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BRIEF REPORT

Introductory Course in Pediatric Oncology for Registrars/Residents and Medical Officers in Sub-Saharan Africa: A Pilot Study

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ABSTRACT

A shortage of pediatric oncologists limits teaching and supervision of registrars/residents and medical officers working in pediatric oncology units. Our aim was to develop and pilot a blended, introductory course in pediatric oncology in Zimbabwe and Zambia comprising self-paced online modules and case-based discussions. The self-paced course was subsequently adopted in South Africa. From May 2021 until August 2024, 25 learners completed the pre-test, and eight completed the post-test, with higher average post-test scores ($p = 0.0253$). Learners found the content relevant, with knowledge gain noted by local pediatric oncologists. Future courses will include strategies to reduce learner attrition.

1 | Introduction

The burden of childhood cancer is high in sub-Saharan Africa [1–3], where nearly 42% of the population is younger than 14 years [4]. A key challenge in pediatric oncology care is the shortage of pediatric oncologists [5–8]. Burdened by high clinical and administrative demands, pediatric oncologists cannot invest adequate time in teaching and supervising trainees, reducing the quality of training and the competencies of trainees in caring for children with cancer. Knowing key concepts in pediatric oncology is essential for timely diagnosis and management of disease- and treatment-related complications. In search of innovative solutions to improve learners' education while providing resources to local oncologists, we envisioned a tiered, blended curriculum in pediatric oncology. Here, we present the development and dissemination of a blended introductory course in the care of

Abbreviations: COVID-19, coronavirus disease 2019; SD, standard deviation; St. Jude, St. Jude Children's Research Hospital.

Uma Athale, Miguel Bonilla, and Daniel C. Moreira are the co-senior authors with equal contribution.

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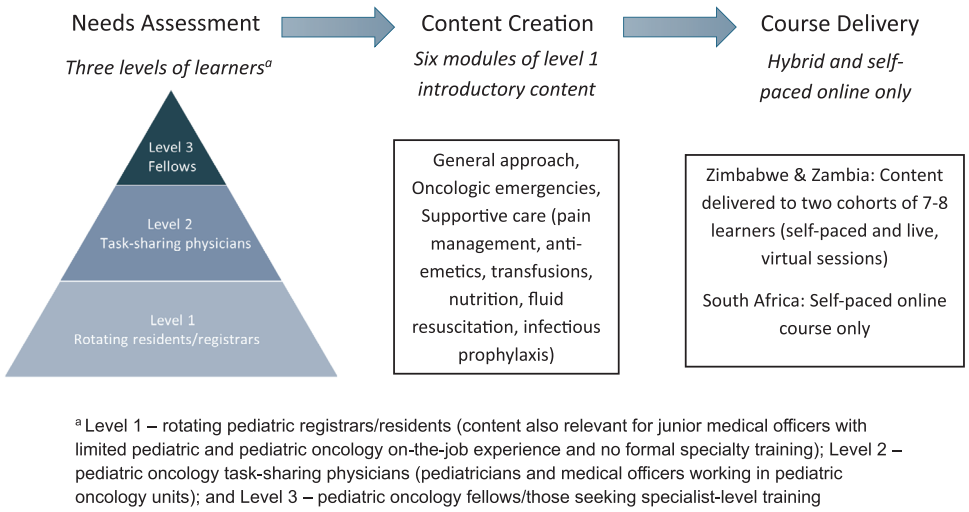

FIGURE 1 | Schema of the process of course creation and delivery.

children with cancer, with the objective of assessing the feasibility of this approach for course implementation.

2 | Methods

2.1 | Study Setting

This study was a collaboration among St. Jude Children's Research Hospital (St. Jude), McMaster University, and the pediatric oncology teams at Parirenyatwa Hospital in Harare (Zimbabwe) and Cancer Diseases Hospital in Lusaka (Zambia). The course was piloted at the hospitals in Zimbabwe and Zambia. These are the only hospitals providing pediatric cancer care in their countries, with each institution seeing 180–200 new diagnoses annually. Each institution had one pediatric oncologist, with clinical care being supported by registrars/residents and medical officers. Subsequently, based on the interest of the local pediatric oncology leadership, the course was adopted at Chris Hani Baragwanath Academic Hospital in Johannesburg, South Africa, a larger center with five pediatric oncologists seeing 150–170 new diagnoses annually.

Of note, the terms residents and registrars (often used interchangeably) refer to physicians in various levels of training in pediatrics, whereas medical officers are general physicians who have completed medical training but are not in specialty training.

