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Developing Research Education Groups in African Cancer Centers: The Experience in Tanzania

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Abstract
Research productivity and outcomes of junior researchers are usually correlated with the degree and quality of mentorship they receive. A bottom-up approach was followed to develop a research group at the Ocean Road Cancer Institute (ORCI), the major cancer center in Tanzania, to build upon the existing clinical and research resources and institutional global collaborations. The ORCI is a clinical center focused on radio- and chemo-therapy treatment of cancer patients from all over Tanzania. In addition, ORCI has a long-standing early detection program for educating women and screening them for cervical cancer. The ORCI physicians have been exposed to cancer research for the past 20 years through non-degree and degree training in the USA and Europe. In addition, US and European groups have been conducting collaborative research and training of oncologists and graduate students at ORCI. The exposure to research through the above-listed venues motivated the clinicians at ORCI to develop their own Research Club (RC) to learn about research methods, seek independent funding, and outline a research agenda for cancer research in Tanzania. However, it seems that mentorship is needed to help the RC members apply the lessons learned from didactic teaching. Mentorship is also needed to enable the RC members to utilize the enormous clinical and epidemiologic data generated by the institutional programs for prevention, treatment, and follow up of patients. This manuscript describes the inception of the program and its achievements, limitations, and suggested opportunities for improvement as a possible model for other LMICs.

Keywords Tanzania · Research · Professional Education · Mentorship

Introduction

Diagnosis and treatment of cancer patients are the primary jobs of physicians and nurses in cancer hospitals in low-and middle-income countries (LMICs). The increasing number of cancer patients in LMICs requires better tools and methods for swift and accurate diagnosis. Treating cancer patients in LMICs, who are usually diagnosed at advanced disease stages, requires managing the limited treatment resources for improving patient survival and maintaining adequate quality of life. Clinical research to answer the continuously-emerging local questions and problems of diagnosis and treatment is rarely initiated by local clinicians in LMICs, including Tanzania. Currently, the vast majority of research ideas, especially in Sub-Saharan Africa, are dictated or developed by clinicians and researchers from the USA and Europe.

Tanzania is a typical example of LMICs in which clinicians and nurses are overwhelmed by clinical practice, and research is considered a luxury [1]. Research training is limited in LMICs, as most training is focused on clinical skills for patient management [2, 3]. However, there is a significant need for research in LMICs to answer important clinical questions and develop local evidence-based new knowledge [4, 5] that can improve patient care and better inform public policies [6, 7].

The Ocean Road Cancer Institute (ORCI) is one of the major cancer centers in East Africa. ORCI provides cancer screening, diagnosis, treatment, education, and research. Challenges in provision of quality oncology care at ORCI

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have ranged from late presentation, to high loss to follow up and poor public utilization of screening, to optimizing treatment for chemotherapy and radiotherapy. Many of these challenges can be resolved by additional research training [8–10] to complement the education that physicians at ORCI receive during their undergraduate and postgraduate education [11, 12]. The ORCI physicians are exposed to research through interactions and collaborations with high-income countries' clinicians and researchers, clinical trials initiated by external groups and pharmaceutical companies, research training of U.S. and European graduate students and trainees [5, 13–20], and during their own degree and non-degree training in the USA and Europe [21–24]. However, only very limited research outcomes have been initiated by Tanzanian clinicians using the Tanzanian data. Factors related to limited research outcomes by physicians in East Africa include limited research training, lack of protected time for research, overwhelming patient care load, and lack of mentorship [25].

Therefore, a new initiative of a Research Club (RC) for peer to peer mentoring was developed at ORCI in 2018. The main objective of the RC was to stimulate local clinical research and equip clinicians with resources and tools for research productivity. The RC has served as a platform for exchange of knowledge to encourage promotion of research among clinicians at ORCI. The RC team is composed of junior oncologists, oncology residents, radiation physicists, pathologists, and oncology nursing staff. Members of the team also include oncology residents from the Muhimbili University of Health and Allied Sciences (MUHAS) in Dar es Salaam, as ORCI is the clinical site for their oncology training. All members were driven by passion to conduct research to improve patient care and inform decision-making and public policy [3, 26, 27].

