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## Research Article

# Can International Expertise Be Leveraged for Multidisciplinary Cancer Care in LMICs?

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## ARTICLE INFO

## Article history:

Received 30 September, 2018

Accepted 16 October, 2018

Published 15 November, 2018

## ABSTRACT

**Purpose:** Cancer care in high-income countries (HICs) is often coordinated at multidisciplinary conferences (MDCs). However, among disparities encountered by cancer care providers in low- and middle-income countries (LMICs) is lack of access to specialized expertise. Modern communication technologies offer opportunity for remote MDCs; reports of this are limited and have described logistical barriers. We explored this concept further.

**Methods:** We reviewed the experience of a cancer center in Lagos, Nigeria, connecting with multidisciplinary expertise in the United States (US). Multidisciplinary consultations were reviewed, and descriptive data were generated. Participating providers were surveyed.

**Results:** Over a two-year period, 27 cases were referred for multidisciplinary consultation. Of these, 21 (78%) were referred to Roswell Park Comprehensive Cancer Center in Buffalo, NY, and 6 (22%) were referred to other US institutions. All but one (26, 97%) were referred using email, while one case was discussed via videoconference. Reasons for consultation were uncertainty about management in 10 patients (37%), need for validation of treatment plans in 14 patients (52%) and unusual clinical scenarios in 3 patients (11%). Limitations included incomplete documentation of treatment recommendations (5, 18.5%) and unavailable diagnostics (7, 26%) or therapies (3, 11%). Time to receive final recommendations ranged from 1 to 14 days, with a median of 3 days. Survey respondents (8, 100%) agreed or strongly agreed that remote MDCs added value, and that email was an effective, low-barrier method for their organization, with some drawbacks noted.

**Conclusion:** This early experience demonstrates feasibility of remote MDCs to benefit providers and patients in LMICs. Future directions include using more sophisticated software and organization to maximize the scalability and sustainability of this concept.

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## Introduction

The management of cancer cases is often complex, and in many cancer types it is understood that optimal outcomes are achieved by

multidisciplinary treatment—some combination of radiologic and pathologic diagnostics, surgery, radiation, systemic therapy, nursing care, rehabilitation, and psychosocial support. The use of a multidisciplinary conference (MDC) as a mechanism to manage this

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complexity is widely supported by consensus guidelines such as those published by the National Comprehensive Cancer Network (NCCN) [1]. Study of MDC implementation supports the conclusion that they significantly impact clinical decision-making and improve related quality metrics; most importantly, some data suggest that they may also improve patient outcomes [2-8]. Despite this well-established role for MDCs and multidisciplinary treatment in general, logistical barriers inhibit access to multidisciplinary management for a significant portion of cancer patients even in high-income countries (HICs), and specific interventions have been described to address this [6, 7].

In low- to middle-income countries (LMICs), a more severely limited healthcare infrastructure and the paucity of oncology expertise frequently imposes marked limitation on the quality of care delivered to cancer patients. The shortage of multidisciplinary oncology subspecialists is a challenge that some centers in LMICs have attempted to overcome by seeking the support of multidisciplinary expertise through the creation of international partnerships and utilization of remote communication technologies [9-12]. In our research we have found that leveraging existing communication technology—such as email—facilitates access to the needed expertise across international lines. This is a retrospective review of a single center's experience with international remote oncology consultations.

## Methods

We performed a retrospective case study reviewing the single-institution experience of a nascent cancer center in Lagos, Nigeria, which has sought to connect with multidisciplinary expertise at cancer centers in the United States (US). Lakeshore Cancer Center (LCC) is a stand-alone

cancer center located in Lagos, Nigeria, which provides diagnostic services, surgical interventions, and chemotherapy. While LCC continues to expand its services, patients requiring advanced diagnostic services or radiation therapy are currently referred to other centers locally or internationally. The full-time staff at LCC currently includes clinical oncologists, a palliative care physician, a general medical practitioner, medical officers, nurses, a pharmacist, a radiology technician, a laboratory technologist, and administrative personnel. Radiographic studies are transmitted to India for review by a teleradiology service. LCC has a well-established affiliation with Roswell Park Comprehensive Cancer Center, with Roswell Park clinical staff performing short-term service trips and serving on the LCC board. In a commitment to support the quality of care provided at LCC, specialty consultations have been provided via email since January 2015.

The experience with remote multidisciplinary support at LCC was evaluated in the following ways. Descriptive data were collected from administrative records regarding the practice patterns at the study location. Review of hospital administrative and medical records and clinician email accounts was performed to identify and characterize all cases that had been referred to US-based cancer centers for multidisciplinary review over a 24-month period between January 2015 and December 2016. Multidisciplinary referrals were reviewed for disease site, method of communication and reason given for multidisciplinary consultation. Outcomes of the consultations were reviewed and were designated as either being successful or unsuccessful with regard to obtaining diagnosis and treatment recommendations. Participating clinicians in both Nigeria and the US were surveyed after the study period to assess perceptions of the remote MDCs. See Table 1 for the survey tool and survey results.

