Review Article

Challenges and Solutions in Implementing Multidisciplinary Tumor Boards in Low-Resource Settings

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Abstract: Multidisciplinary Tumor Boards (MDTBs) have become a key component of modern cancer care, promoting joint decision-making to help improve the diagnosis, treatment planning and results. However, their application in low-resource settings (LRS) fails due to a number of systemic, technical, and cultural barriers. This analysis mainly focuses on the problems of improving MDTBs in LRS, such as poor healthcare facilities, lack of skilled workers, insufficient staff, inability to generate funds, and lack of digital health records. Other additional barriers include problems with transportation, time limitation, lack of community knowledge, and cultural norms to modern cancer care treatment. These problems impair prompt diagnosis, treatment, and long-term monitoring of cancer patients.

Despite difficulties, as our analysis elaborates, various approaches have been thought to improve the availability and value of MDTBs in these settings with limited resources. Telemedicine and virtual tumor boards can help address regional demands of the community, while training programs and simpler MDTB activities can enhance long-term sustainability. It is also important to strengthen partnerships with international health system, adopt user-friendly digital record systems, and engage in specified community education programs. Furthermore, policy funding and collaborative support is required to integrate MDTBs into national cancer control plans.

This review underscores that, with strategic planning and targeted investments, effective multidisciplinary cancer care is attainable even in the most underserved regions. By establishing MDTB programs to local needs and making use of available technologies and partnerships, low-resource settings can move toward equitable, patient-centered oncology care. Ultimately, the successful implementation of MDTBs can play a transformative role in reducing the global disparity in cancer outcomes.

Keywords: Multidisciplinary Tumor Boards (MDTBs), Low-resource settings, Cancer care, Telemedicine, Healthcare infrastructure, Oncology workforce shortages.

INTRODUCTION

The improved delivery of cancer care over the years can be credited to tumor boards, which are multidisciplinary team meetings that have taken root in many countries. MDTBs have now assumed a significant role in the management of cancer, as they provide interdisciplinary teams of clinicians with opportunities to discuss specific patients' cases and/or offer individualized therapies. Because these interdisciplinary meetings have been demonstrated to enhance clinical decision-making, treatment adherence, and patient outcomes, work on solidifying such meetings can help foster a collaborative environment between relevant disciplines such as medical oncology, surgical oncology, radiation oncology, radiology, pathology and others [1]. This approach will ensure that the health care team has better communication, coordination and decision making with regards to patient care. Many investigations of MDTBs in relation to cancer outcomes indicate beneficial data with potential benefits for cancer treatments [2].

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Cancer treatment and management in low-resource settings (LRS) is influenced by a number of factors including the complexity of cancer and the advanced and coordinated care it necessitates [3]. Making effective use of MDTBs can be particularly difficult in low-resource environments where healthcare systems are characteristically limited by structural capacity, financial resources, and human capital. One of the main challenges is the shortage of qualified specialists, such as oncologists, radiologists and pathologists, which are invaluable to the team of a tumor board [4]. For most of these resource poor countries, the healthcare workforce is skewed, where the healthcare workers are overworked and often have no time or money to spare to attend MDTBs [1, 5]. Exacerbating the challenges is the chronic lack of high-tech imaging and pathology facilities, appropriate access to diagnostic equipment, and advanced cancer therapies that are integral for holistic cancer care. Furthermore, cancer surveillance is not well developed in LRS and there is often a weak reporting system for reliable data collection which complicates the task of determining cancer burden, cancer trends or high risk populations and evaluation of any program interventions that can be put into place [5, 6]. Undoubtedly, the vast geographical distances and limited transport-networks that many low-in-

come countries possess remain as core logistical challenges in maintaining in-person tumor-board meetings, where healthcare professionals who can be located in a multitude of dispersed healthcare facilities may not be able to convene regularly [5].

Therefore, one of the key measures that can be considered is capacity building and training where local healthcare providers are trained and educated through programs in collaboration with international partners, enabling exchange of knowledge and competent practices [7]. One such method is to increase and enhance the knowledge and capacity of premier and first-line care professionals and practitioners in order to expand access to such specialized forms of cancer services to the underserved populations. Telemedicine can also be of significant value in enhancing MDTBs by addressing gaps in equity of access to specialists in limited-resource areas [8, 9].

