

BMJ Open Non-randomised prospective clinical trial to improve follow-up adherence, survivorship knowledge and late effects documentation at a childhood cancer clinic in Western Kenya: a study protocol

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ABSTRACT

Introduction International survivorship guideline consortia have developed strategies to prevent, detect and manage late effects of childhood cancer survivors. However, recommendations do not adequately reflect the everyday reality of paediatric oncology care in low- and middle-income countries. In this study protocol, a survivorship intervention programme, comprising an educational component and a follow-up component, is described. The Educational Programme aims to improve follow-up adherence of childhood cancer survivors through increasing survivorship knowledge of caregivers. The Follow-up Programme aims to map late effects by implementing a follow-up form at the outpatient clinic to be used by trained healthcare providers.

Methods and analysis This non-randomised prospective clinical trial will be performed at a referral hospital in Western Kenya. 100 caregivers of children diagnosed with cancer, who will complete treatment within 2 months, will be enrolled and followed for 24 months after completion of treatment. A caregiver control group receiving usual care will be recruited, and sequentially, caregivers will be included in an intervention group to attend an educational group session where they receive educational materials (video, booklet and Survivorship Card). Primary study outcome will be survivors' follow-up adherence. Survivors will be considered lost to follow-up after they miss a scheduled appointment and do not revisit the clinic for more than 6 months. Mixed models regression analyses will be performed to determine intervention effects on follow-up adherence and on caregiver survivorship knowledge uptake. Additionally, healthcare providers will be trained on follow-up care, whereafter a form will be introduced at the outpatient clinic to document late effects in paediatric survivors attending the clinic for the period of a year. Secondary outcomes will be late effects prevalence as documented in the follow-up form and caregiver and healthcare provider survivorship knowledge uptake. Implementation measures (reach, potential effectiveness, adoption, satisfaction and maintenance) will be evaluated for both programmes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Caregivers, childhood cancer survivors and healthcare workers will be included in this Kenyan survivorship programme.
- ⇒ This trial will evaluate the follow-up adherence, knowledge uptake, late effects prevalence and implementation success among the recipients.
- ⇒ A Practical, Robust, Implementation and Sustainability Model analysis was performed to identify potential pre-implementation pitfalls and facilitators.
- ⇒ A sequential non-randomised study design was chosen out of ethical concerns.

Ethics and dissemination The Institutional Research and Ethics Committee has approved the study protocol. Findings will also be shared with governmental and non-governmental organisations that support children with cancer in Kenya to inform their target audiences and guide their policy development.

Lessons learnt from this study could inform healthcare providers and policy makers on how to shape survivorship programmes in the Kenyan context and possibly implement similar programmes in other centres in Sub-Saharan Africa.

Trial registration number NCT06680687.

INTRODUCTION

Survival of childhood cancer in Kenya has increased in the last decade.^{1 2} As a result, an emerging number of childhood cancer survivors will be in need of care. Survivors may experience either physical or psychosocial late effects due to treatment-related toxicity.^{3 4} In addition, survivors are vulnerable to educational, career, relationship and financial setbacks.^{5 6} Reaching survivors with the appropriate care remains a major hurdle

in high-income countries as well, especially once paediatric survivors transition into adult care.⁷⁻⁹ International guideline consortia have developed evidence-based follow-up strategies and care models to prevent, detect and manage late effects.^{10 11} Despite the attempt to harmonise guidelines to address the demands of practitioners worldwide, current recommendations do not seem to reflect the everyday reality of paediatric oncology care in low- and middle-income countries (LMIC). A South African survey showed that most clinicians need to adapt existing guidelines according to their local practice.¹² Insufficient staffing, a lack of time and possibly knowledge hamper healthcare providers in providing optimal survivorship care.¹³ Furthermore, healthcare facilities may not offer adequate investigations, or patients may not be able to afford them.¹³ There are few examples of African paediatric oncology centres that found a solution for the drop-out of survivors by compensating travel fares or the wages of missed working days.^{14 15} However, without available support to sustain follow-up care, follow-up adherence of survivors has traditionally been low in LMIC.¹⁵ A cross-sectional study among 26 young adult Kenyan childhood cancer survivors showed that survivors who recalled being informed about survivorship remained 3 years longer in follow-up care compared with survivors who were not educated.¹⁶ This study aims to retain survivors and caregivers in early follow-up by thoroughly informing them about the late effects associated with cancer treatment and the importance of ongoing monitoring. Awareness of alarming conditions that may occur in the nearby or distant future should empower caregivers to timely link with a healthcare provider. Concurrently, the attentiveness of healthcare providers and caregivers to the risks of social reintegration issues and stigmatisation in the community may ensure prompt referral to counsellors or social workers.¹⁷