**Table 1**

<b>International remote oncology consultations add value.</b>				
Strongly Agree (75.0%)	Agree (25.0%)	Neutral (0%)	Disagree (0%)	Strongly Disagree (0%)
<b>Email is a good means to provide you information about patients who need remote consultations.</b>				
Strongly Agree (42.9%)	Agree (57.1%)	Neutral (0%)	Disagree (0%)	Strongly Disagree (0%)
<b>Email is a good mechanism to interact with international physicians.</b>				
Strongly Agree (42.9%)	Agree (57.1%)	Neutral (0%)	Disagree (0%)	Strongly Disagree (0%)
<b>Email is an effective tool to conduct remote international oncology consultations.</b>				
Strongly Agree (42.9%)	Agree (57.1%)	Neutral (0%)	Disagree (0%)	Strongly Disagree (0%)
<b>Why was email a good mechanism for communication? Check all that apply.</b>				
Minimally disruptive to normal workflow (71.4%)	Familiarity of email messaging (85.7%)	No additional technology (71.4%)	No additional cost (71.4%)	
<b>What were the limitations of email? Check all that apply.</b>				
The messages were easily neglected in my inbox (57.1%)	Challenging to maintain a cohesive conversation (28.6%)	Inadequate maintenance of records for follow-up consultations (28.6%)	Email is not designed for multi-media, multi-participant conversations (28.6%)	The email discussion was unstructured (28.6%)

## Results

Review of practice patterns at LCC revealed that case volumes have been increasing, and the cancer types seen as of June 2016 were 38% breast, 12% prostate, 8% colorectal, and 6% cervical, while the remainder were a combination of other gynecological, gastrointestinal, CNS,

hematologic, and renal cancers. Most patients presented with stage III (24%) or IV (61%) disease. This corresponds to other available epidemiologic data; while cancer registration in Nigeria remains incomplete, available 5-year prevalence data from Nigeria compiled by GLOBOCAN 2012 shows 37.7% of registered cancers arising from

breast, 13.4% from prostate, 3.7% from colon and rectum, and 15.4% from the uterine cervix [13, 14].

The full-time staff at LCC referred 27 challenging cases for multidisciplinary review during the 24-month review period. Of these, 21 (78%) were referred to specialists at Roswell Park Comprehensive Cancer Center in Buffalo, NY, and 6 (22%) were referred to specialists at other US institutions. All but one of the cases (26, 97%) were referred using email communication, while one case was discussed via videoconference (utilizing Skype software). The reason for consultation was uncertainty about management in 10 patients (37%), the need for validation of treatment plans in 14 patients (52%) and unusual clinical scenarios in 3 patients (11%). Encountered challenges included incomplete communication of treatment recommendations in 5 patients (18.5%), unavailable diagnostic testing services in 7 patients (26%), and unavailable therapies in 3 patients (11%). Review of the cases showed that the communication was successful in obtaining at least partial recommendations 100% of the time.

Results of the post-study survey are reflected in (Table 1). A total of 8 respondents provided feedback via the survey, but several survey questions were skipped by one respondent. All respondents either strongly agreed (75.0%) or agreed (25.0%) that remote MDCs added value. All respondents confirmed that email was a good mechanism for communication, noting minimal barriers to its use while between 28.6% and 57.1% of respondents reported that email messages were easy to overlook in an inbox, did not facilitate cohesive conversation, did not support adequate record-keeping, did not provide specialized structure and were not designed for multi-media group conversations.

## Discussion

While this case study is limited by its retrospective nature, small number of participants and its focus on a brief, single-institution experience, our study identifies a significant need and should increase awareness and motivation for further investigation and intervention within the global oncology community. There is reason to believe that this case study does not represent an uncommon scenario. Cancer incidence and mortality rates are rising in LMICs, and existing healthcare systems are inadequately trained and underequipped to address this burgeoning public health crisis [15-17]. Our results show that clinicians at LCC sought help due to uncertainties about diagnosis and treatment of complex cases, highlighting the need for the development of improved local capability and multidisciplinary expertise. Our work to connect clinicians at LCC with colleagues in multidisciplinary cancer care via email has been partially successful with a usefulness that appears to have been impaired by the timeliness, convenience, and completeness of documentation. It has mostly involved input from one or two specialist oncologists for each case rather than a multidisciplinary team. The international partnership between LCC clinicians and multidisciplinary expertise in HICs has demonstrated value, but our experience suggests that there is significant room for improvement.

