Review Article

Virtual Multidisciplinary Teams in Oncology and their Application in Pakistan: A Review

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Abstract: The recent pandemic has led to the transition of multidisciplinary tumor boards (MTB) to the virtual domain. The shift enabled collaborations across geographical barriers, improving accessibility and efficiency, both administratively and clinically. For a low-middle income country (LMIC) like Pakistan, where MTBs are not prevalent due to resource limitations, Virtual multidisciplinary tumor boards (VMTBs) are an ideal solution. Aptly, the initiative, Tumor Board Establishment Facilitation Forum (TEFF) has successfully used VMTBs to fill this unfortunate clinical gap. Where VMTBs fulfill their role by providing clinical input, they also educate participants, allow physicians to resolve challenging cases, enable isolated clinics to receive input from tertiary care centers, and provide options for remote consultations and cross-border discussions. Although VMTBs may not provide the comfort of in-person engagement, and low levels of technological literacy present significant challenges, they have been proven to be as clinically efficient as in-person MTBs. If one is to consider all aspects, a well-rounded opinion would sit in favor of VMTBs, as evident during the recent pandemic.

Keyword: Neoplasms, Patient Care Team, Telemedicine, Developing Countries, Health Literacy, Education, Medical.

INTRODUCTION

At the end of the last century, the Calman-Hine report encouraged the discussion of cancer cases in multidisciplinary tumor boards [1]. Since then, integration of multidisciplinary tumor boards (MTBs) to make clinical decisions in cancer care has been proven to be crucial for enhancing patient outcomes [2, 3]. Virtual multidisciplinary tumor boards (VMTBs) as described by Munro *et al.* are a type of MTB which have the following 6 aspects: the meeting is asynchronous, its composition is either constant or variable, is not affected by geographical boundaries, has a problem-specific rather than tumor-specific approach, and includes the use of text, images, video, virtual microscopy [4]. The popularity of VMTB grew over the COVID-19 pandemic [5, 6] and, over time the perception rates of VMTBs have improved with the introduction of new technologies and fast paced infrastructure development [5]. Today VMTBs are being used all around the world to provide quality cancer care.

In Pakistan, a low-middle income country where MTBs are recently introduced [7]. The implementation of VMTBs has emerged as a transformative approach to cancer care. Studies show that VMTBs can lead to improved adherence to oncological guidelines and better patient management, similar to in-person meetings and facilitate better interdisciplinary collaboration, allowing for more cases to be discussed and reducing delays in diagnosis [8,9]. Our review discusses the application of VMTBs in Pakistan's context.

METHODOLOGY

We searched MEDLINE via Pubmed and, separately, Google Scholar. We also used a backwards snowballing approach to search references of relevant studies. Our search terms included 'Virtual Tumor Boards OR Virtual Multidisciplinary Tumor Boards OR Multidisciplinary Tumor Boards AND Pakistan'. Studies which were not written in English were not considered. Studies which explored the logistics and application of tumor boards were included, especially those which catered to Pakistan.

Clinical Applications and Effects on Outcomes

A recent meta-analysis of 59 observational studies of MTBs, which included 134,287 subjects, highlighted a significant improvement in overall survival (OS). Patients that received a multidisciplinary assessment had a median OS of 30.2 months (range, 5-74 months), whereas OS for controls was 19.0 months (range, 3-38 months). These statistics represent an overall assessment for MTBs for all cancer types. A subgroup analysis in the same study revealed a consistent survival benefit for MTBs for

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cancers of the breast, colon, esophagus, blood, head and neck, liver, lung, and pancreas. For cancers of the stomach and soft tissues, there was no difference in mortality between. While, for the latter, this could be owed to a smaller number available studies (n=2), it does allay the importance of a multidisciplinary consensus for these cancer types, especially because the survival benefit is one aspect out of several [10].

