdrawals. Median completion times were 9 minutes for the survey, 32 minutes for healthcare provider interviews, and 22.5 minutes for patient interviews. No participant fatigue was observed, and there were no requests to terminate interviews early, suggesting tool acceptability. Recruitment, informed consent, and data collection procedures were feasible in both sectors, although patient recruitment required modification at the private facility. Administrative staff were unable to provide information for several survey questions, which were transferred to the healthcare provider interview. Semi-structured interviews produced qualitative data adequate for deductive and inductive thematic analysis. Transcription review, verification and initial coding required at least four hours per interview.

Conclusions

The principal finding was that obtaining complete and reliable data relies on aligning study instruments, their content, and participant expertise. The methodology modifications were designed to improve data completeness and quality in a subspecialist setting and to increase data collection efficiency. The findings also enabled an evaluation of the resources required for qualitative analysis, supporting the planned inclusion of at least one public and one private facility per province. The pilot study demonstrated that the methodology is feasible and acceptable and supports proceeding to the overarching study with refined study instruments and procedures. It may inform future service mapping in other specialised healthcare settings.

Keywords

Clinical haematology, health systems research, pilot study, service mapping, healthcare access, health equity, South Africa.

Key messages regarding feasibility

1) What uncertainties existed regarding the feasibility?

It was uncertain whether the facility survey and semi-structured interview guides would effectively capture the information required for the main study, whether administrative staff could successfully complete the facility-level survey, and whether the use of interview prompts would facilitate more complete answers or influence participant responses.

2) What are the key feasibility findings?

The facility survey and semi-structured interviews were comprehensible and acceptable in duration and burden. However, administrative staff were unable to answer some survey questions; these data could be gathered during healthcare provider interviews. Routine use of interview prompts had the potential to influence participant responses and will only be used when clarification or further exploration is required. Patient recruitment in the private setting required modification to accommodate the timing of their appointments. Qualitative data processing required at least four hours per interview, providing a basis for resource allocation and planning for the main study.

3) What are the implications of the feasibility findings for the design of the main study?

The main study can proceed with targeted refinements to the study instruments and procedures. Facility surveys should be completed by respondents with appropriate knowledge of the service, with unanswered facility-level questions addressed during healthcare provider interviews.

Interview prompts should be used selectively for clarification or further exploration, and patient recruitment procedures should accommodate the timing of appointments in private facilities. The estimate of at least four hours per interview for qualitative data processing will inform researcher time and resource allocation for the main study.

Introduction

This pilot study forms part of Phase Two of the doctoral project, 'Mapping Clinical Haematology Services in South Africa and Neighbouring Countries'. Its purpose was to evaluate procedural feasibility, study instrument usability and acceptability, and data completeness prior to undertaking the full mixed-methods study. The overarching project seeks to develop a framework to assess access, service readiness, and equity of clinical haematology care in South Africa using facility surveys, semi-structured interviews, and quantitative data from laboratories and blood banks, with the ultimate aim of providing recommendations to inform service planning and health policy. A limited analysis of services in neighbouring countries (Botswana, Eswatini, Lesotho, Mozambique, Namibia and Zimbabwe) will be performed to ensure generalisability without compromising depth. The pilot study was undertaken to ensure that the survey instruments, interview guides, and research procedures were appropriate, understandable, and practical for use in both public and private clinical haematology settings.

Background

There is a heavy and growing burden of haematological disease in sub-Saharan Africa (sSA) [1]. Clinical haematology facilities are centralised in urban areas and the private sector, with resultant inequitable access. A lack of staff and expertise and the high costs and resource-intensive nature

of therapies such as haematopoietic stem cell transplants (HSCT) contribute to this inequality, which limits timely diagnosis, has adverse implications for management and patient retention, and results in poorer outcomes [2] [3]. Diagnostic delays, poor resource allocation and a lack of clinical registries subsequently contribute to under-characterisation of the burden of disease [3] [4]. Reliable data on service availability is urgently needed to facilitate strategic planning and improved equality in resource allocation.

Many haematologic conditions necessitate specialised diagnostic techniques and infrastructure, such as tissue microscopy, immunohistochemistry, flow cytometry, and molecular tools [5]. Additionally, response to treatment, prognosis, and staging for haematological malignancies often rely on advanced imaging modalities like PET/CT (positron emission tomography/computed tomography) and MRI (magnetic resonance imaging). These technologies are costly and resource-intensive, posing significant barriers to access. When unavailable or improperly utilised, there is a high risk of misdiagnosis or missed diagnoses; for instance, symptoms common to both tuberculosis and lymphoma often lead to lymphoma cases being misdiagnosed as tuberculosis [5] [6].