Transferring knowledge, both in dedicated follow-up clinics and through primary care physicians, has been shown to promote cancer understanding among survivors and enhance the risk perception of late effects.^{18 19} The survivorship care plan, comprising an educational component, a treatment summary and recommendations based on individual, diagnosis and treatment specific risks, has become a widely-used instrument to keep survivors engaged in follow-up care.¹⁹ Delivery of such care should ideally follow a flexible, multidisciplinary, survivor-centred approach. However, site-specific differences among the target population, the care models used, the digital infrastructure in place and resources allocated by policy makers demand tailored implementation strategies.^{20 21} In our study, caregivers will be primarily addressed, as they continue to be the spokesperson for the childhood cancer survivor in early follow-up. However, children's actual performance can differ from how caregivers interpret their functioning, and therefore, survivors' preferences and expectations should be taken into account as early as possible.²² Particular caution should be raised to be thoughtful of

language and cultural appropriateness in health education.²³ Speakers of native or vernacular languages may be more receptive to audio or video education than to printed materials in a less conversant language.²⁴ Topics such as infertility and disability have been associated with childhood cancer stigma in Sub-Saharan Africa and should, despite their relevance, be handled with sensitivity.²⁵ Trained survivor champions, vocal through advocacy groups, could be instrumental in setting the right tone to engage both peers and policy makers.²⁶ At the organisational level, government-run initiatives in LMIC are often burdened with a high patient load, and as a result, non-governmental organisations have positioned themselves as valuable partners to support survivors who had moved out of sight and are difficult to reach.²⁷ Clinical resource-adapted guidelines have long been documented to advise healthcare providers on the best possible practice in a lower-resource setting.²⁸ The impact of such recommendations, however, is highly affected by the level of training on the interpretation of those manuals. Also, healthcare providers working in peripheral centres might not be familiar with subspecialised services such as neuro-cognitive testing or hormonal replacement therapy in the absence of dedicated multidisciplinary teams.^{29 30} Regardless, considering the accumulating number of survivors that depend on care in tertiary referral hospitals, shared-care facilities should eventually be strengthened to participate in survivorship care delivery.³¹

In this study protocol, we described a survivorship intervention programme that will be performed at a referral hospital in Western Kenya. This will be a non-randomised prospective clinical trial with a sequential hybrid effectiveness-implementation design. The study comprises an educational component for caregivers of childhood cancer survivors and a follow-up component targeting healthcare providers with survivorship training and implementation of a late effects documentation tool. Through these interventions, we aim to (1) increase follow-up adherence of childhood cancer survivors; (2) increase caregivers' and healthcare providers' knowledge about childhood cancer diagnoses, treatment and the corresponding late effects risks; (3) document late effects at a childhood cancer outpatient clinic; (4) evaluate programme implementation and satisfaction among recipients and providers.

METHODS

Study settings

The study will be performed at Moi Teaching and Referral Hospital (MTRH), situated in Eldoret, Kenya. It is a large tertiary care referral hospital whose service area covers a population of at least 24 million.³² The total bed capacity of MTRH is approximately 1000 of which 35 beds are dedicated to the paediatric oncology department. Surgery, chemotherapy and radiotherapy are available and services are covered for subscribers of the National Health Insurance Fund or the newly introduced Social

Health Insurance Fund.^{33 34} Patients up to 14 years of age are admitted at the paediatric ward. The most prevalent diagnoses are acute lymphoblastic leukaemia (ALL), Burkitt lymphoma and Wilms tumour.² Patients often live far away from the hospital, and caregivers frequently have to leave their household to stay with the child in the wards.³⁵ In the initial phase of treatment, patients are continuously admitted, sometimes for several months, until they are in a stable clinical condition. In later stages of treatment, patients have their check-ups at the outpatient clinic and will only be admitted in case of serious side effects or to receive intensive therapy. In the same outpatient clinic building, survivors are reviewed after treatment during scheduled appointments. An estimated 100 of the 300 children diagnosed annually with cancer will successfully complete treatment.² We estimated that 30% of survivors remain in follow-up 2 years after completion of treatment. Follow-up appointments are scheduled every month to every 3 months for the first 2 years and every year, after 3 years. At the follow-up clinic, patients generally arrive early in the morning where their file is retrieved by the medical records administration. Procedures such as blood drawings are done first, after which measurements (weight, length and blood pressure) are taken by a nurse, before then the survivors are reviewed by the clinician. A patient navigator assists in directing the survivors to the right stations. The next scheduled appointment is noted in a paper diary, and in case of a no-show, the patient navigator makes a phone call to the caregiver.