Methods

The development of the RC followed specific steps to utilize the institutional support and resources (Table 1). This section details (a) developing the RC based on eliciting interest and possible contributions of the ORCI physicians and nurses, (b) the activities of the RC team, and (c) the contents of the education and training provided for the RC team.

a) Developing the RC team:

A survey was sent to all physicians and nurses at ORCI to collect information about their interest in the RC idea, best approaches to structure the RC team, and the suggested focus that need to be pursued by the RC. Based on the responses, 28 of the 36 physicians and nurses were interested in the idea of the RC. Each RC team member was asked to write a statement about his/her interest in participating in the RC and the expected outcomes of participation. In addition to the ORCI staff, the RC includes 5 oncology residents from MUHAS who spend 3 years at ORCI for oncology training. Finding solutions for operational problems encountered during patient care [28] and writing applications to seek funding for small grants advertised by international agencies were the two most important areas requested by the RC members.

b) Activities of the RC Team:

Since its establishment in 2018, the RC has had bi-weekly meetings. The meetings included lectures and discussions of small grant applications for LMICs identified from websites or received through institutional mail.

The syllabus included two parallel themes; research methodology and grant writing. The reason for implementing two broad themes was to ensure that all members are engaged, irrespective for their backgrounds, specialties, or years of experience of participants. The research methodology training incorporated a varied format including lectures, discussions, and group projects.

Generally, both the research methodology and grant writing sessions were executed in a conventional lecture format followed by group discussions. Research methodology sessions involved lectures organized to teach essential elements for developing research projects. Since the group consisted of members with varying understanding and experience in research, these pedagogical sessions were carried out by members, for members. The syllabus (Table 2) delivered in the first few weeks emphasized implementing research and ethics. Grant writing sessions followed as a second part of each RC sessions. Local as well as international guest speakers who visited Tanzania were invited to lead grant writing sessions. Furthermore, the RC members who attended workshops outside Tanzania conveyed their experiences to the whole RC team after returning back to the country. All guest and internal speakers were evaluated by the audience on their material and delivery to ensure satisfaction, open communication, and learning. The RC members were organized into six groups, each comprising five members with representatives from academic and clinical departments (Table 3). The other members were randomly placed to ensure equitable distribution of backgrounds.

Group members were encouraged to dedicate several hours each week to meet, discuss, and work during their personal time to refine knowledge and skills gained from the RC sessions. All session-related materials were shared on the RC group server that was accessed through the government's institutional network. The materials and housekeeping announcements and those pertaining to assignments were communicated through WhatsApp. There are plans for a future designated RC online discussion board.

Table 1 Steps employed during the foundation of the Research Club

Action	Approach	Outcomes
Creating a dedicated front to push agenda	Open communication and strategizing. Use other forums within the institution to identify likeminded individuals to work with. Example, the initial drivers of the Research Club at ORCI formulated the idea while working on a call for proposal by the institution *Pro tip: It is critical in the initial stage to keep the group small and avoid duplication of strengths example the pair of a clinician and a statistician*	An accountable team of dedicated players
Engagement with the head of institution	Clearly communicate the issue and what you would like to have done about it. *Research Club Initiative Proposal*	Obtaining a road map for sustainability where the head suggested position of the RC within the institution's organogram *Pro tip: make them Club patron as this cultivates a sense of paternalism for success*
Engagement with key stakeholders	The head of an existing academic and or research unit are key stakeholders in the implementation of a RC Invite them to be honorary members of the group *Pro tip: if it is a department on its own, during the creation of small groups, distribute them purposefully among the small groups. Do not leave it to chance!*	They may have already served in a more advanced research capacity and they can be a reservoir of lecturers An existing unit is vital to drive the administrative end of things especially with the bureaucracy of a government institution. Example official communications for the RC, can exploit established communication formalities thereby mollifying audit requirements
Engagement with other stakeholders	Heads of departments, IT media personnel, informal notifications within (WhatsApp) staff groups *Pro tip: if your institution is also a teaching hospital, involve the residents in your research teams. They are inherently motivated and your group may draw support and collaboration from their lecturers*	Raising awareness of the Club and create a demand for the uptake of the group, website presence (https://www.orci.or.tz/research-club/)