The cost of therapy, including standard-of-care chemotherapy and radiation therapy, HSCT, and access to novel, more targeted non-chemotherapeutic agents, is another barrier to care. Access to HSCT is severely limited in sSA for a multitude of reasons, including budget restrictions and competing healthcare priorities (primarily communicable diseases) [4]. An example of the inequitable distribution of services for clinical haematology is the location of HSCT centres. In South Africa, all 13 HSCT centres are in large cities, and only four of these are state centres.

Only one of these four state centres provides comprehensive stem cell transplant services [2]. In this context, clinical trials may offer patients therapies that are unaffordable or unavailable otherwise. However, few centres can provide access to clinical trials due to financial constraints, limited staff with relevant expertise and capacity, and challenges in the regulatory and ethics processes [7]. In addition to specialised treatments, supportive care, including patient blood management, is an essential component of managing patients with haematological conditions. The availability and safety of blood products have improved remarkably in sSA, yet there are still improvements that can be made that will have an impact on the quality of care received by any patient requiring this management [8].

It is estimated that there are around 60 actively practising clinical haematologists in South Africa currently, with 85 (including inactive practitioners) registered with the Health Professionals Council of South Africa as of April 2026 [9]. This is around one clinical haematologist per million in a population of 63 million (20). In Botswana, Eswatini and Lesotho, there is not a single clinical haematologist. In Namibia, there is one; in Mozambique, there are three; and in Zimbabwe, there are five. Only five of the eleven medical schools in South Africa are currently able to provide this training due to the limited number of clinical haematologists and posts available in state facilities, and the training needs of neighbouring countries also need to be accommodated here. This has a direct impact on the quality of training of under- and postgraduates, as well as on the support available for other specialities.

The Three Delays Framework is a method used to understand delays in healthcare provision and investigates the following areas: seeking, reaching, and receiving quality care, with the Four

Delays Framework adding remaining in care [10] [11]. Seeking care, or the demand for care, includes patient knowledge, beliefs, and attitudes towards care [12]. Delays in reaching care include not attending a healthcare facility and lack of transport [10]. The third and fourth delays - receiving and remaining in care - can also be regarded as the service-delivery interface, influenced by accessibility, availability, and acceptability of care. This also includes the supply of care, influenced by the efficiency, reliability, and adequacy of treatment provision and measured by the experience of care at a healthcare facility [12]. The capacity of a facility to provide the necessary services can be determined through service readiness assessments, which investigate and score the availability of the components required [13].

A convergent, cross-sectional, multi-site, mixed-methods study collecting quantitative facility data from surveys, and qualitative data from semi-structured interviews with healthcare providers and patients will be conducted at public and private clinical haematology facilities in South Africa. Neighbouring countries such as Botswana, Eswatini, Lesotho, Mozambique, Namibia, and Zimbabwe will be included using virtual platforms. Before implementing these methods for the full study, it was necessary to establish that the data collection instruments were feasible, acceptable, and capable of generating high-quality data [14]. The pilot study therefore focused on methodological evaluation rather than assessment of service provision itself. The survey and semi-structured interview guides that were used in this study were designed on Qualtrics following a literature review and in collaboration with experts at the University of Southampton.

1. Aim and Objectives

1.1. Aim

The pilot study aimed to evaluate the procedural feasibility, study instrument usability and acceptability and data completeness.

1.2. Objectives

1. To evaluate the clarity and content of the facility survey and semi-structured interview guides.
2. To assess the feasibility of planned participant recruitment, informed consent, and data collection.
3. To evaluate survey and interview completion times and participant burden.
4. To assess the completeness of the quantitative and qualitative data generated by the study instruments.
5. To identify methodological challenges and refine the study instruments and study procedures before implementation of the main study.

2. Methods

2.1. Study design

A mixed-methods, cross-sectional, convergent pilot study to evaluate the procedural feasibility, usability, and acceptability of study instruments and data completeness prior to an overarching mixed-methods service mapping study was undertaken [15]. It included quantitative data from a facility survey (Appendix A) and qualitative data from semi-structured healthcare provider and patient interviews (interview guides can be found in Appendices B, C and D). It was conducted

between May and July 2026 at one public tertiary-level haematology department and one private haematology practice in Cape Town, in the Western Cape. Findings were used to refine the instruments and procedures for the overarching study.