Patient and public involvement

Implementation science focuses on the integration of interventions into their intended systems. Barriers that could endanger the envisioned outcomes may be related to a complex interaction between the intervention and the perspectives and characteristics of the organisation and recipient, the external environment and the implementation infrastructure.³⁶ A contextual analysis with frameworks such as the Practical, Robust, Implementation and Sustainability Model (PRISM) can help to identify potential implementation pitfalls and facilitators.³⁷ Between 2021 and 2023, 54 caregivers, 26 young adult survivors and 60 healthcare workers responded to questionnaires containing open-ended and multiple-choice questions that explored preferences to design a follow-up programme for childhood cancer survivors.^{16 38} In addition, multiple discussions with key stakeholders resulted in the following preimplementation mapping of the study context according to PRISM domains: intervention, recipients, external environment and implementation and sustainability infrastructure (box 1). The PRISM analysis was performed by the lead researcher and was reviewed and refined by the collaborating authors of this trial protocol. The previously described caregiver, survivor and healthcare worker perspectives were not subjected to a formal qualitative analysis, but appreciated through a PRISM lens adopted by the lead researcher.

Box 1 Pre-implementation assessment informed by stakeholder responses and categorised under the PRISM domains (Intervention, Recipients, External Environment and Implementation and Sustainability Infrastructure)

Intervention

Patient Perspectives

- ⇒ Intervention should bridge a knowledge gap that concerns both physical and psychosocial problems.
- ⇒ Peer interaction should be considered to discuss survivor issues.
- ⇒ Community, spiritual and school leaders should be involved in survivor interventions.

Organisational Perspectives

- ⇒ Follow-up care could benefit from protocols similar to those implemented in the treatment phase.
- ⇒ Care and content provided should be guided by international standards.
- ⇒ Focus should be on symptoms rather than on subclinical surveillance.
- ⇒ A tedious administrative burden should be avoided.
- ⇒ Check-ups would best be delivered by a paediatrician or oncologist.

Recipients

Patient characteristics

- ⇒ Involves both caregivers and survivors.
- ⇒ Experience financial and logistic barriers to adhere to clinic appointments.
- ⇒ May be exposed to community perceptions that affect willingness to participate in follow-up care.

Organisational characteristics

- ⇒ Leadership supportive of clinical change based on research findings.
- ⇒ Communicate openly among multiple disciplines (counsellors, (neuro)surgeons, radio-oncologists).
- ⇒ Strong referral pathways are established with peripheral (county and subcounty) facilities.

External environment

- ⇒ Prospective oncology registry and electronic medical registry have recently gone live.
- ⇒ Outpatient oncology care is not (fully) compensated by health insurance.
- ⇒ Particular additional investigations (eg, hormonal assessment) may not be available.
- ⇒ No clinic day or clinic structure dedicated to survivors only.

Implementation and sustainability infrastructure

- ⇒ Survivorship has been included as a key topic in the National Cancer Strategy 2023–2027.
- ⇒ High patient burden on a limited number of healthcare workers.
- ⇒ Local providers of the intervention are enrolled in a PhD trajectory on survivorship.
- ⇒ Proposed interventions are, once developed, relatively cheap to print, use and display.

The PRISM analysis illustrated that caregivers and survivors desired an intervention incorporating physical and psychosocial elements of survivorship care with an opportunity to engage in peer interaction. The organisational perspective, representing both tertiary referral hospitals and lower level peripheral facilities, added that an intervention should be founded on international guidelines and with an accent on symptom-based screening opposed to screening for subclinical conditions. Limited compensation of follow-up care by health insurance, insufficient

availability of additional investigations, a high patient burden, but also the inclusion of survivorship in the Kenya National Cancer Strategy were highlighted as determinants for implementation success.

Eligibility criteria

Caregivers of children diagnosed with cancer (primary or secondary malignancy) below 15 years old who will soon be finalising childhood cancer treatment (within the final 2 months of treatment) will be eligible to participate in this study. Caregivers of children with any form of treatment failure at the time of enrolment (abandonment, relapsed disease, progressive disease) and caregivers accompanying the child who are not the primary guardians will be excluded from participation.

Healthcare providers (the paediatric oncology workforce comprises an estimated 30 staff members) working in the paediatric oncology department at MTRH will also be recruited. Any cadre involved in patient care or patient education of children with cancer (eg, paediatric oncologists, fellows, registrars, medical officers, clinical officers, nurses, patient navigators and child life specialists) will be allowed to participate.

Childhood cancer survivors (successfully completed treatment and without treatment failure) who are attending the outpatient clinic will be eligible to be reviewed with the late effects documentation tool.