Table 2 Research Club Syllabus topics

Topic	Subtopic and specifics
Introduction to Research	• Meaning and significance of research • Develop a focused research topic • Types of research and approach • Sources of research problems
Academic conduct and dishonesty	Ethical conduct of research
The Research Proposal	• Literature review • Databases keywords and search options/builder • Identifying key terms and develop a search strategy • Citations and References management tools • Defining the problem • Making a problem statement • Justifying a problem statement • Making a hypothesis and asking research Qs • Main parts of a research proposal and dissertation • The problem statement • Literature review • Objectives of the study • Methods: Qualitative sampling • Methods: Quantitative sampling
Data Management	• Qualitative data collection: in-depth interview, focus group discussion • Quantitative data collection: observation,questionnaire • Analysis
Others that were not completed in the first year	Budget and justification, results, discussion, abstract, scientific paper writing, dissemination of research findings; conferences
Grant writing	• Grant writing workshops, tangible experiences by seasoned researcher (CUNY, MUHAS) • Exploration of grant proposal sites

Table 3 Socio-demographic characteristics of Research Club members that responded to the survey

Demographic profile		Frequency	%
Total number of respondents		15	60[1]
Gender	Male	3	20
	Female	12	80
Marital status	Married	12	86
	Single	2	14
Education	Degree	**7**	47
	Masters	8	53
Specialty unit	Nursing	4	33
	Medical doctors	6	50
	Others	2	17
Duration in current profession	Below 3 years	1	7
	3–5 years	5	33
	6–9 years	3	20
	10 and above	6	40
Duration at ORCI	Below 3 years	1	7
	3–5 years	2	14
	6–9 years	5	36
	10 and above	6	43

[1]To calculate the proportion, the 3 lead members were excluded and therefore setting the denominator as 25

There has been no grading system in place to guide learning progress of members. Instead, the evolving research protocols and grant applications have been viewed as evaluation points by individual group members and the instructors. Successful completion of RC modules relied upon the attendance of all sessions in person, completion of assignments and other requirements, as outlined in the relevant class.

Because ORCI is government agency, there is a requirement that all new features be placed under an existing organogram. As such, the RC is housed under the Academic and Research Unit of the ORCI. A folder is created for official communication with generation of a recognized reference number. Meticulous written records are maintained after each session. Similarly, sign-in sheets, presentations, pictures and a live portfolio are also maintained. The RC reports and minutes of meetings are submitted for progress evaluation by the Executive Director (Club patron) and these included summaries of meetings with some photographic evidence.

c) Contents and Style of the Education and Training Offered:

The RC provided didactic lectures because the team members needed to learn about study design and conducting

research studies. The activities of the RC are designed to provide a platform for professional growth of clinicians to advance their research skills for management of cancer patients. The RC concentrated on operational challenges at the workplace and brainstorming of solutions within the workforce. The team identified opportunities available both for training and small grant applications for junior clinicians in LMICs. The grant applications utilized the availability of data on cancer patients and non-cancer control subjects at ORCI from different regions of Tanzania.

The RC followed a team-based learning approach (TBL) through 3 stages of self-directed learning involving individual reading of the material, small group discussions, and assignments for real-life applications. Participants were all full-time professionals with no protected time outside the RC biweekly sessions. The TBL is a new tradition in Tanzania because clinical learning has been the tradition for medical education in the country.

Results

The RC included 28 members, including 2 founding members, designated chairperson, and a vice chairperson, with the support of head of the Academic and Research Unit (ARU). The MUHAS oncology residents (Y1 through Y3) were engaged through the ARU (Fig. 1). Backgrounds and specialties of the participants are depicted in Fig. 1. Table 3 shows results of the baseline demographics, research experiences, and computer literacy of the RC members.