It is suggested that merged efforts with institutional heads and governing bodies should be made to compile and maintain a mandatory national level cancer registry for urban and rural areas, in order to collect vital data and track outcomes of treatment sessions. This registry should be sustainably funded with state of the art equipment, data management and statistical analysis to support sound cancer control interventions and patients' outcome enhancement [10]. Additionally, the utilization of regional and international financing and procurement systems can go a long way toward alleviating the resource scarcity and also enhancing the availability of quality cancer services. Hence, long-term financing appears critical to the sustained delivery of MDTBs and their translational innovations. To address the problem of discontinuity of these services, it hence becomes important to adopt long term sustainable approaches to financing these services; for instance through partnerships with Non-Governmental Organizations and or through government sponsored programs. MDTBs must also be introduced into current healthcare systems, because their integration can increase the efficiency of cancer care, as well as patients' access to services based on the existing infrastructure [9, 11]. Inclusion of local communities and other stakeholders will also improve the acceptance of the multidisciplinary tumor boards to support the delivery of cancer care [7]. These solutions show promise, however, the core issues of resource constraints and systemic healthcare problems may continue to be barriers that require constant support and search for solutions on how best to deliver cancer care [12].

This review article discusses the existing literature on the challenges and possible strategies in implementation of MDTBs in developing countries in further detail. The search strategy involved systematically querying various prominent biomedical databases, such as PubMed and Google Scholar, to identify relevant peer-reviewed studies published in English. The key search terms used included "multidisciplinary tumor boards," "low-resource settings," "challenges," "solutions," and related synonyms.

DISCUSSION

Challenges in Implementing MDTBs in Low-Resource Settings (LRS)

Limited Infrastructure and Resources

One of the biggest problems of LRS is the absence of primary health care that mainly includes diagnostic facilities, electronic health records and communities for MDTB meetings [13]. Globally, the availability of hospitals in LRS is quite limited. While exact numbers vary, in Africa, for instance, many regions have fewer than two hospitals per 100,000 people. Similarly, in South Asia, there is a marked shortage, particularly in rural areas where hospitals and medical facilities are sparse [14, 15].

Furthermore, a significant number of hospitals in LRS currently operate without modern diagnostic equipment such as imaging or pathology services critical in diagnostic determination of the tumor and suitable treatment procedures. Moreover, lack of digital applications for information exchange interferes with collaborative decision making processes, something that is significant for establishing an MDTB as the whole purpose of an MDTB is collaboration between different specialties of healthcare professionals [16].

Scarcity of Trained Personnel

MDTBs depend on advice from other professionals including medical oncologists, radiation oncologists as well as surgeons. But, in LRS, there is still shortage of specialist health care professionals [17, 18]. Over 80% of cancer patients in LRS, who need surgical interventions, often do not receive timely or safe procedures [19]. This results in delayed diagnosis and treatment strategies as those limited healthcare personnel might have to cater to a larger patient load coupled with several additional responsibilities. Furthermore, few options for medical education and training are available in LRS, and constant professional development is also scarce, leading to a substantial skills deficit [20].

Understaffing

Shortage of healthcare personnel in hospitals in LRS remains a leading concern across the globe, as stated by WHO [21]. According to WHO Global Health Workforce Network, there is still a shortage of millions of human resources for health, particularly to support the needed workforce for universal health coverage in these areas [21,22]. Globally, Africa is short of 6.1 million healthcare workers while in low-resource settings qualified workers migrate to developed countries and few retention techniques exist [22].

For instance, especially in Tanzania, Rwanda and other countries attempts have been made to use performance based pay and educational incentives to keep the healthcare professionals from migrating. Despite all these efforts the problem still persists

because even with incentives the healthcare facilities fall short of providing an adequate working environment [22].

These chronic shortages and staffing problems reduce the capacity and quality of the healthcare provided especially in rural or remote areas where patients are underserved. It is a global problem, and low-resource centers across the globe experience such staffing challenges, not limited to Africa but South Asia, South East Asia, Latin America inclusive [21,22].

Financial Constraints

Financial limitation is one of the major factors hindering effective establishment of MTDs in LRS; from the procurement of necessary stocks of essential medicines and equipment to sustainment of MDTBs [13]. Treatment of cancer is costly, and the number of health facilities in LRS lacks funds to support the running of MDTBs. Additionally, other diseases take precedence in such health systems in terms of funding and concern, thus taking their toll on cancer prevention and treatment programs [19].