Interventions

Educational programme

Caregivers, admitted in the wards or visiting the outpatient clinic, will be invited to attend an educational group session. Each session will take 60–90 min and will be organised weekly to monthly, depending on the availability of study participants. A maximum of 10 caregivers can be present at a session.

First, a video will be displayed in which healthcare providers explain medical aspects of survivorship (different follow-up periods; what does a visit look like; previous treatment; lifestyle recommendations; late effects; coping and peer contact; stigma and social reintegration).³⁹ Caregivers of survivors and young adult survivors discuss their experiences after completing cancer treatment in the video. The spoken language used will be Kiswahili and subtitles will be in English. A healthcare provider will be present to answer questions of the attending caregivers.

Second, the present healthcare provider will hand over an information booklet 'Life after childhood cancer' to the caregivers (online supplemental file 1). The booklet covers similar topics as presented in the video and will be available in English and Kiswahili.

Finally, a Survivorship Card will be shared with the caregivers (online supplemental file 2). The card contains a record of the patient's cancer and treatment history and the expected follow-up appointment schedule. It lists specific late effects that are associated with the received treatment that the caregiver should be aware of. Most

information will be prefilled, according to the standard treatment administered per protocol. An explanation about the content and purpose will be given to the caregiver individually. Personalised information will be filled by a healthcare provider on the card at the first follow-up visit. The survivor and family take one card home, and a duplicate copy of the card remains in the medical file.

Follow-up programme

Healthcare providers will attend a training session of approximately 90 min, in which investigators will discuss the same topics as covered in the educational group session supported by PowerPoint slides. This strategy aims to, besides transferring knowledge, create awareness and engagement with the planned interventions among the staff in the department.

A follow-up form will be introduced to be used by healthcare providers in the outpatient follow-up clinic. The form will include questions referring to symptoms specific to certain late effects. Specific questions will be included per subcategory: haematological malignancies, solid tumours or central nervous system tumours.⁴⁰ The first part of the follow-up form will focus on detecting relapses. The form addresses general health issues such as fatigue, pain, dental hygiene, neurocognitive (concentration/memory) and psychosocial issues (in school or in the community). In case of identified symptoms, subsequent investigations or referrals are suggested to consider according to international guidelines. At every follow-up visit, a new follow-up form will be included in the medical record, enabling the healthcare provider to easily address new symptoms and keep track of previously identified health problems.

Primary outcomes

The primary outcome of this clinical trial will be follow-up adherence. This outcome was selected because improved adherence to follow-up care within the intervention group was considered the most clinically meaningful impact of the educational programme. Efforts to improve the quality of survivorship care will only have a prolonged effect if the target group remains engaged in follow-up care over the long term.

Follow-up adherence will be monitored by checking whether the survivor showed up at scheduled hospital appointments.

Survivors will be considered non-adherent when they do not appear for their scheduled visit within 4 weeks before or after the scheduled visit. Survivors will be considered lost to follow-up when they miss an appointment and do not revisit the follow-up clinic after their missed appointment for more than 6 months.

Reasons for non-adherence and the intentions to revisit the follow-up clinic will be explored through a phone call.

Secondary outcomes

Caregivers' and healthcare providers' knowledge about disease history, treatment exposure, associations between

Table 1 Caregiver and healthcare provider knowledge assessments on disease history, treatment history, follow-up care, late effects risk and risk perception

Caregivers (educational programme)	Healthcare providers (follow-up programme)
Disease history	
Type of cancer; general name of cancer (eg, leukaemia); specific name of cancer (eg, ALL); location of cancer in the body	
Treatment history	
Surgery; surgery type; radiotherapy; radiotherapy location; chemotherapy; name chemotherapeutic agents	Surgery; surgery type; associations between surgery and late effects; radiotherapy; radiotherapy location; association between radiotherapy and late effects; chemotherapy; name chemotherapeutic agents; associations between chemotherapy and late effects
Follow-up care	
Why; where; frequency and duration	
Late effects risk	
Physical	
Heart; lungs; ears; eyes; bones; hormonal system; fertility; kidneys; nervous system; secondary cancer; liver; cardiovascular system; urinary system	
Quality of life	
Pain; fatigue; challenges physical exercise; mental problems; social problems; cognitive problems; educational problems	
Risk perception	
Low to high	Diagnoses at high risk to develop late effects
ALL, acute lymphoblastic leukaemia.	

treatment and late effects, follow-up care, late effects risk and risk perception will be assessed with a questionnaire (table 1; online supplemental file 3).