The RC members had access to 35 small grant announcements. During the first year, the team submitted 5 grant applications and were successful in securing 2 grants; one through the SPARC Metastatic Breast Cancer Challenge and the other was through U54 HIV-related malignancies' grants. Finally, the introduction of the group to online tools such as Google Docs, use of Web.whatsapp.com, aided the RC members in optimizing group work and having access to literature information. However, access to Pubmed and Medline would have definitely added to the literature resources available to the RC participants.

Figure 1 shows the specializations of the RC members. More than 2/3 of the members where physicians and nurses. Figure 2 shows the baseline research experience among participants with 70–90% of participants utilizing the course material. Figure 3, shows that most RC members own or have access to computers and can be connected to the internet. However, the majority noted needing mentorship (67%) and learning about how to read research papers (67%). Also, the majority of participants (73%) noted that they have no access to a research database, such as a tumor registry, or do not know if they have access to a research database.

Discussion

To our knowledge, this is the first experience of developing an internal research group in a cancer center in a low-income country in Sub-Saharan Africa. This program has been unique in three aspects. First, the initiation and continuation of the program resulted from a local group of junior physicians and nurses who became interested in research after exposure to western research groups of faculty, clinicians, and graduate students, either in Tanzania, Europe, or the USA. Second, the initiative for this program was conceived by junior physicians and nurses who maintained the program. This bottom up approach is contrary to the usual traditions in clinical settings in LMICs in which rules, regulations, policies, and directions are usually a top to bottom approach. Third, the program followed a peer mentoring approach which is also a new tradition in LMICs. It is important to note that in LMICs academic credentials

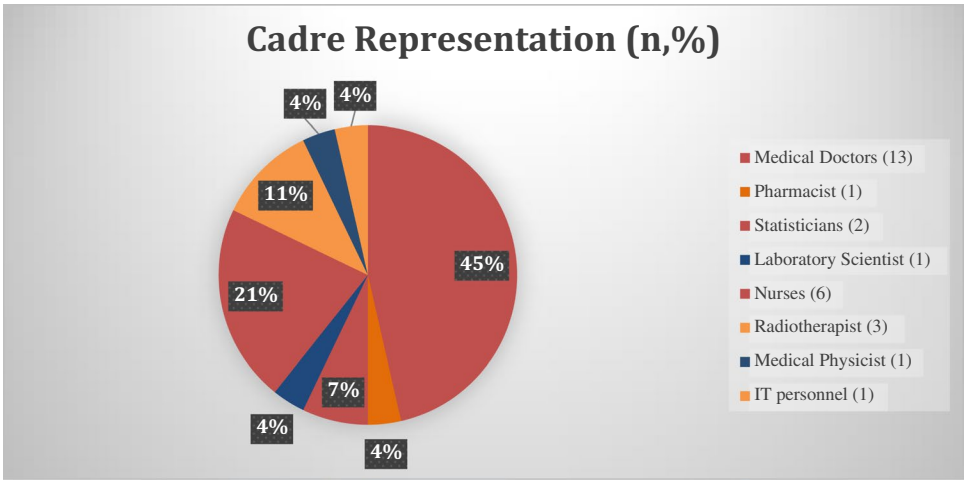


Fig. 1 ORCI Research Club Members' Expertise and Specialization

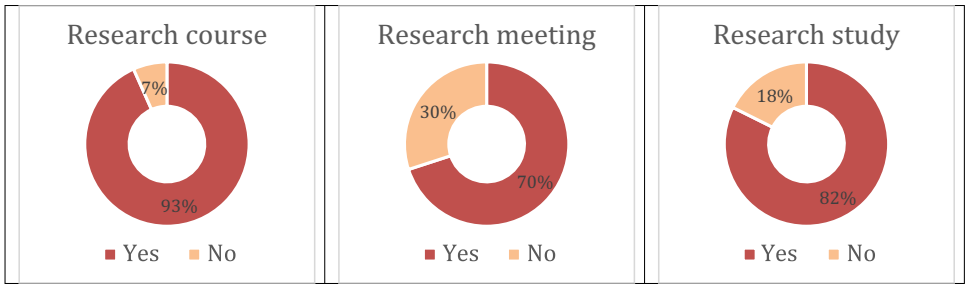


Fig. 2 Baseline experience with research among respondents

and promotion may be politically and seniority-based, and not sufficiently merit-based to stimulate research and publication. This may be changing, but it is worth discussing, even if it is a sensitive topic. The RC could be a step in this process.