Logistical Barriers

Scheduling ordinary MDTB meetings might pose some difficulties in terms of organization, for instance in geographically scattered and remote regions. In cases where the healthcare facilities are located far apart, there will be problems with physical presence of specialists [23]. Additionally, interrupted internet connectivity and unpredictable telecommunication networks pose challenges to the use of even virtual platforms in MDTBs [24].

Time and Caseload Pressures

MDTBs require coordination among healthcare professionals from multiple specialties, but time constraints and large patient caseloads, especially in high-incidence areas, can lead to inefficiencies. This is worsened when cancer cases are mixed with non-cancer cases in the same discussions [25]. Studies prove how time constraint is one of the major factors barring efficacy of MDTBs. Being on a time crunch can lead to rushed discussions and hasty decisions which can reduce the quality and thoroughness of case analysis and decision-making. For instance, a study revealed that time factors were inimical to effective communication and interaction with patients within the MDTBs, and that frequently more time is usually required for case consultations on complex cases so as to enable proper and complete patient care [26].

These temporal demands can be worsened by having many patients. The members of MDTBs, particularly within high incidence malignancy streams, identified time deficit as a counterproductive influence where they are swamped with cases to be dealt with, leading to less than optimal outcomes. Findings reveal that whenever cancer and non-cancer cases are grouped in case discussions, the workflow of the MDTB gets compromised since the practitioners have challenges in handling all the cases efficiently within the set time [27, 28].

Lack of Awareness and Cultural Barriers

Adding on to the several factors that hinder the implementation of MDTBs are cultural factors and ignorance which are easily encountered in areas with limited resources. These hindrances are attributed to limited knowledge of patients on the benefits of having tumor boards and their lack of understanding of the complexities of cancer care. Therefore, in such contexts, the stakeholder, may that be the healthcare workforce or the general public, may not fully appreciate the value of integrated care that is offered by MDTBs [29].

Certain obstacles also stem from cultural issues, for instance lay interpretation, which is now common in many communities, including the use of family members and friends: this inevitably results in misinformation and misunderstanding about potentially confusing medical terms, symptoms, and treatments. Moreover, cultural perceptions on illness such as belief that the disease may be brought by evil spirits or some supernatural or spiritual means can deter a patient from adhering to the doctor advised cancer treatment. Furthermore, in certain cultures patients prefer to make decisions on their treatment with the consent from their relatives, which is an obstacle in the promotion of a patient's right to self-determine their treatment options during the illness [30].

Limited Patient Data and Medical Records

Scarcity of patient information and variability in documentation are some other major barriers to the proper functioning of MDTBs. For these meetings, the chance of ineffective communication and decision-making can be a result of lack of comprehensive patient information and access to their medical records [31].

In many low-resource settings, there are poor digital medical record systems or systems that are outdated and inadequate making essential patient information less available during tumor board meetings. The absence of a centralized system leads to caregivers being dependent on disparate forms of information hence complicating decision making [25].

Studies indicate that the disorganized or inconsistent medical records result in flow of missing information in the MDTBs. According to Walraven JEW, *et al.* the quality of the material discussed determines the quality of decisions made during the clinical discussions. Therefore, when medical records are incomplete or unavailable, healthcare professional may miss out on critical information that could severely influence treatment plans [25, 32].

Good MDTBs work with a volume of relevant and precise information to assess patient cases. Inadequate past medical histories may result in ineffective diagnoses or improper treatment advice. For example, a systematic review pointed out that failure to obtain adequate patient information hinders the capacity to evaluate the effectiveness of treatment and making necessary modifications [25, 32]. This can be very damaging especially in the oncology setting where minor history of the patient and previous therapies play a huge role in decision making.

Furthermore, a study found that healthcare personnel generally face difficulties in obtaining necessary information for MDTBs which can delay discussions and decisions. This can further result in delays in the initiation of patient care, and therefore worsen their health status and prognosis [25, 32].

Limited Follow-Up Care

Ensuring appropriate and consistent follow-up for cancer patients can sometimes be a real challenge, especially in the LRS where access to health care facilities is limited.