2.2 | Course Design

Following a systematic approach to curriculum development [9], a needs assessment was conducted via discussions with local pediatric oncologists. A working group was created comprising pediatric oncology faculty from Zimbabwe and Zambia, and pediatric oncology faculty from St. Jude and McMaster University who additionally had a background in the implementation of educational initiatives. Three levels of learners were identified for a tiered curriculum (Figure 1). The Level 1 course was designed as a blended format [10, 11], with asynchronous, self-paced online modules and facilitated case-based discussions. The online modules were created on Cure4Kids, an online learning platform [12] (Figure S1), and consisted of recorded presentations (30 minutes each), quizzes, and a course evaluation form. The presentations were provided by faculty from St. Jude and McMaster University who were approached for their expertise in their respective content. Facilitator guides were developed by the working group for the case-based discussions. A course guide was provided with a teaching schedule based on the intended sequence of completion of the modules over 6–12 weeks, aligning with the duration of most learners' rotations. The learners could access the online course on their own time (self-paced). The lead collaborating pediatric oncologist at each center could monitor learners' progress in the course. While the live sessions were designed to be delivered by local faculty, they were facilitated by collaborating international faculty during the pilot phase for Zimbabwe and Zambia due to time constraints for local pediatric oncologists. Feedback and suggestions about the course were obtained from course facilitators and local pediatric oncologists. The study was granted a waiver of consent for educational research by the Institutional Review Board at St. Jude.

2.3 | Statistical Analysis

Descriptive statistics were used to analyze quantitative data, and *t*-tests were performed to compare the pre- and post-test scores. The level of significance was defined as $p < 0.05$. Data were analyzed by using GraphPad Prism version 10.4.1. Representative comments on the course from learners, course facilitators, and local pediatric oncologists are included in the results.

3 | Results

The course comprised six modules with 12 presentations on high-yield content for Level 1 learners: introduction to pediatric oncology, introduction to the management of cancer in children, oncologic emergencies, fluid resuscitation and nutrition, blood product transfusions, and other supportive care (i.e., pain

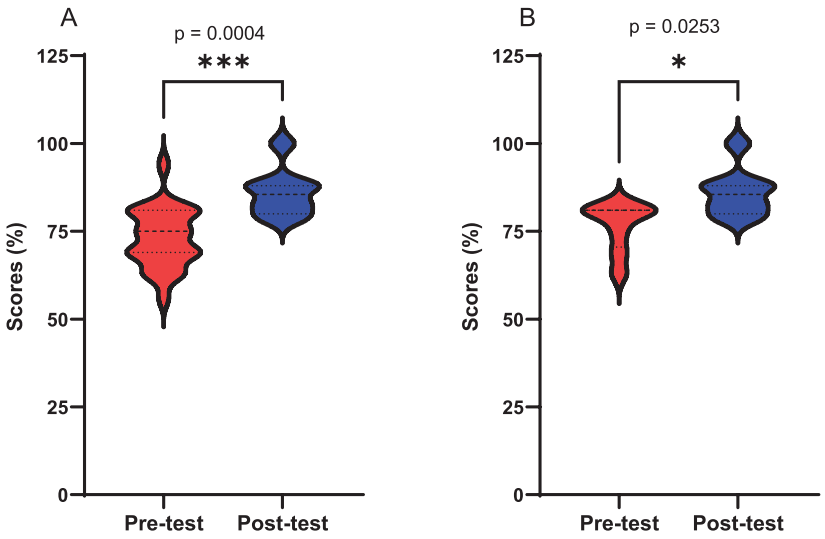

FIGURE 2 | Violin plots showing the distribution of the course participants' pre- and post-test scores. Plot A—Unpaired *t*-test of all pre-test ($n = 25$) and post-test ($n = 8$) scores; $p = 0.0004$. Plot B—Paired *t*-test of those participants who completed both the pre-test and post-test ($n = 8$); $p = 0.0253$.

management, chemotherapy-induced nausea/vomiting, infection prophylaxis) (Table S1).

3.1 | Course Delivery

The blended format was piloted in Zimbabwe and Zambia in May 2021 for two consecutive groups, each with seven to eight learners (the number of rotating trainees and medical officers at each site). None of the learners completed the self-paced modules; therefore, to ensure content delivery during their clinical rotations, the Cure4Kids presentations were delivered live over 6 weeks for each group. Although all learners attended the live sessions in the first group, only one to three attended in the second group, leading to discontinuation of the live sessions. The course remained available as a self-paced online resource and started being used in South Africa in April 2023.

