J Canc Educ (2019) 34:111–115
DOI 10.1007/s13187-017-1274-8

Cancer Training for Frontline Healthcare Providers in Tanzania

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Published online: 16 August 2017

Abstract Cervical and breast cancer are responsible for the highest cancer-related mortality in Tanzania, although both are preventable or curable if diagnosed at an early stage. Limited knowledge of cervical cancer by clinic and dispensary level healthcare providers in Tanzania is a barrier for prevention and control strategies. The purpose of the study was to provide basic oncology training to frontline healthcare workers with a focus on cervical and breast cancer in order to increase knowledge. A 1-day cancer training symposium was conducted in Arusha, Tanzania, with 43 clinicians. Pre- and post-intervention surveys assessed cancer knowledge and confidence of clinicians in risk assessment. Sixty-nine percent of the participants reported never receiving any cervical cancer training in the past. A significant difference was found between the pre- and post-test in a majority of knowledge questions and in reported confidence recognizing signs and symptoms of breast and cervical cancer ($p < 0.05$). The 1-day community oncology training symposium was effective in delivering and increasing basic knowledge about cervical and breast cancers to these healthcare providers. The low level of baseline cancer knowledge among frontline medical providers in Tanzania illustrates the need for increased training around the country.

Keywords Tanzania · Breast cancer · Cervical cancer · Knowledge · Training · Frontline healthcare workers

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Introduction

Cancer is one of the leading causes of death worldwide with a majority of these deaths occurring in low- and middle-income countries [1]. Breast cancer is the leading cause of death in women worldwide, but cervical cancer disproportionately affects East Africa, with the highest incidence and mortality rates from cervical cancer in the world [2]. Both cervical and breast cancers can be prevented or screened for and treated at early stages and cured.

Cervical cancer causes the highest cancer-related mortality in the United Republic of Tanzania (Tanzania), a country in East Africa [2]. A majority of cervical cancer in Tanzania is diagnosed at advanced stages [3]. High prevalence of human papilloma virus (HPV) and a lack of HPV vaccination programs and screening are factors contributing to high mortality in a cancer that is largely preventable in high-resource countries. Strikingly, prior to the commencement of cervical cancer screening in the 1960s, the incidence rates of cervical cancer in the USA were higher than the highest rates in East Africa today [4].

Prevention and screening programs for cervical cancer in Tanzania have been limited and uncoordinated [5]. HPV vaccination, HPV testing, and HPV cytology have not been formally introduced due to a lack of adequate human and financial resources [5]. Therefore, when available, visualization with acetic acid (VIA) with cryotherapy is used for secondary prevention of cervical cancer, which is endorsed by the World Health Organization and American Society of Clinical Oncology in low-healthcare resource settings [6, 7].

Breast cancer is the second leading cause of cancer in Tanzania, following cervical cancer [2]. Despite the fact that breast cancer is common all over the world, mortality is disproportionately high in developing countries likely due to a combination of limited awareness and access to screening

leading to delayed presentation and late stage at diagnosis [8, 9]. In a 2014 survey of female patients attending district hospitals in Tanzania, 98% knew of breast cancer; however, they could only correctly identify 30% of risk factors and 51% of symptoms in a knowledge survey [10]. In addition, most women accepted one or more breast cancer myths. A recent pilot survey of patients and providers in a northern hospital in Tanzania found similar low rates of knowledge of breast cancer risks and beliefs in myths such as carrying money in one's brassiere puts one at risk [11].

Education and screening of both the general population and healthcare providers is an important strategy in reducing the mortality rate of cervical cancer in Tanzania. This is particularly important when treatment options are limited. Lyimo and Beran (2012) conducted a general population survey of women in Moshi, Tanzania, regarding cervical cancer screening. They found the greatest predictors of cervical cancer screening attendance were knowledge about cervical cancer and distance to a facility [12]. Among patients in Dar es Salaam at the Ocean Road Cancer Institute (ORCI), women with more advanced cancers tended to come from longer distances and more rural areas and had less knowledge about signs and symptoms of cervical cancer than urban women [13]. The lack of knowledge about cancer is not limited to the general population; the Ministry of Health in Tanzania reports limited knowledge of healthcare providers as a barrier for prevention and control strategies [5]. In 2011, Urasa conducted a survey of nurses' knowledge of cervical cancer at the regional referral hospital Kilimanjaro Christian Medical Centre (KCMC) and found that less than half had adequate knowledge [14]. Oncologists in Tanzania have noted the need for the frontline healthcare providers in health centers and dispensaries to have basic knowledge of curable cancers, such as cervical and breast cancer, in order to educate their patients and provide referral for timely treatment at earlier stages [15].