Lack of access to follow-up oncological care is another considerable challenge that cancer survivors in rural areas face since many primary care physicians are their main source of care, as the oncological services are located far from their localities. For instance, studies show that ninety-six percent (96%) of cancer survivors seek follow-up at a primary care physician, with only sixty percent (60%) consulting an oncologist [33]. This disparity is exacerbated in LRS where patients lack adequate access to specialized healthcare, making them spend time and money to travel for better healthcare. This causes most patients in LRS to prefer their neighborhood doctor over the hassle of seeing a specialist. Moreover, patients in LRS encounter challenges in accessing the productive and coordinated care provided by interdisciplinary treatment of cancer [34].

Additionally, inadequate training and hospital facilities hinder many rural healthcare providers' capability to administer appropriate cancer survivorship care. MU School of Medicine discovered that many clinicians rely on outdated training and scarce patient data when navigating follow-up cancer care [33].

Solutions for Enhancing MDTB Implementation in Low-Resource Settings

Telemedicine and Virtual Tumor Boards

The integration of telemedicine platforms in LRS help address the geographical barriers by enabling virtual MDTBs [23]. Research has proven the effectiveness and feasibility of using teleconferencing tools to convene various healthcare specialists online [24]. Telemedicine not only solves the problem of a lack of specialists but also provides ongoing and consistent consultation and decision-making, primarily in areas with limited oncology facilities [16]. Collaboration with overseas cancer institutions has also been useful in enriching virtual MDTB meetings [24]. Additionally, incorporation of telemedicine can also help provide a mechanism for regular follow-ups without requiring patients to travel long distances.

Capacity Building and Training Programs

The capacity development programs such as specialized training in oncology, radiology and pathology are integral for the fostering and strengthening of the expertise of healthcare workers [20]. There are a number of successfully implemented projects which aim at educating healthcare workers in LRS, using tools such as workshops, fellowships and online courses [17]. Such involvement of the community healthcare workers and general practitioners can also enhance early identification and referral which further facilitates the MDTB process [20]. Lastly, early sensitization of medical students to MDTBs provides them a foundational understanding which fosters a culture of collaboration and teamwork, essential for effective MDTBs. By normalizing the concept of MDTBs, students can help create an environment where interdisciplinary collaboration is valued and pursued. Sensitized students can therefore become advocates for MDTB implementation within their communities [18].

Simplified and Streamlined MDTB Models

Adapting simplified MDTB models to LRS can make them more sustainable by streamlining workflow. For instance, prioritizing the most complex cases for MDTB discussions, utilizing task-shifting strategies, and developing standardized protocols have been proposed as viable strategies [13]. Simplified protocols also help reduce the reliance on high-end diagnostic tools that may be unavailable [16].

Electronic Medical Record (EMR)

The implementation of EMR systems, even simplified models, could greatly improve the documentation by streamlining the ability to collect, store and transfer such information. They are designed to create real-time, patient-centric records that make it easier for physicians to have access to a patient's entire medical history – a data aggregation that is critical in tumor board interventions [35].

Effective usage of EMRs requires staff to be fully trained to ensure they keep records that are accurate and complete. It should be handled with due sensitivity to the specific roles of the healthcare professionals involved and should indicate to them how each can best get the most out of the system. According to BMJ Informatics, increased training and ongoing support consequently results in staff endorsement of the EMR systems and enhanced patient care results [36].

Moreover, the attainment of EMR systems can enhance efficiency of work and assist to achieve improved coalescence between multidisciplinary teams preventing them from having to face the complexity of inconsistent or fragmented patient data [35]. With organizations getting involved in the improvement of infrastructure and introducing user friendly interfaces, overall efficiency of patient management increases, thus improving the efficiency of the tumor boards in low-resource environments [35, 36].

Collaboration and External Partnerships

Global partnerships and collaborations between high and low-resource settings can be potentially useful for improvement of the functions of the MDTB in LRS [19]. Strategic collaborations

can help in sharing knowledge, getting donations of diagnostic, testing and treatment equipment as well as obtaining funds [24]. The WHO and international cancer agencies have begun a number of directed efforts to build up the framework to provide cancer care in LRS [19].

Health Policy and Advocacy

Sustainability in the long-term lies in advocating for the enhancement of health policies to promote cancer care and MDTB expansion. MDTB establishment plans should be incorporated into governments and international healthcare bodies for cancer control plans, particularly regarding funds allocation and strengthening the healthcare system [13]. Moreover, in order to minimize expenses, patient insurance and financial assistance programs have to be established [17].