Between May 2021 and August 2024, a total of 25 learners took the pre-test (South Africa: $n = 12$; Zambia: $n = 12$; Zimbabwe: $n = 1$), with an overall mean pre-test score of 73% (standard deviation [SD]: 8.6%). Eight learners took the post-test (South Africa: $n = 6$; Zambia: $n = 2$), with a mean score of 86% (SD: 6.7%) ($p = 0.0253$ for participants with both pre- and post-test completion) (Figure 2). Separating by sites, the mean pre-test score for participants from South Africa ($n = 12$) was 77.8% (SD: 7.7%), and the mean post-test score ($n = 6$) was 88.3% (SD: 6.2%) ($p = 0.0071$ for participants with both pre- and post-test completion). Only one participant from Zimbabwe took the pre-test, and none completed the course and took the post-test. For participants from Zambia ($n = 12$), the mean pre-test score was 69.4% (SD: 8.01%), and the mean post-test score ($n = 2$) was 79% (SD not calculable as both participants had the same post-test score of 79%).

3.2 | Course Feedback

Learners who completed the online course ($n = 8$) found the course helpful and said they would recommend it to other learners. Suggestions for improvement included expanding content to include modules on specific cancers and enabling offline accessibility to the course material (Table S2). Local pediatric oncology team leaders found the content to be a useful introduction to pediatric oncology, particularly when completed early in the rotation, and saw observable improvements in the clinical work of attendees, such as the enhanced management of tumor lysis syndrome. Among challenges, increased workload and limited numbers of learners—particularly during the coronavirus disease 2019 (COVID-19) pandemic when junior doctors were additionally deployed to other hospital areas—were cited as reasons for high learner attrition. The inability to engage more faculty and university/institutional leadership was reported as impeding local ownership of monitoring and delivery of the course (Table S3).

4 | Discussion

This pilot study achieved its goal of developing and disseminating an introductory course in pediatric oncology to registrars/residents and medical officers in Zimbabwe, Zambia, and South Africa. The course was well-received and led to a statistically significant increase in post-test scores for the self-paced content, indicating short-term knowledge gain. However, a high attrition of learners was seen for both the live and self-paced components.

Implementing training initiatives in busy clinical environments involves inherent challenges that are further aggravated by workforce shortages and infrastructure restraints [13–15]. Online content can be overwhelming to navigate, and it can be hard to know which free resources are trusted and up-to-date [16, 17]. A self-paced curriculum on a web-based platform can facilitate exposure to the necessary concepts when learners need this knowledge the most. However, local context may play a significant role in its uptake.

Our small sample size limits the interpretation of the significance and the generalizability of our results, although they may be

relevant for similar clinical learning environments. Our self-paced modules were completed by only 32% of participants, most from South Africa, where learners were quizzed on clinical rounds as an accountability measure of course completion. The attendance at the live, virtual sessions was also poor after the first group, which led to their early discontinuation. While the live sessions were led by international faculty, the time of the sessions was chosen based on the availability of learners; therefore, facilitating faculty being in different time zones was not a limiting factor for learners' participation, although it made the attrition more discouraging for faculty, especially as they were volunteering their time, often outside of regular work hours. Course length and internet access were not reported as barriers to participation in the self-paced and live components. The target audience of learners was not included in the needs assessment; doing so may have helped with the design of the course and better learner buy-in prior to course delivery. It is possible that the lack of disease-specific modules lowered general interest in the course for some learners, as indicated by their feedback on adding content to the course. Competing clinical responsibilities—particularly during the COVID-19 pandemic—were reported to affect learners' participation; however, inadequate expectation-setting for learners may have also contributed to the high attrition, as the course was not required as part of learners' rotations. Lack of local infrastructure, especially in Zimbabwe and Zambia, hindered ownership of monitoring the course, a strategy that may have improved uptake, suggesting that new strategies to engage institutional leadership and better integration into existing curricula are required. International collaborators can additionally support teams in advocacy efforts at national levels to prioritize resource allocation for workforce training [18–21].

In conclusion, our introductory course in pediatric oncology was relevant for the target audience; however, a high learner attrition was seen. Rigorous implementation methodology, including engaging the target audience and local institutional leadership to facilitate local ownership of course delivery, will be employed to mitigate learner attrition and ensure sustainability and scalability of future courses. Impact measurement [22] was beyond the scope of this pilot and will be assessed and reported for subsequent phases of implementation. Expansion of content to include tumor-specific modules is also planned for the next version of the course. Follow-up studies will be essential for a more robust measurement of the impact and success of these courses.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Figure S1: Course landing page on the e-learning platform, St. Jude Global Cure4Kids (Cure4Kids | Cure4Kids) (Pediatric Oncology Classroom, Sub-Saharan Africa–enrollment in the course is currently upon request only). **Table S1**: Learning objectives for an introductory course in pediatric oncology. **Table S2**: Course evaluation comments from learners. **Table S3**: Local context and course feedback from local pediatric oncology team leaders.