The concept of international partnerships in global oncology has been gaining momentum, with the American Society of Clinical Oncology (ASCO), the Union for International Cancer Control (UICC), and the World Health Organization (WHO), among others, devoting targeted

efforts to improving cancer care in LMICs and prioritizing multidisciplinary training and “multi-stakeholder engagement” [18]. Specific partnerships have developed in recent years between centers in HICs and LMICs, designed to facilitate knowledge sharing and support of multidisciplinary cancer care development. Many of these partnerships have included the use of email or videoconferencing technology to facilitate knowledge sharing and multidisciplinary discussions in addition to investment in specialized oncology education [9-12, 19-22]. However, email communication for the coordination of multidisciplinary care is associated with the difficulties we have described above, and attempting to arrange videoconferencing- or teleconferencing-based MDCs is associated with significant logistical barriers such as potential time zone differences and scheduling conflicts [23]. Other technologies exist for long-distance coordination of medical diagnostics and treatment planning, collectively described as telemedicine. Perhaps the most well-known iteration is teleradiology, a form of telemedicine widely used in HICs, which entails the electronic transmission of imaging files for review by the receiving radiologist. This technology has been applied to provide radiology support to clinicians in LMICs. Médecins Sans Frontières (MSF) has implemented a teleradiology system accommodating both Digital Imaging and Communications in Medicine (DICOM) and Joint Photographic Experts Group (JPEG) formatted images. An early report of implementation in southern Malawi described 159 cases reviewed by teleradiology over one year, of which patient management was altered in 23.5% [24]. It was subsequently reported that over a four-year period, 564 cases from 22 different countries were reviewed by 14 different radiologists via the MSF system. A survey was distributed to clinicians who had submitted images for review, and responses indicated that the radiologists’ input had assisted in the clarification of diagnoses [25]. Zennaro and colleagues report on a teleradiology partnership between a pair of institutions in Angola and Italy, involving teleradiology review of 127 cases over a two-year period. Participants reported that teleradiology contributed to clinical decision-making in 84.3% of these cases [26]. A teleradiology system was also used to connect regional hospitals in Mali to radiology specialists at the University Hospital in Bamako, Mali. Sangaré et al report that this system accommodated teleradiology review of 5,628 cases between 2005 and 2013. The reviewing radiologists provided the only diagnosis in 29% of these cases and changed the diagnosis given by the referring clinician in a further 12% [27].

Methods for remote review of pathology specimens have also been developed. This is known as telepathology, which includes several distinct techniques for creating, transmitting, and analyzing images of tissue specimens [28]. The most straightforward of these is known as static telepathology and entails creation of simple digital images of anything from the gross specimen to a stained slide to an electrophoresis gel; the image can then be shared via electronic transmission and reviewed asynchronously by the receiving pathologist. The pathology service at Massachusetts General Hospital (MGH) implemented a static telepathology program in partnership with four hospitals in Eastern Africa. They concluded that the program was cost-effective and feasible, with a significant and realized opportunity for educational interaction and capacity building at their partner hospitals. The review of 109 challenging cases by the pathology service at MGH over a period of 40 months allowed them to provide a diagnosis in 91.7% of cases. In the remainder of the cases, diagnosis was precluded by incomplete clinical

history, technical issues, or unavailable immunohistochemistry [29, 30]. Robotic telepathology involves the use of a microscope that is equipped with a digital camera and can be remotely controlled via an Internet connection, allowing synchronous review of pathology slides over great distances. This technique was applied in a study by Wamala and colleagues, in which 96 cases were reviewed using robotic telepathology by pathologists located in Uganda and Germany. In 3% of these cases, telepathology review by a subspecialist led to a change in the diagnosis [31].

We suggest that a solution incorporating the advantages associated with teleradiology and static telepathology along with tools for detailed discussion of a case history and recommendations may be expected to provide improved ease and effectiveness of MDCs between international partners. A web-based application has been developed that meets these characteristics, and can facilitate efficient, thorough, asynchronous, multimedia, multidisciplinary, telemedicine review of cases including radiographic studies, pathology specimens, case history, and other details [32]. We describe elsewhere the experience with implementation of this application for MDCs at Roswell Park Comprehensive Cancer Center, which demonstrated the feasibility of this tool [33]. In addition to its capability to facilitate the process of conducting MDC case discussions, the application includes a searchable database of cases including records of case discussions, with options considered and final recommendations. It may be anticipated that cumulative use of the application will create a progressively larger knowledge bank of completed MDC case discussions, which would then be available for clinicians to independently access and review as an educational tool. Further development of this and similar applications may eventually create an opportunity for semi-automated responses to clinician queries.

## Conclusion

We report the single-institution experience of a cancer center in Nigeria, demonstrating feasibility and benefits of leveraging international expertise for the multidisciplinary management of cancer cases. While email communication is a low-barrier tool and has shown some success in connecting local clinicians with multidisciplinary international expertise, use of a more sophisticated multidisciplinary telemedicine platform for asynchronous MDCs would potentially achieve better results in terms of facilitating timeliness, complexity, and completeness. We intend next to implement and study the use of such a platform in partnerships between cancer centers in HICs and LMICs. The ideal result would be a scalable model, and further development of the concept will be necessary to achieve economic sustainability, potentially incorporating elements of automation and machine learning.

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