Tanzania has a decentralized health care delivery system. Each of the 20 regions of the country has a regional referral hospital. District hospitals and various private mission hospitals are dispersed throughout each region. Local dispensaries and health centers provide the frontline prevention and diagnostic care [16]. There is a significant shortage of physicians in Tanzania with 0.03 physicians per 1000 population [17]. As a result, non-physician clinicians such as clinical officers (COs) and assistant medical officers (AMOs) provide a majority of the frontline primary care. These non-physician clinicians have accelerated training in the medical model and generally work in underserved areas. COs are graduates of secondary school with 3 years of medical training and are granted ability to diagnose common illnesses, practice obstetrics, perform minor surgery, and prescribe medications. AMO students are selected from practicing COs to undergo 2 more years of additional medical training including surgery. Both COs and AMOs exceed the number of physicians in the country, with slightly more assistant medical officers and six times more clinical officers [18].

The evidence of low levels of breast and cervical cancer knowledge among healthcare providers led to the current study. This study was conducted to identify the baseline oncology knowledge of non-physician clinicians, provide basic oncology training with a focus on cervical and breast cancer, and assess for increased knowledge.

Methods

This study took place in the northern zone of Tanzania in partnership with the Arusha Lutheran Medical Centre (ALMC) and St. Catherine University Physician Assistant (PA) program. ALMC is a private hospital in the northern zone of Tanzania serving a population of more than half a million people. Ethical research clearance was secured locally and from the St. Catherine University Institutional Review Board. In January 2016, clinical staff from 22 dispensaries and clinics in the Arusha region were invited to attend a 1-day cancer training symposium at ALMC. Pre- and post-self-administered surveys were utilized to assess changes in knowledge and confidence levels.

The curriculum for the training session was developed based on basic oncology concepts focusing on the epidemiology of the cancer incidence in the region. Core content included signs and symptoms of common cancers to improve early detection as well as risk factors and cancer prevention education to facilitate patient education and awareness of cancer. The training focused on cervical and breast cancer and taught in English and Swahili. To enhance learning and retention, the trainees were provided a training manual containing slides and data after the training. In addition, they were provided materials and posters for patient education. A referral process to track patients from the dispensary level to referral hospital was established to help expedite patient evaluation. Each participant was provided a referral logbook to measure long-term impact of the training.

The English language survey instrument included 14 items. The only demographic data collected was occupation; however, the trainers recorded the number of male and female participants. The first section assessed participants' confidence in recognizing breast and cervical cancer followed by their past training in cervical cancer and experience referring patients for further screening. The second section assessed general cancer knowledge and specific risk factors using multiple choice and true/false options. A final open-ended question allowed participants to ask questions prior to the training as well as identify how the training may impact future changes in practice.

Descriptive statistics were conducted including frequency calculations and mean scores of Likert scale questions. In

Table 1 Pre- and post-test knowledge questions

Knowledge question	Response options	Pre-test participant response % (n = 43)	Post-test participant response % (n = 43)	p value
What causes cancer? Choose one.	Curse	2% (1)	0	0.324
	A change in genetic material of a cell	98% (41)	100% (40)	
	Touching someone who has cancer	0	0	
	Vaccines	0	0	
What is the most common cancer in Tanzania? Choose one.	Cervical cancer	79% (33)	93% (38)	0.032*
	Breast cancer	21% (9)	7% (3)	
	Prostate cancer	0	0	
	Lung cancer	0	0	
There is a vaccine to prevent cervical cancer. Choose one.	True	67% (28)	97.5% (39)	0.001*
	False	33% (14)	0	
	NA	0	2.5% (1)	
A risk factor is something that increases your risk of developing a disease. A modifiable risk factor is something you are able to change. What is NOT a modifiable risk factor for cancer?	Tobacco use	2% (1)	0	0.001*
	Alcohol use	2% (1)	0	
	Age	48% (20)	97.5% (39)	
	Lack of physical activity	48% (20)	2.5% (1)	

Asterisk denotes significance

addition, paired t tests were conducted to assess differences between pre- and post-test results. IBM SPSS Statistics Version 24.0 software was used for all analyses.