Community Outreach and Education Programs

Community sensitization and mobilization activities via educational programs for cancer and cancer care help raise awareness regarding the significance of multidisciplinary approach. Since such programs utilize local health care professionals and leverage trusted key community influencers, they can successfully link patients with appropriate healthcare services, even in areas with limited access.

Such outreach endeavors may help increase the level of understanding of communities on risk factors, screening and treatment of cancer. Approaches to culturally tailored education and engagement have demonstrated increased participation in preventive examinations, screenings and cancer research amongst various cultures and ethnicities [37]. Also, they can engage with the community health ambassadors who can advocate for improved healthcare in the society, thus fostering a supportive environment for cancer care [38, 39] (Fig. **1**).

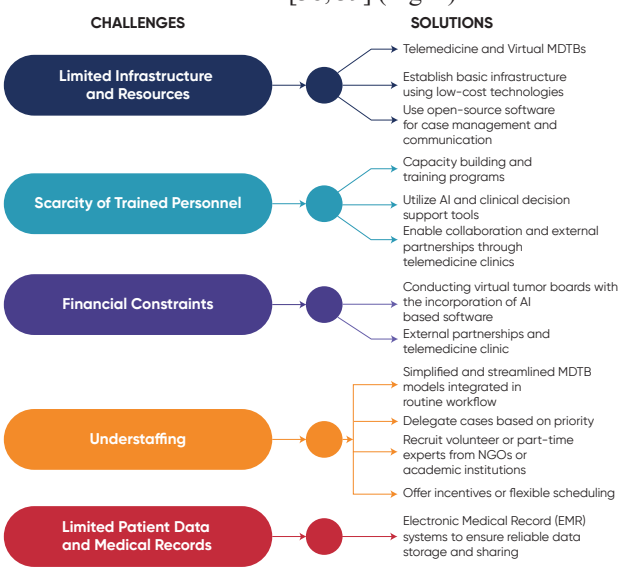

Fig. 1. A Summary of Challenges in Establishing MDTBs in LRS and their Proposed Solutions.

CONCLUSION

In conclusion, even if there are a lot of obstacles to overcome when implementing MDTBs in low-resource environments, these can be addressed with creative, customized solutions, as discussed in our review paper. Staff shortages can be tackled by task-shifting and using telemedicine since mobile platforms can reduce infrastructural constraints, while low-tech record-keeping solutions can improve patient data consistency [40] ensuring efficient dissemination of important information.

To improve teamwork, culturally sensitive methods and translation services are needed to overcome communication and cultural hurdles. Furthermore, MDTBs can be maintained in resource-constrained environments by obtaining funding from local and international benefactors and organizations that share the same vision while also simplifying MDTB operations. Therefore, as established earlier, MDTBs can enhance patient outcomes in resource-limited settings by employing these specialized techniques, challenging the belief that cancer care is unreachable in developing countries [41].

It is now necessary to refute the widely held belief that cancer patients in under-developing nations will not receive the same quality of treatment. Our proposal is to make cancer care and control swiftly and widely accessible, prioritizing cancers that can be prevented, cured, or, in circumstances where these options are not feasible, palliated [5]. Furthermore, improved techniques to track performance, teamwork, and results are required [4]. To enhance cancer outcomes, all government agencies and health system sectors must work together, strengthen the health workforce, and focus on healthcare financing, prioritization, and procurement. Addressing these issues associated with cancer control will inevitably lead to strengthening of the health care system as a whole [6].

Drawing to closure, it is our hope that in the future cancer patients in LRS are able to receive equity of quality and access of cancer care like their counterparts in established economies by leveraging the power of telemedicine and implementing the solutions discussed in our review paper.

ABBREVIATIONS

LRS: Low-Resource Settings.

MDTBs: Multidisciplinary Tumor Boards.

AUTHORS' CONTRIBUTION

Lamea Bint Sahban : Conceptualization, Study Design, Methodology, Data analysis and interpretation, Writing Draft, Critical review and revision the manuscript, Final approval, final proof to be published.

Ayesha Kamran: Methodology, Data analysis and interpretation, Writing Draft.

Samra Mamur: Writing Draft.

Fatima Shaukat: Final approval, Final proof to be published.

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