2.2. Participants and setting

The exact locations of the facilities in this pilot study will remain anonymous to avoid identifying participants and to preserve privacy and confidentiality. Participants were approached discreetly. Interviews were conducted in private consulting rooms in the haematology facilities where responses could not be overheard. One administrative staff member at each facility was recruited to complete the quantitative survey with purposive sampling. The criteria for their selection included knowledge of facility procedures and willingness to complete the survey [16]. These were conducted on 4 and 6 May 2026 at the private and public facilities, respectively. One clinical haematologist at both the private and public facilities was recruited using purposive sampling on 4 May and 19 June, respectively. One medical officer at the public facility was recruited with purposive sampling to ensure that the interview guide could be generalised to other participants [16]. This interview was conducted on 1 July.

Purposive sampling was used to select these participants to ensure a broad range of perspectives were obtained [16]. Minimum inclusion criteria required at least six months' experience at the facility to ensure familiarity with the environment. Purposive sampling of healthcare providers was performed by the researcher. Consideration for inclusion was made based on expertise and academic and policy-making influence in the clinical haematology community. However, the planned overarching study was kept in mind, and healthcare providers identified for inclusion in

this study were excluded from the pilot in case study instruments needed to be adapted, which would require repeating interviews with the identified experts considered essential for the main study. Expertise criteria included the number of years practising in a haematology facility, current practice in private, public or academic settings, and extent of involvement in patient management. Academic selection criteria included affiliation with an academic institution and supervision of students. Policy-making criteria included membership on advisory committees (e.g., institutional, provincial, and national), involvement in guideline development, and involvement in societies.

One patient was recruited at each facility using random sampling to ensure that the outcomes were generalisable [16]. Random sampling of patients was performed by obtaining a list of patients attending the clinic on that day, excluding any patients under 12 years of age, and then selecting a patient using a random number generator. However, due to challenges with recruitment resulting from scheduled appointments and patients' time constraints at the private facility, this process was adapted to convenience sampling. Patients were interviewed at the private and public facilities on 5 May and 10 July, respectively.

The researcher briefly introduced herself and the study and asked whether the participant was willing to receive any further information about the study. If so, detailed information was provided, and the participant was given the opportunity to ask questions and read the consent form (Appendices E, F, G, H and I). Care was taken to emphasise that participation was entirely voluntary, and if they declined to participate, that it would not influence the care they would receive in any way (in the case of patient participants). Time was allowed for potential

participants to consider the study, consult with their family or other trusted individuals, and to fully explain the potential risks, benefits, confidentiality and withdrawal rights before participation.

2.3. Instruments

The survey was designed on Qualtrics and composed of 28 questions which were predominantly closed-ended with categorical or numerical response options. There were a small number of free-text options to capture facility-specific information. The survey assessed facility characteristics and level of clinical haematology care; volumes of patients managed and bed capacity; data management systems; staffing and availability of other medical specialities; access to haematopathology, pathology, and other diagnostic services; blood bank availability; haematopoietic stem cell transplantation (HSCT) capacity and related services; clinical trial activity; and training in clinical haematology.

Semi-structured interview guides were used to obtain qualitative data from healthcare providers and patients. The healthcare provider interview guide comprised 27 open-ended questions, with prompts used where required to explore facility-level service provision, staffing and workload, data management, referral pathways, access to laboratory and radiology services, blood products, treatment including access to HSCT, clinical trials, patient access barriers, resource prioritisation, and locally developed strategies or solutions. The patient interview guide explored patients' experiences of diagnosis and referral, access to investigations and treatment, blood products and HSCT where relevant, clinical trial opportunities, travel time and transport,

financial and other costs associated with accessing care, experience and coordination of care, and perceived inequities and potential improvements in clinical haematology services.

2.4. Outcome measures

The outcome variables investigated included measures of procedural feasibility, including recruitment, informed consent processes and data collection, and study instrument usability (review of clarity and content) and acceptability (evaluating completion times and participant burden) [17]. Quantitative and qualitative data completeness were also evaluated. Following data collection and evaluation, methodological refinements were identified (see Table 3 below).