Documentation of late effect symptoms will be monitored by extracting data from the follow-up forms attached in the medical records (online supplemental file 4). Late effects are categorised into physical outcomes (eg, relapsed disease, heart failure, infertility), physical aspects of quality of life (eg, fatigue, challenges

exercising), psychosocial aspects of quality of life (eg, anxiety, exclusion) and neurocognitive aspects of quality of life (memory, educational problems) according to the International Childhood Cancer Outcome Project.⁴⁰

Implementation measures will be repeatedly collected and will fit into the reach, effectiveness, adoption, implementation and maintenance domains (table 2).⁴¹

Table 2 Caregiver and healthcare provider implementation outcomes according to RE-AIM domains

Caregivers (educational programme)	Healthcare providers (follow-up programme)
Reach	% Eligible caregivers having received the booklet, video and Survivorship Card; characteristics of caregivers included in the study
Effectiveness	Follow-up adherence; knowledge; documented late effects
Adoption	% Study participants taking the Survivorship Card to their clinic appointment
Implementation	% Eligible survivors having received the follow-up form in clinic; % follow-up forms completely filled by clinician; investigations and referrals done; actions adhering to form instructions
Maintenance	Satisfaction (acceptability, feasibility, potential effectiveness) Questionnaire
	Recommendations to improve follow-up form
RE-AIM, reach, effectiveness, adoption, implementation and maintenance.	

Recruitment

The trial has opened in November 2024 and is planned to finish in November 2027. Caregivers will be identified weekly in the paediatric oncology wards and the outpatient clinic. Study information will be provided, and investigators will request caregivers for their informed consent (online supplemental file 5). A log will be kept with the number of eligible participants that consented together with the justifications for non-consent. If the survivor and caregivers do not appear at their follow-up appointment, a phone call will be made to discuss their no-show. If they remain unable to attend the follow-up clinic, caregivers will be requested for a phone interview to assess knowledge and satisfaction.

The paediatric oncology administration will provide a list of healthcare providers working in the department (consultants, fellows, registrars, medical officers, clinical officers, nurses and counsellors). These healthcare workers will be sensitised about the intervention programme through training followed by a knowledge assessment. They will be actively involved and encouraged to be attentive to direct eligible study participants to the investigators.

Assignment of interventions

A caregiver control group of 50 participants receiving usual care will be recruited and sequentially, 50 caregivers will be included in the intervention group. Because follow-up adherence is also time-dependent (the risk of non-adherence increases with time), we reasoned that the educational programme should be delivered before completion of treatment, to prevent survivors getting lost to follow-up before receiving the intervention.

Healthcare provider training will be provided to at least 75% of the healthcare providers that match the inclusion criteria, and the timing of the training will be determined by availability. The follow-up form will be used to document late effects in all survivors that attend the outpatient clinic, regardless of their enrolment in the educational programme.

Participant timeline

The timing of planned interventions and assessments is shown in figure 1 and online supplemental table 1. Participants of the control (usual care) group A will be recruited during the last 2 months of treatment (T-2). At the end of treatment (T0), they will complete a knowledge questionnaire, and they will be followed for another