Results

There were 43 participants in this study from 5 district hospitals, 4 health centers, and 13 dispensaries from the northern zone of Tanzania. Forty-two percent of participants were COs, 19% nurses, 16.3% AMOs, and 14% doctors (Fig. 1). The male to female ratio was 1:1. Sixty-nine percent of participants had never received prior cervical cancer training. Participants demonstrated a significant difference in their knowledge between the pre- and post-test surveys for the majority of the questions (Table 1). In addition, their overall mean confidence score in breast and cervical cancer knowledge and risk factors changed significantly ($p < 0.001$) (Fig. 2).

A common local misconception was that carrying money or a phone in a brassiere was a risk factor for breast cancer. This misconception reduced from 74.4 to 18.6% after the training ($p < 0.001$). Prior to the training, approximately two thirds (67%) of participants were aware of VIA screening and 65% were aware of the existence of a HPV vaccine (Table 1). Ninety-five percent of participants reported they would refer women with cervical cancer symptoms for evaluation if they did not have the capabilities for speculum exam at their health center.

There was some evidence of previous cancer training experience and making patient referrals for further testing and treatment. Thirty-one percent of participants indicated that they had received some cancer education either during their formal training or at continuing education sessions held at local hospitals such as the ALMC, Selian Hospital, and KCMC. Twelve (29%) of clinicians had referred patients for cancer evaluation. Eight of these referrals were to the ORCI in Dar es Salaam, and the others were to the local district government hospital.

Participants took advantage of the open-ended questions to pose questions and share plans following the training. Common themes of the pre-test questions included signs and symptoms of cervical and breast cancer; differential diagnosis,

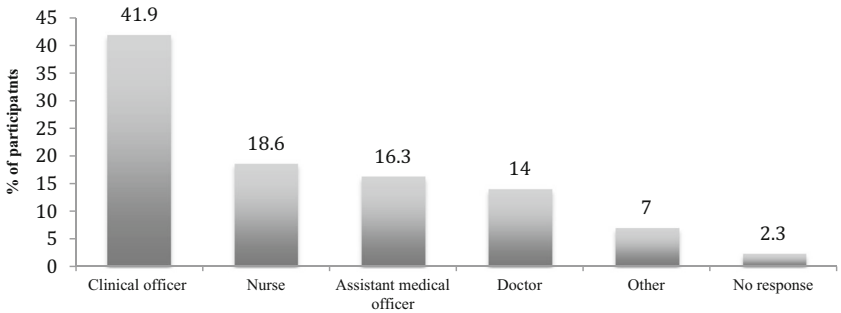

Fig. 1 Occupation of participants

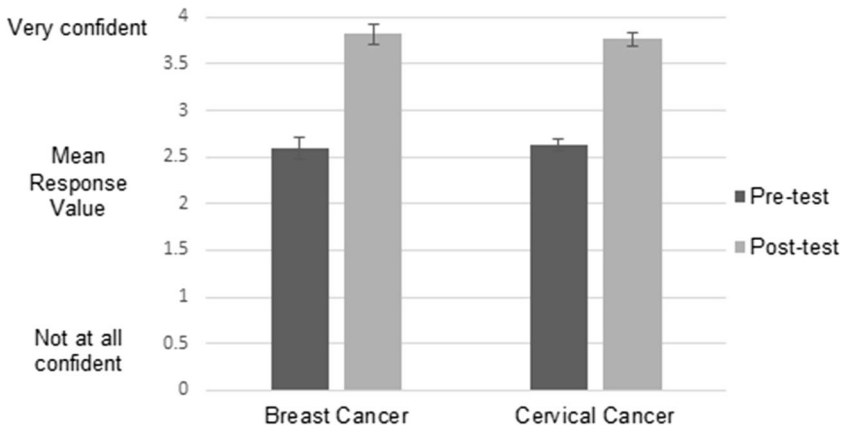

Fig. 2 Mean pre- and post-test knowledge confidence of breast and cervical cancer ($p < 0.001$)

risk factors, pathophysiology, and stages of breast and cervical cancer; and screening methods and feasibility. Following the training, participants reported that they would change their practice in the following ways: (a) educating patients about cancer, (b) screening patients for cervical and breast cancer during family planning visits, (c) obtaining more detailed histories from patients, and (d) using the training booklet to train other colleagues about what was learned. Participants also emphasized the need for increasing education in their dispensaries and communities, screening more patients, discussing signs and symptoms of cervical and breast cancer with patients, and increasing referrals.