2.5. Bias

Standardised study instruments for data collection, including the survey and semi-structured healthcare provider and patient interview guides, were used to minimise potential sources of bias. All interviews were conducted by the same researcher to ensure consistency.

2.6. Study size

One province was selected by convenience (the Western Cape) to conduct the pilot study. As the main study is planned to be conducted in at least one public and one private facility per province, one public and one private facility were selected for the pilot study. The corresponding numbers of administrative staff, healthcare providers, and patients were recruited at each facility in line with this. This was considered an appropriate representation of the total number of minimum stipulated participants planned for the main study. This included one clinical haematologist and

one patient in each of the public and private facilities in nine provinces, for a total of eighteen clinical haematologists and eighteen patients.

2.7. Data collection

Survey data were collected using the Qualtrics platform, provided by the University of Southampton (https://www.qualtrics.com). Surveys were sent to participants using personalised links, which were completed in their own time, and the results were downloaded into an Excel spreadsheet. The data was de-identified and uploaded to Microsoft OneDrive on the Stellenbosch University server.

Recruitment and interviews (both processes performed by the researcher, Brigid McMillan) took place in consulting rooms in the clinical haematology facilities to maintain confidentiality. All interviews were conducted in a private room with a closed door, in person, in English, using the relevant interview guides developed for this purpose in alignment with the framework laid out by Kallo et al. [17]. Qualitative data was collected using a voice recorder. This file was saved with an anonymous name using the date, facility name, and type of interview participant, which was uploaded to Microsoft OneDrive on the Stellenbosch University server. These files were transcribed using artificial intelligence (AI) large language models and uploaded to Atlas.ti Scientific Software Development GmbH (https://atlasti.com) computer-assisted qualitative data analysis software, where they were reviewed in full with the original audio files, edited, and checked thoroughly for accuracy by the researcher.

2.8. Data analysis

Quantitative data were analysed descriptively. Qualitative analysis was initially undertaken using deductive thematic analysis, with themes aligned with the Four Delays Framework, supported by verbatim quotes [11]. An inductive approach to evaluate themes and codes was also used to describe previously unanticipated concepts [18] [19]. The constant comparison method was used to continuously evaluate that codes and themes were comparable across the dataset [20] [21].

2.9. Researcher Reflexivity

The researcher, Dr Brigid McMillan, is a specialist physician and PhD student with clinical experience in haematology in the public and private healthcare sectors in South Africa and has a special interest in clinical haematology. She is engaging in formal training in qualitative and quantitative research methods through the University of Stellenbosch as part of her doctoral degree. Her background and a literature review on the topic informed the development of the study instruments and have provided an understanding of the organisation and delivery of clinical haematology services in the area. The researcher developed the study instruments with the help of Dr Ken Brackstone at the University of Southampton, conducted all interviews, reviewed and verified the interview transcripts, and performed the qualitative analysis.
Prior professional relationships existed with all healthcare providers interviewed and with the administrative staff at the public facility, as the researcher had previously worked with these participants in a clinical setting. While these relationships facilitated interview rapport and an understanding of the local context, they also had the potential to influence data collection and interpretation through preconceived assumptions or participants providing socially desirable responses, as participants were aware of the goals of the researcher, her interests in clinical

haematology, and the PhD project. No prior clinical relationship existed with the patients before recruitment. During the interviews, the researcher was aware of how her prior clinical experience and professional relationships with the participants could impact data collection and interpretation and used a reflexive approach to ensure that these were true to the participants' responses [22].

2.10. Reporting

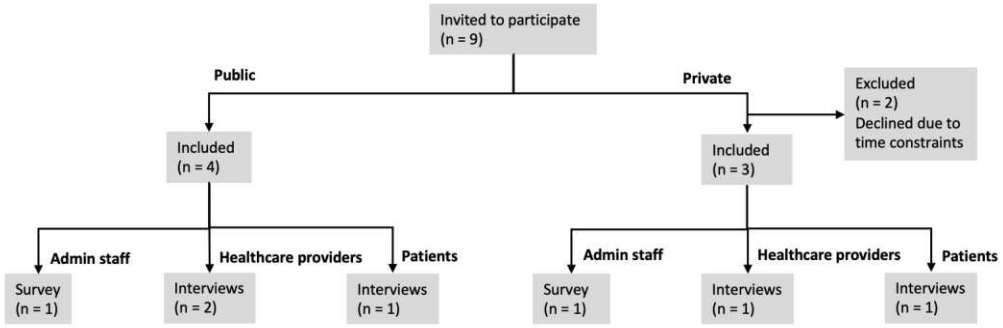
This pilot study was reported according to the recommendations laid out in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies, and in line with applicable principles from the CONSORT 2010 extension to randomised pilot and feasibility trials [14] [23].