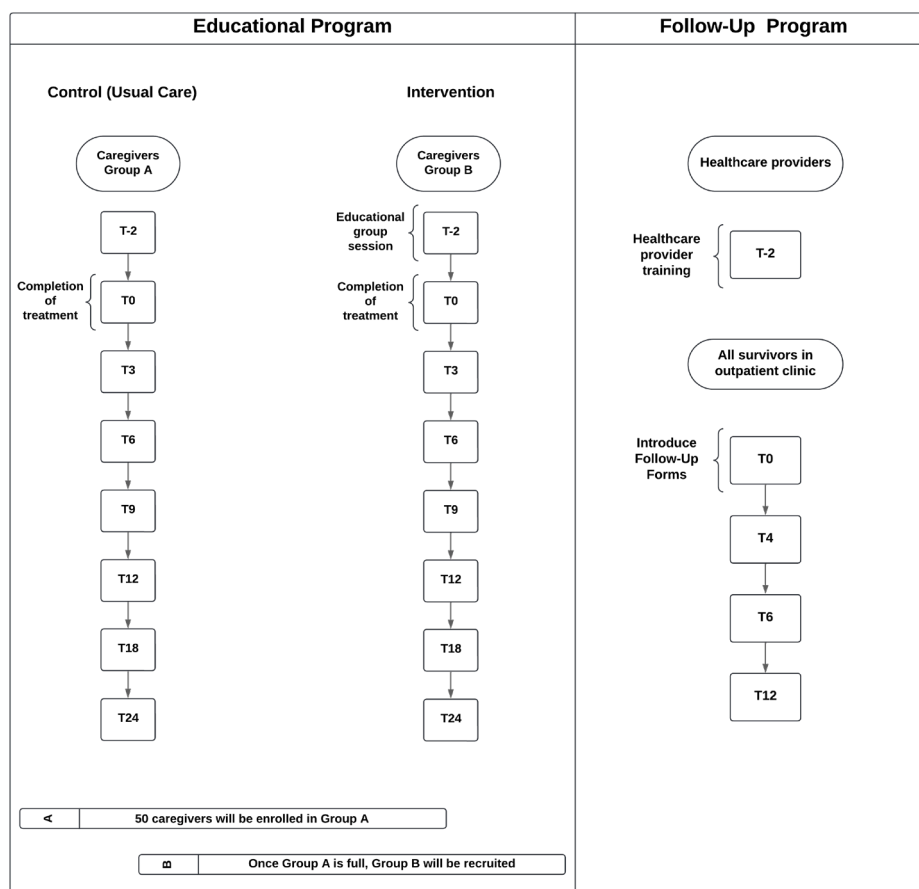


Figure 1 Participant timeline for the control (Group A) and intervention (Group B) groups in the educational programme and healthcare providers and survivors in the follow-up programme.

24 months. At 6 months after treatment completion (T6), a final follow-up knowledge assessment will be conducted.

Participants will be enrolled into group A until the intended sample size of 50 participants is reached. We estimate to have reached this number within 4–6 months based on recent survival rates. The educational intervention will then be introduced and assigned to intervention group B. A similar procedure will apply to the intervention group. They will complete a knowledge assessment before receiving an educational intervention between T2 and T0. To evaluate early and late knowledge uptake, they will complete a post-education knowledge assessment at T0 and a follow-up knowledge assessment at T6. Follow-up adherence will be evaluated at every 3 months for the first year and at every 6 months during the second year after treatment completion for both groups. In case of a no-show at any scheduled follow-up appointment, the reason for non-adherence will be explored by phone and an attempt will be made to reschedule the appointment. Implementation measures (reach, adoption) will be captured starting at T3 until T24, together with a satisfaction questionnaire that will be administered at T6.

Healthcare provider training on survivorship will start at the same timepoint as recruitment of group A (T2). Follow-up forms will be introduced at the follow-up clinic once an estimated 30 healthcare providers have received the training (anticipated at T0). Healthcare providers will fill in a knowledge assessment directly pre- and post-training (T-2) and at 6 months post-training (T4). Documentation of survivor late effects in follow-up forms will be monitored for 12 months, starting at T0. Implementation measures will be collected weekly starting from T0, and healthcare providers will complete a satisfaction questionnaire at T6.

Survey assessments will be conducted at regular clinic appointments, and participants will not be invited to visit the hospital for research purposes solely. If caregivers express an inability to attend the follow-up clinic, they will be requested for a phone assessment instead. Any concomitant care or interventions will be permitted during the study.

Sample size

A sequential two-group design will be used to test whether the Group B (intervention) proportion (P1) is different from the Group A (control) proportion (P2) ($H_0: P1 - P2 = 0$ vs $H_1: P1 - P2 \neq 0$). The comparison will be made using a two-sided, two-sample Z-test with unpooled variance, with a type I error rate (α) of 0.05. The control group proportion (P2) is assumed to be 0.3. To detect a proportion difference ($P1 - P2$) of 0.3 (or P1 of 0.6) with 80% power, the number of subjects needed will be 40 in Group B (intervention) and 40 in Group A (control). The sample size was computed using PASS 2023, V23.0.2. Anticipating a 20% dropout rate, 50 subjects should be enrolled in Group A and 50 in Group B, to obtain final group sample sizes of 40 and 40, respectively. Caregivers in the control group will be allowed to receive the

educational material during follow-up if they actively request it.

Training of childhood cancer survivorship will be provided to an estimated 30 healthcare providers within approximately the first 2 months from the start of the study. The educational group sessions for caregivers and the outpatient clinic follow-up forms will not be introduced before 75% of healthcare providers have attended the training sessions.

Data collection methods

Patient and treatment characteristics will be collected from the medical records and clinic diary (eg, sex, comorbidities, diagnosis, date of planned completion of treatment), follow-up adherence (eg, attendance at scheduled date, lost to follow-up) and implementation measures (eg, % eligible caregivers having received the booklet, video and Survivorship Card; % follow-up forms completely filled by clinician) (online supplemental file 2).