MTBs also improve coordination between specialties and speed up case discussion times [3, 11, 12]. Busy schedules, coupled with the lack of a scheduled date, make it difficult for specialties to meet. Additionally, MTBs ensure treatment efficiency by eliminating the need for the patient to visit different specialties. In Pakistan's context of health and related factors there is a prevalence of geographical and financial heterogeneity with a large percentage of the population experiencing financial disadvantage [13-15]. This makes obtaining appointments with various specialties monetarily unfeasible. MTBs eliminate the unnecessary cost and time consuming practice of visiting multiple specialties by providing input from all relevant specialties in one, or more, meetings. Presence of multiple specialties is also beneficial in providing answers to rare and challenging clinical questions, whose answers may not be found elsewhere [3, 16]. In recent times, VMTBs are also being used to facilitate the enrollment of patients in different clinical trials [17,18].

For Pakistan, it may not be possible to provide or set-up MTBs at every nook of the country where cancer patients reach out for treatment. However, integration of VMTBs has emerged as a beacon of hope for oncologists and cancer patients. The model set up by the Tumor Board Establishment Facilitation Forum (TEFF) can be implemented where possible. Based on our experience, TEFF filled a major gap in patient care by utilizing medical students. TEFF is a not-for-profit organization, first led by medical students of the Dow Medical College in Karachi, followed by wings at the Jinnah Sindh Medical College and the Karachi Medical and Dental College, both situated in Karachi [19,20]. Based on a recent report, the model can handle a high load of cases which is more than that seen by national-level MTBs. This could be because TEFF's model is institute-specific and utilises the student force in order to fulfil the administrative needs. This takes away the logistical weight and administrative burden off of the shoulders of physicians, and only requires their presence [20].

Administration of Virtual Multidisciplinary Tumor Boards

With the advent of VMTBs, rapid resolution of complex cancer cases has increased tremendously. The working model of VMTBs fundamentally revolves around the coordination of specialists, such as oncologists, radiologists, pathologists, and surgeons, through video conferencing platforms [21]. In a study by Davis *et al.* the use of VMTBs for a year resulted in a 46% increase in physician attendance and a 20% increase in patient case presentations [22].

Key components of VMTBs include secure digital communication platforms, patient case data repositories, and teleconferencing tools that allow real-time interaction between team members. Generally, an MTB coordinator contacts the head/referring clinician, sets up the date and time according to the availability of invitees, and virtually connects the attendees through a video conferencing software. The chairperson of a VMTB leads the discussions, ensuring that all team members contribute effectively, guiding the decision-making process and making sure to set a protocol of operation for these meetings, hence is a crucial pillar of VMTBs.

In Pakistan, MTBs and VMTBs are yet to be implemented nationally [3]. Despite all of this, on various occasions commendable steps have been taken to counter challenges faced in oncology care. As mentioned previously, TEFF has been establishing VMTBs (Virtual Multidisciplinary Tumor Boards) in the face of these challenges to a positive effect. Global Village Oncology Network (GVON), an online network which was established inorder to enhance multidisciplinary management of patients, links Pakistan and other LMICs with professionals in developed countries, creating a collaborative platform so that innovative solutions may be reached [23]. Naureen *et al.* have also reported their pediatric neuro-oncology twinning program in collaboration with Canada. They concluded that a positive shift in the drafting of management plans was noticed in the last 3 years of the program when compared to the first 3.5 years. Hence, it can be deduced that such collaboration of experts across the world has the potential to refine the local treatment protocols [24].

Technological Aspect of VMTBs

Various barriers come into play where digital healthcare is concerned. Factors such as lack of interoperability, and budget disparity often lead to limited availability of resources and technological infrastructure, making communication of relevant medical details difficult [25]. Pakistan is also facing limitations with internet penetration which forms the backbone of virtual MTBs by enabling real-time communication, data sharing, and video conferencing [26]. It is reported that a minimum bandwidth of 2 Mbps of internet speed is required for the smooth functioning of VMTBs [3].

Thus, it's critical to address these constraints by conducting pilot studies based on the current digital infrastructure in order to develop technologies that are more affordable, and well-suited to the needs of virtual MTBs and the modern technological climate [25].

Data Management

Virtual platforms nowadays require the smart equipment of existing and emerging technologies [27]. When talking about the integration of technology, it is imperative for it to be tailored for the needs of the team. One example would be the use of Decision Support Systems (DSS) [4]. MATE (Multidisciplinary Meeting

Assistant and Treatment Elector) is a computerized DSS platform used to store and evaluate patient data, for the purpose of patient enrollment in clinical trials and to suggest suitable treatment options for them. Although such systems are still not properly developed, they are emerging tools in such settings [28].