3. Results

3.1. Pilot study participants

Seven participants were included in this pilot study. These comprised two administrative staff members (one per facility) who completed the facility survey, two clinical haematologists (one public and one private), one medical officer from the public facility and two adult patients (one from each facility). The patient in the public facility was interviewed along with her carer. Administrative staff and healthcare providers were recruited using purposive sampling, and the patients were recruited with random sampling.

Nine participants were approached, and seven agreed to participate with no withdrawals following consent (see Figure 1).



345

346 Figure 1: Pilot study participants

347

348 Table 1: Characteristics of participants included in the pilot study

Participants	Public	Private	Total
Administrative staff	1	1	**2**
Clinical haematologists	1	1	**2**
Medical officer	1	-	**1**
Patients	1	1	**2**
Total	**4**	**3**	**7**

349

350 ### 3.2. Feasibility of study processes

351 #### 3.2.1. Recruitment

352 Recruitment was successfully completed at both participating facilities. All participants recruited
353 at the public facility agreed to participate, and the administrative staff member, haematologist,
354 and one patient at the private facility agreed to participate. Two randomly selected patients at the
355 private facility declined participation, and patient recruitment differed slightly between sectors.

Recruitment was more challenging at the private facility. In the public facility, all patients arrived early to have their blood tested and waited to see the next available doctor. Random sampling worked well in this setting, as all patient numbers were entered into a random number generator which enabled selection. In the private facility, patients arrived in time for their appointment and left immediately afterward. Two patients who were approached for an interview after their appointments did not have time to stay longer. The recruitment strategy was therefore adapted to avoid interfering with appointment times at the private facility by approaching a patient who was waiting for their appointment due to a delay while the doctor attended to a medical emergency.

3.2.2. Informed consent

The informed consent forms and processes were feasible and acceptable in all participant groups. All participants preferred receiving a verbal summary of the consent form, and none wanted to read it in its entirety. An option of sending a virtual version was offered but declined by the healthcare provider participants. All participants were given the option of a physical copy of the consent form, and one patient took one home. No changes to the consent process are considered necessary.

3.2.3. Data collection

The facility survey was completed by administrative staff at both facilities. However, several questions could not be answered, as both participants worked in the outpatient clinics and did not know specific details about the age cut-offs used for children, number of beds available for admission, the number of inpatients served by the facility, the availability of laboratory

(including molecular) tests, and the total numbers of staff at each facility. The lack of insight into the intricacies between medical staff was demonstrated by the answers generated in this section. The state participant left these questions blank, while the private participant provided answers that were unlikely to be true (for example, the presence of registrars and fellows working in this setting). There were also some free-text questions in the survey that were either not completed well or left out entirely, thus contributing little meaningful data.

Unanswered questions from the survey were incorporated into the semi-structured interview with the haematologist at the private facility, and all the planned data was successfully collected. However, it resulted in a slightly longer interview, 36 minutes, compared to the interviews at the public facility, which were 26 and 32 minutes. These findings have resulted in minor adaptations to the survey before the full study is implemented. This included removal of duplicate questions about blood banks and send-away tests that were already part of the healthcare provider interview guide and questions on more specific details about clinical trials (staffing and particular focus areas) and training in clinical haematology that are more suited to an interview than a survey.

The healthcare provider interviews were successfully conducted without any required refinements to the processes or tools, other than those required by the results of the survey. Similarly, patient interviews did not require instrument modification. However, patient recruitment and interviewing processes needed a minor additional stipulation. One patient requested that her carer be present during her interview. This was allowed, and the patient underwent the informed consent proceedings with the carer acting as a witness. However,

throughout the interview, the carer interjected, and these responses were recorded and transcribed. As the carer had not been consented, these responses have subsequently been left out of the qualitative analysis.

3.3. Study instrument usability

There were no identified concerns with the clarity or comprehensibility of the study instruments. The content of the survey will be adjusted, with some items moved to the healthcare provider interview guide as outlined above to improve data completeness. It was also observed that the routine use of prompts in the semi-structured interviews may have led participants to a particular answer. These will therefore be kept only as needed if additional clarification or exploration is required.