Additional data will be obtained through data collection tools: caregiver background information (eg, primary caregiver, travel time, regular income), healthcare provider background information (eg, cadre, years practising in paediatric oncology), pre-test, interim-test and post-test knowledge assessments (eg, disease history, treatment exposure), documented late effects (eg, relapse, pain) and implementation measures (eg, satisfaction and recommendations). English and Kiswahili versions of the data collection tools will be available. The investigator will read the caregiver questionnaires aloud and will note the responses on the forms, to account for misinterpretations. The healthcare provider questionnaires will be self-administered.

Adherence will be monitored in a clinic diary and in attendance sheets at specified planned visits (3–24 months).⁴² Follow-up visits are generally scheduled every month to every 3 months during the first 2 years after treatment.^{43 44} Therefore, we defined caregivers who will not revisit the clinic after a missed appointment for 6 months as lost to follow-up, implying they will have missed several scheduled visits. Reasons and motivations for non-adherence will be explored with a phone assessment.

The content of the knowledge assessment questionnaires for caregivers and healthcare providers derives from information outlined in the medical records, recommendations in the Survivorship Card, educational booklet and video and the healthcare provider training. The perceived risk will be evaluated against the risk determined by the validated Intensity of Treatment Rating Scale. Responses to the questionnaire items will be graded: accurate with detail, accurate without detail, incorrect, known or unknown.^{45–47}

Late effects data will be collected, and symptoms will be categorised as proposed by the joint consensus statement for measuring quality of life of childhood cancer survivors.⁴⁰

Caregiver and healthcare provider satisfaction will be measured on adapted 3-point and 5-point Likert

acceptability, feasibility and potential effectiveness scales, and recommendations will be explored with open-ended questions.^{48 49}

The healthcare provider training and knowledge assessments will be accompanied by a lunch. Caregivers will not be compensated for participating in the study.

Statistical methods

Descriptive data will be presented in percentages, medians or means. Adherence and lost to follow-up binary data will be collected for both groups in the educational programme at multiple time points. Mixed models Cox-regression analysis will be performed to determine the effect of the intervention on the primary and secondary outcomes, with the non-adherence and lost to follow-up risk presented as a hazard risk (HR).

Levels of knowledge (number of accurate/inaccurate/known/unknown responses) and knowledge uptake (changes in number of accurate responses) progression will be followed over time. Progression within and differences between the control and intervention groups of the educational programme and progression within the healthcare provider cohort of the follow-up programme will be calculated with mixed models linear regression. Propensity score stratification will be used to address potential confounding factors known from the literature and clinical experience (eg, age, insurance status, travel time). The prevalence of late effects will be described as the percentage of individual survivors visiting the outpatient clinic for the duration of 1 year who reported a symptom as documented in the follow-up forms. Recipient and provider satisfaction will be presented descriptively on item level.

In the case of missing data, imputation techniques will be performed depending on the type of missing data mechanism.

Data management

Procedures to ensure data quality are described in a data management plan. Study participant data will be entered into Castor EDC, an online platform for secure clinical research data storage, hosted on a Dutch server. Before going live, the database will be tested and validated. Medical records data will be registered directly into Castor, and data collected with paper forms will be entered online after data extraction. Investigators will be instructed on data management and entry before gaining access to the data collection tools and databases. Patient hospital numbers will be saved in a local identification log that will not be available online. Paper forms will be stored in a cabinet at a research office with limited access and will remain here before, during and after the study. Access to Castor EDC will be given only to trained and supervised research staff. Confidentiality will be prioritised in line with Institutional Research and Ethics Committee (IREC) and the Helsinki Declaration policies.⁵⁰ Agreements about access to and ownership of data among the affiliated research institutes will be formalised

in research collaboration agreements. Research records will be destroyed by paper shredding, 6 years after study completion.

Ethics and dissemination

The IREC at MTRH and Moi University has approved the study protocol (FAN: 0004807, 27-06-2024). Adjustments to the protocol should be re-approved by IREC. Investigators will provide an informed consent (online supplemental file 3) form to the study participants in English or Kiswahili that will be read out aloud by the investigator or read by the study participant. Informed consent will only be signed once all queries raised have been satisfactorily answered and participants are aware of the potential benefits, burdens and risks of the study. We consider this a low-risk intervention, and we do not foresee any resulting adverse events. Participants may feel uncomfortable about learning about their disease history, treatment exposure and their late effects risk. Participants will be allowed to express their concerns about study activities or the wish to withdraw from the study at any time.

The study will not be routinely monitored by an external committee. The single centre study is exempted from scheduled external monitoring due to the minimal risks involved. The National Committee for Science, Technology and Innovation has the mandate to undertake inspections of Kenyan research institutions to evaluate adherence to their policies. Study interventions and data collection impose only a minimal risk to the study participants. Data will be collected at routine clinic visit days, and investigators will reach out by phone if the participant is unable to be present at the study location.