Regarding the initiation of the program locally by junior physicians and nurses, this was an unusual event. Historically, low-income countries initiate research that is donor-driven. Therefore, there are no opportunities for initiating new ideas for independent research or ideas for local research questions that may solve local problems.

The initiation and continuation of the RC by junior physicians and nurses was also a new concept. ORCI and cancer hospitals in Africa function according to top down hierarchical fashion. The untapped potential of the RC members and their interest in conducting research in a traditionally seniority-based environment was the major impetus for this initiative. While the initiative for this RC was to pursue research for finding solutions to operational problems, there was no assurance for funding for continuing the interest in research. In light of these barriers, initiation of this employee-driven mentorship program was envisioned as innovative, cheap method to provide meaningful supplementation to regular clinical work. Finding small grant opportunities and developing research ideas and protocols for competing for funding opportunities was a good motive for continuation and maintenance of activities of the RC.

The other interesting and new initiative in this program is peer mentoring. The co-authors who founded the RC (KM and MM) were interested in showing that the enthusiasm of the group and peer mentoring would help launch this initiative with minimal external help. The information gathered about the potential participants through the CVs and statements of interest provided useful information of assurance about the multidisciplinary backgrounds and diversity of the potential participants. Working in groups also gave chance for everyone to express leadership skills, team work, and independent work.

The experience of the RC at the ORCI is promising. To further energize the team and achieve more productive outcomes, there should be a plan for structured mentorship of the research team. Considering the ongoing connections of the ORCI with partners from the USA and Europe, the RC team members can benefit from a mentorship plan with those partners. With increasing utilization of online and remote education, the partners can regularly connect with the team in Tanzania to provide

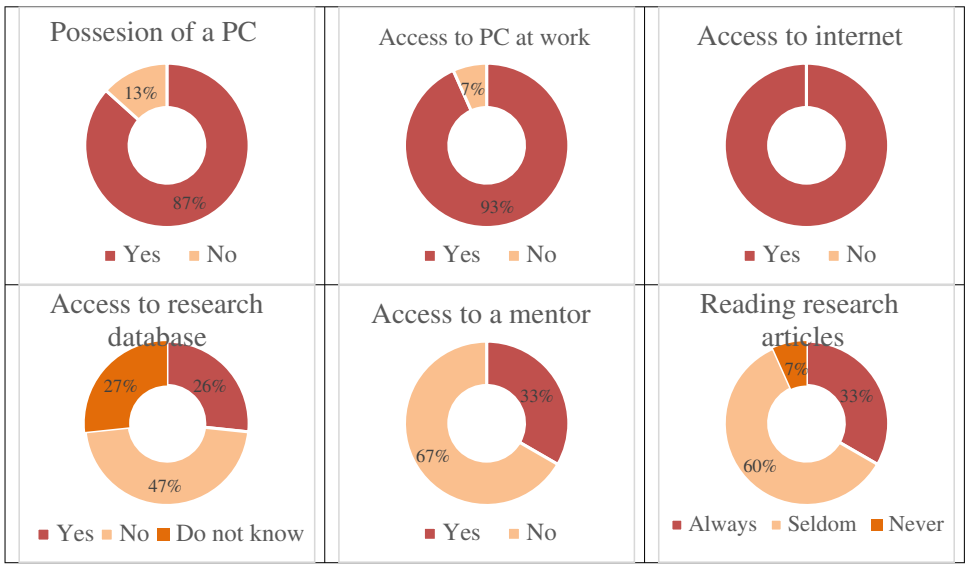


Fig. 3 Baseline access to resources among respondents

such mentorship and evaluate its outcomes. Also, the mentorship can enable the RC team to utilize patient data from ORCI to answer timely questions that can enhance treatment, prevention, and help cancer prevention and control in this country. The RC model can definitely be disseminated to other LMICs.

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