3.4. Acceptability

3.4.1. Survey and interview completion times

Completion times were acceptable and did not interfere with patient management, clinical, or administrative work. They were in line with what was projected in the study protocol.

Table 2: Survey and interview completion times

Instrument	**Median**	**Range**
Facility survey	9 minutes	8 minutes – 10 minutes
Healthcare provider interview	32 minutes	26 – 36 minutes
Patient interview	22.5 minutes	20 – 25 minutes

3.4.2. Participant burden

Scheduling interviews with healthcare providers was the greatest logistical challenge due to their clinical commitments. The length of the interview guide for both healthcare provider and patient interviews was appropriate, no participant fatigue was noted, and there were no requests to end the interview early. No questions were found to be sensitive or distressing to healthcare providers. One patient interview included a brief emotional response from the carer around the delay experienced in diagnosis. Both carer and patient were comfortable continuing the interview and did not experience any further distress. This response illustrates the emotional impact that delayed diagnosis has on patients and their loved ones and supports the acceptability of the interview process, as no participants asked to skip any questions, end the interview, withdraw consent, or access psychosocial support. Overall, the burden of the interviews, including time, inconvenience and emotional burden, appeared to be low.

3.5. Feasibility of data processing and analysis

A good volume of quantitative data was obtained from the two surveys, and high-quality in-depth qualitative data was obtained from all interviews. Some of the survey questions were incomplete, as the administrative staff were unable to provide specific information. In all five interviews with both healthcare providers and patients, every question was answered, resulting in a complete data set. Quantitative data was readily exported from the Qualtrics platform into Excel, which facilitated data analysis. Minimal data cleaning was required.

Transcribed audio recordings, uploaded into Atlas.ti, required a minimum of four hours for transcription review, verification with the original recording and editing, followed by coding and

thematic analysis. The transcript quality was fair and varied across participants. The healthcare provider transcripts had inaccuracies with colleagues' names, medical terms and medications. South African accents were also frequently incorrectly transcribed. Close manual review of these transcripts was essential to ensure that the interviews were correctly captured and to enable accurate coding and capture of quotes.

3.6. Harms

There were no research-related adverse events in this study. No participants accepted the social work support offered at the start of the informed consent and interview proceedings, requested to stop the interview, skipped questions or withdrew consent.

4. Summary of pilot findings

Table 3: Modifications to methods arising from the pilot study

Finding	**Modification**
Administrative staff were unable to answer certain survey questions.	Ensure the survey is completed by healthcare providers or staff with the required knowledge.
Poor survey free-text responses.	Move these questions to the interview.
Challenging private patient recruitment.	Modify recruitment strategy.
Interview prompts were occasionally leading.	Use only if clarification is required.
Challenging healthcare provider interview logistics.	Shorten the semi-structured interview.
Carer contributions.	Ensure patients are interviewed alone.

Discussion

This pilot study demonstrated that the proposed overarching mixed-methods study is feasible in both public and private clinical haematology facilities in South Africa [14] [24]. Participant recruitment, informed consent, and data collection procedures were successful, and the survey and semi-structured interview guides generated comprehensive quantitative and qualitative data. The pilot study was designed to improve the efficiency and quality of the main study and identified several procedural refinements for participant recruitment [25]. The depth and time-consuming nature of the required qualitative analysis have facilitated more careful planning for the future study. These findings support progression to the planned overarching mixed-methods study with the identified methodological refinements.

The pilot study demonstrated that participant selection matters as much as the quality of the design of the tool itself [26]. The expertise of participants had a significant impact on the quality and completeness of data obtained. This reinforces the rationale for carefully planned purposive sampling. Any unanswered questions in the survey, if completed by administrative staff, will be included in the semi-structured interview with the healthcare providers. This will allow for a flexible approach, with the facility able to identify the most appropriate people to complete all survey items. The roles played by staff members differ in different practices and departments, and systems knowledge across the different aspects of the survey may be held by multiple different staff members.

Prompts were included in the interview guides to facilitate discussion, but it was also noted that using these in the interviews could unintentionally lead the participants to a particular answer or

to structure their answer using the prompts provided. Therefore, these will only be included if the participant is struggling to answer the question or requires clarification, which will maintain the open nature of the interview and reduce the researcher's influence. Patient interview processes have also been refined for the full study. Patients will be interviewed individually as far as possible. If they request that their carer be present, the carer will be asked not to contribute to the interview.