Dissemination policy

The authors aim to report the study results in scientific publications. Findings will also be shared with governmental and non-governmental organisations that support children with cancer and their families such as the National Cancer Institute, National Cancer Control Programme, Faraja Cancer Support Trust and Hope4Cancer Kids to shape their policies and inform their target audiences. This study is embedded in a larger programme that aims to sustainably impact paediatric oncology care in Western Kenya, and insights may be adopted by or integrated into other running or planned projects. There have been ongoing discussions to establish a survivor and caregiver association to organise events such as survivor meetings, peer support sessions and fundraisers. Our findings could help to further define the agenda of such a platform. Lessons learnt from this study could also create momentum for healthcare providers and policy makers to plan on expanding survivorship programmes to other tertiary and peripheral centres in Kenya and Sub-Saharan Africa.

DISCUSSION

We have described an intervention programme to improve follow-up care of childhood cancer survivors which, to our knowledge, is the first in Sub-Saharan Africa. We aim to build capacity among caregivers, survivors and healthcare workers and provide them with tools to receive and deliver high-quality long-term care. Adaptations of treatment protocols, implemented by pan-African collaborations in prospective trials, have resulted in improved outcomes of childhood cancer patients in Africa.^{51 52} These experiences should now be translated to the after-treatment phase.

We propose that reviewing childhood cancer survivors should primarily focus on a thorough history taking and physical examination, opposed to screening for subclinical conditions. Caregivers and survivors should be well-informed about the red flags that necessitate urgent consultation with a healthcare provider. Also in the high-income setting, multicentre studies have concluded that the number of scheduled blood samples to identify a relapsed ALL or the number of routine imaging to detect recurrent rhabdomyosarcoma were excessive and did not result in a survival advantage.^{43 53} Exceptions should be considered for relapsed malignancies such as Wilms' tumours that also showed significant curability in the low- and middle-income setting.⁵⁴ Interestingly, we found that the International Childhood Cancer Core Outcome Set, a consensus statement that largely informed our study content, did not include standards for retinoblastoma and nasopharyngeal carcinoma survivors, both prevalent paediatric tumours in LMIC.⁴⁰ Therefore, we included symptom-screening questions for these tumour types in the follow-up form for solid tumour survivors.

This trial protocol complements other educational interventions in paediatric oncology that have been deployed in Kenya. Community health workers in Bungoma county have been enrolled in a mobile learning tool in an attempt to reduce the time to referral of children with signs of cancer.⁵⁵ Project ECHO has been established as an interactive online platform for didactic sessions and complex clinical cases since 2020. This concept has been copied from a telehealth pilot targeting childhood cancer survivors living in remote areas in the USA.⁵⁶ In spite of the increasing number of digital solutions to influence the healthcare-seeking behaviour of parents and patients, continuous training of caregivers and healthcare workers on the ground, together with engaging local authorities and uniting patient advocates, remains a central combined strategy to achieve and sustain change.⁵⁷

This study has the following methodological limitations. Observational studies are prone to time-dependent confounders in comparison to randomised studies. Usual care at this point is limited and generally consists of a non-standardised end-of-treatment conversation with the caregiver and survivor. We had ethical concerns with withholding an educational intervention, once introduced, from a control group as a result of randomisation. Therefore, we will first recruit a control cohort receiving usual

care, to serve as a comparison to the subsequent intervention cohort. We found it important to sensitise healthcare providers on the study topic by training. However, this may also affect the standard care conversations with caregivers of survivors and could influence follow-up behaviour and knowledge irrespective of the offered interventions. A number of limitations apply to the interventions as well. The caregiver group education will be organised during one single session, while repeated sessions, although resource-intensive, may be beneficial to ensure knowledge retainment. Also, the follow-up form does not allow quantifying complex constructs like fatigue or pain in further detail, in order to limit the administrative burden for the user.

In conclusion, we present a survivorship intervention programme involving caregivers, childhood cancer survivors and healthcare providers. This will be a unique long-term prospective intervention study aimed at childhood cancer survivors in Sub-Saharan Africa. The results of this study could inform healthcare providers and policy makers on how to shape survivorship programmes in Kenya and possibly implement similar programmes in other centres in Sub-Saharan Africa. In future, survivor champions could be appointed to advocate for the inclusion of follow-up services in the national insurance package and to enforce the National Cancer Strategy survivorship goals. A formalised association for survivors and families affected by childhood cancer would eventually help sustain attention on survivors' priorities beyond the research perspective.

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