Discussion

The limited baseline cancer knowledge among frontline healthcare providers in the northern region of Tanzania highlights the need for increased cancer education at the community level. In Urasa and Darj's 2011 study in Moshi, a neighboring town to Arusha, nurses' knowledge of cervical cancer also demonstrated high rates of misinformation or general lack of knowledge [14]. In Uganda, a knowledge, attitude, and practice survey of medical students reported that less than 40% knew the risk factors for cervical cancer [19]. Fifty-three percent of nurses in the Moshi study indicated that they received most of their cancer information during nursing training [14]. In our study, only 31% of participants reported any previous training on cervical cancer. Although a third of our participants had previous cancer education, the national Assistant Medical Officer training curriculum does not specifically list oncology as a topic to cover [20]. This in part may explain some of the low levels of cancer knowledge in our study population since the majority were AMOs or COs.

At the pre-test, we saw that just two thirds of participants were aware of VIA as a screening strategy or the HPV vaccine for primary prevention. Systematic reviews of data across Sub-Saharan Africa show widespread limited knowledge of cervical and breast cancer knowledge among both the general population and health care providers [21, 22]. The African Organisation for Research and Training in Cancer (AORTIC) recognize that an inadequately trained healthcare workforce is one of the greatest barriers to cancer control and prevention efforts in the region [21]. They also identified inadequate treatment facilities and often uncoordinated systems of care and referral. The lack of available cancer care and treatment emerged in this study as well. The majority of patient referrals were made to the ORCI, which is a minimum of 630 km from Arusha. The cost and time required to travel there is prohibitive for many patients. In a 2010 survey women receiving cancer care or screening at the ORCI, the majority of those receiving treatment for advanced cancers came from rural areas and traveled long distances; most women coming in for screening lived locally [13]. Since the training in January 2016, the KCMC Helmut and Rotraut Diefenthal Cancer Center and Mark and Linda Jacobson Infusion Center opened in Moshi in December 2016, which now can service the population of the northern zone of Tanzania.

The pre- and post- survey data demonstrated significant changes in terms of both cancer knowledge and recognition of pre-cancerous symptoms. A 1-day training symposium, though limited, was effective in delivering basic oncology knowledge, including the risk factors and signs and symptoms of cervical and breast cancer, and expediting referral to a higher level of care when appropriate. It also elicited a strong interest in screening patients for cervical and breast cancer, showing an intent for action with educational empowerment. However, to reach this objective far more, community healthcare providers need cancer screening and detection skills and knowledge. This pilot training session may be easily replicated to extend the training to other dispensaries and clinics throughout the northern zone of Tanzania (Arusha, Kilimanjaro, and Manyara regions).

There were a number of limitations to the study. The sample size of 43 is relatively small; however, the number of participants was nearly double the 25 expected to attend. This figure spoke to the high interest of frontline healthcare providers in increasing their cancer knowledge and skills. The survey tool was brief in order to increase participation. We

would add some additional demographic, knowledge, and risk factor questions in future trainings to more fully assess demographics and baseline knowledge. The value of this study is the demonstration of its meaning to participants, the relative ease of delivery, and the efficacy of knowledge change.

This study highlights an example of international partnership between PAs from the USA and non-physician clinicians from Tanzania. This partnership formed a platform for the sharing of knowledge and cultural competency and for advocating for non-physician clinicians on a global level. The facilitators of the training were a combination of local clinicians and visiting clinicians (a PA and PA students). Although the participants spoke English, Tanzanian partners helped to facilitate discussions in Swahili. The collaboration between US PAs and Tanzanian health care providers promoted this increased depth of reflection of the Tanzanian health care system and determination to make changes to improve overall health of Tanzanian women.

In summary, collaboration to provide training and more education efforts between frontline health care providers, the MOH, and patients are needed to improve the quality of health and provide better screening and care for Tanzanian women. Cervical and breast cancer can be curable if patients are screened and treated early. More research is needed to integrate education and training methods to improve implementation of screening processes.

Acknowledgements Conception and design by Tara Rick and St. Catherine University MPAS Class of 2016. We thank the Physician Assistant Foundation for funding the project. We thank Judith Merinyo and Richard Mwakatundu for administration assistance. We thank Dr. Mark Jacobson for host institution support at Arusha Lutheran Medical Centre. We thank St. Catherine University faculty, Heather Bidinger and Donna DeGracia.

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