Another important outcome of this pilot study is that the main study workload can be extrapolated from these findings, which provided a realistic estimate of the resources required for qualitative data analysis. A minimum of 36 interviews are currently planned (18 healthcare providers and 18 patients), which translates into at least 144 hours of transcription and coding. If one healthcare provider at all 44 currently-identified South African clinical haematology practices is included, including an oncologist in public and private in provinces without clinical haematologists, this will mean a minimum of 276 hours of transcription and initial coding for only the healthcare provider interviews. Protected researcher time will need to be prioritised to ensure that the minimum number of interviews can be conducted and transcribed in a timely manner, consistent with the study timelines and funding.

Limitations

A limitation of this study is that it included only two facilities, was only conducted in the Western Cape, and contained a small number of participants. These factors make it difficult to generalise the findings to the rest of South Africa and beyond its borders to neighbouring sub-Saharan African countries. Another potential limitation is that the interviews and data analysis

were all conducted by the same researcher, which has ensured consistency but may limit interpretation despite reflexive practices. However, the pilot study successfully evaluated the methodological processes and instruments.

Conclusion

This pilot study achieved its objectives in assessing procedural feasibility, study instrument usability and acceptability, and data completeness. The refinements resulting from this study are intended to improve data collection efficiency and quality. The planned overarching study can proceed with the revised methodological processes and study instruments, which have been designed to strengthen the efficiency and data completeness for assessing clinical haematology services in South Africa and neighbouring countries.

List of abbreviations

AI:	Artificial intelligence
CONSORT:	Consolidated Standards of Reporting Trials
DKMS:	Deutsche Knochenmarkspenderdatei
HHFA:	Harmonized Health Facility Assessment
HREC:	Health Research Ethics Committee
HSCT:	Haematopoietic stem cell transplantation
MRI:	Magnetic resonance imaging
PET/CT:	Positron emission tomography/computed tomography
SARA:	Service Availability and Readiness Assessment

sSA: Sub-Saharan Africa

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

Declarations

Ethics approval and consent to participate

Ethical approval for the main study, which included a planned pilot study, was received from the Health Research Ethics Committee (HREC) of Stellenbosch University (Reference No. S25/11/315). Permission to conduct the study was obtained from the participating public institution prior to commencement. All participants provided written informed consent before participation. The study was conducted in accordance with the principles of the Declaration of Helsinki and South African Good Clinical Practice guidelines.

Consent for publication

Consent for publication was obtained from all participants. No personally identifiable information is included in this manuscript.

Availability of data and materials

The protocol and all datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This pilot study formed part of Phase 2 of the doctoral research project 'Mapping Clinical Haematology Services in South Africa and Neighbouring Countries'. The DKMS Special Award supported the research. The funder had no role in the study design, collection, analysis or interpretation of the data, or manuscript writing.

Authors' contributions

B.M. wrote the main manuscript text and prepared the CONSORT extension for Pilot and Feasibility Trials Flow Diagram and Tables 1-3. K.B., J.B. and V.L. reviewed and edited the manuscript.

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AI Declaration

Artificial intelligence (AI) tools were used to support certain aspects of this research. AI-assisted transcription software generated initial interview transcripts, which the researcher reviewed against the original audio recordings and corrected manually. Large language models (including ChatGPT) were used to assist with language editing, improving clarity of expression, restructuring sections of the report and refining tables and figures. No AI tools were used to generate research data, perform data analysis, interpret findings or make scientific decisions. The

researcher, supported by her supervisor, performed the conception and study design, data collection, analysis, interpretation, and all final decisions in this report. The researcher is fully responsible for all content in this report.

References

1. Gopal S, Wood WA, Lee SJ, Shea TC, Naresh KN, Kazembe PN, et al. Meeting the challenge of hematologic malignancies in sub-Saharan Africa. Blood. 2012;119(22):5078-87.
2. Grobbelaar S, Mercier AE, Verburgh E, Brittain D, Pepper MS. Haematopoietic stem cell transplantation in South Africa: Current limitations and future perspectives. S Afr Med J. 2019;109(8b):46-52.
3. Omotoso O, Teibo JO, Atiba FA, Oladimeji T, Paimo OK, Ataya FS, et al. Addressing cancer care inequities in sub-Saharan Africa: current challenges and proposed solutions. International Journal for Equity in Health. 2023;22(1):189.
4. Ngwa W, Addai BW, Adewole I, Ainsworth V, Alaro J, Alatise OI, et al. Cancer in sub-Saharan Africa: a Lancet Oncology Commission. Lancet Oncology. 2022;23(6).
5. Antel K, Verburgh E. Lymphadenopathy in a tuberculosis-endemic area: Diagnostic pitfalls and suggested approach. South African Medical Journal. 2019;109(10).
6. Black GB, Boswell L, Harris J, Whitaker KL. What causes delays in diagnosing blood cancers? A rapid review of the evidence. Primary Health Care Research & Development. 2023;24:e26.
7. Alemayehu C, Mitchell G, Nikles J. Barriers for conducting clinical trials in developing countries - a systematic review. International Journal for Equity in Health. 2018;17(1):37.

593 8. Louw VJ. Transfusion education and practice in South Africa. Transfusion and Apheresis
594 Science. 2014;51(3):6-7.
595 9. Health Professionals Council South Africa. Personal communication; 2026.
596 10. Fraser A, Newberry Le Vay J, Byass P, Tollman S, Kahn K, D'Ambruoso L, et al. Time-
597 critical conditions: assessment of burden and access to care using verbal autopsy in Agincourt,
598 South Africa. BMJ Global Health. 2020;5(4):e002289.
599 11. Roder-DeWan S, Gupta N, Kagabo DM, Habumugisha L, Nahimana E, Mugeni C, et al.
600 Four delays of child mortality in Rwanda: a mixed methods analysis of verbal social autopsies.
601 BMJ Open. 2019;9(5):e027435.
602 12. Burnett JM, Myende N, Africa A, Kamupira M, Sharkey A, Simon-Meyer J, et al.
603 Barriers to Childhood Immunisation and Local Strategies in Four Districts in South Africa: A
604 Qualitative Study. Vaccines (Basel). 2024;12(9).
605 13. WHO. Service Availability and Readiness Assessment (SARA) Manual. 2015.
606 14. Eldridge S, Chan C, Campbell M, Bond C, Hopewell S, Thabane L, et al. CONSORT
607 2010 statement: extension to randomised pilot and feasibility trials. BMJ. 2016.
608 15. Thabane L, Ma J, Chu R, Cheng J, Ismaila A, Rios LP, et al. A tutorial on pilot studies:
609 the what, why and how. BMC Medical Research Methodology. 2010;10:1.
610 16. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful
611 Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation
612 Research. Administration and Policy in Mental Health. 2015;42(5):533-44.
613 17. Kallio H, Pietila AM, Johnson M, Kangasniemi M. Systematic methodological review:
614 developing a framework for a qualitative semi-structured interview guide. Journal of Advanced
615 Nursing. 2016;72(12):2954-65.

616 18. Bradley EH, Curry LA, Devers KJ. Qualitative data analysis for health services research:
617 developing taxonomy, themes, and theory. Health Services Research. 2007;42(4):1758-72.
618 19. Ramanadhan S, Revette AC, Lee RM, Aveling EL. Pragmatic approaches to analyzing
619 qualitative data for implementation science: an introduction. Implementation Science
620 Communications. 2021;2(1):70.
621 20. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in
622 Psychology. 2006;3(2):77-101.
623 21. Fishler Malone K, Carmichael N. Research methodologies in genetic counseling:
624 Grounded theory. Journal of Genetic Counseling. 2025;34(3):e70060.
625 22. Olmos-Vega FM, Stalmeijer RE, Varpio L, Kahlke R. A practical guide to reflexivity in
626 qualitative research: AMEE Guide No. 149. Medical Teacher. 2022:1-11.
627 23. von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP, et al.
628 The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)
629 statement: guidelines for reporting observational studies. Journal of Clinical Epidemiology.
630 2008;61(4):344-9.
631 24. Lancaster GA, Thabane L. Guidelines for reporting non-randomised pilot and feasibility
632 studies. Pilot and Feasibility Studies. 2019;5:114.
633 25. van Teijlingen E, Hundley V. The importance of pilot studies. Art & Science. 2002.
634 26. WHO. Harmonized Health Facility Assessment (HHFA): Comprehensive Guide.