Electronic Health Record systems like Epic and Cerner store patient-data, allow real-time access, and regular updates during VMTBs [28]. Simultaneously cloud-based data sharing, genomic data platforms, and Artificial Intelligence (AI) tools are actively being integrated in the Virtual MTB system [3, 27]. Tumor specific genomic data is essentially an integral part of precision oncology. Since the complex intricacies of such data might not be understandable to many, such data is also discussed in VMTBs, including the molecular aspects of the patient's diagnosis and treatment [29, 30].

Digital Infrastructure

Healthcare practitioners frequently use video conferencing or telemedicine systems like Zoom, Google Meet, and Microsoft Teams to conduct virtual or hybrid MTBs [31]. These platforms aid in fluent communication, MTB presentation, and data sharing (including patient reports and radiological scans). Nonetheless, even with the presence of required resources to conduct virtual MTBs, the sustainability of such platforms is still a growing concern. After COVID-19, the infamous 'Zoom fatigue' was born. Majority of masses reported exhaustion after using 2 years of videoconferencing for interactions with one another. Infact, according to a survey conducted in 2020, 42% of physicians favored in-person MTBs rather than virtual MTBs. It is believed that these numbers are likely to increase with a concurrent decline in patient case presentations. However, around 91.7% respondents reported that radiological scans, histological reports/samples were better visualized on virtual platforms than in-person MTBs [32].

Patient Security and Data Breach

Use of online platforms for conducting virtual MTBs comes with great responsibilities and ethical dilemmas. It is fundamental to have robust security of sensitive patient information such as patient history, diagnosis, histological and radiological reports, especially with escalating online hacking and malicious activity [32]. One way to safeguard patient confidentiality is to use software with end-to-end encryption and cloud-based storage choices. Developing countries like Pakistan, however, usually have to pay extra for this. One way to encounter this would be to use de-identified patient information in case presentations [33].

Use of VMTBs in Training and Research

VMTBs are slowly being recognized as platforms of oncological learning and education [34]. Convenience of attendance has been noted to significantly increase physician attendance in different site-specific VMTBs [22]. As VMTBs also provide an opportunity for cases to be discussed across institutions or even across different countries a diverse platform for exchange of ideas and professional networking is formed, enhancing the participants' communication and collaborative skills [35,36], enabling the formulation and application of high-quality guidelines, and ultimately facilitating in improved patient outcomes, and the development of oncological education and academia [35,37].

In a study regarding the application of virtual head and neck tumor boards, 76% of practicing head and neck surgeons reported educational benefits from either attending the virtual tumor board or watching a recording of the tumor boards [38]. Similarly, in another setting recordings of gastrointestinal VMTBs were deemed as an important educational resource by medical professionals who were given access to them. The majority of them agreed that participation in VMTBs provides significant help in learning about current guidelines, and helps prepare for licensing exams [39].

Medical students have previously shown a willingness to incorporate MTBs into their course material [40]. In recent times, VMTBs have also been employed for the purposes of Continued Medical Education (CME) of medical students to a positive effect [19, 20]. The tactical advantage provided by VMTBs has led to the formation of student tumor boards. A platform which assists students in learning the practical and tangible applications of their knowledge in a clinical setting [29]. Pakistan, which is facing a paucity of MTBs, can and has started to derive great benefit from the academic applications of VMTBs through TEFF, GVON and other similar projects [20, 23, 41].

CONCLUSION

In Pakistan the lack of a reliable infrastructure and the absence of digital literacy among both healthcare professionals and the general public serve as significant obstacles to VMTB formation. VMTBs require diligent planning. As such, dedicated teams like TEFF which are available to provide logistical, technological and administrative assistance may be the solution. We believe that this will help mitigate barriers that limit the feasibility of VMTBs in Pakistan and lead to advancement of oncology in Pakistan.

ABBREVIATIONS

AI: Artificial Intelligence.

CME: Continued Medical Education.

COVID-19: Coronavirus Disease of 2019.

DSS: Decision Support Systems.

GVON: Global Village Oncology Network.

LMIC: Low-Middle Income Country.

MATE: Multidisciplinary Meeting Assistant and Treatment Elector.

MTB: Multidisciplinary Tumor Board.

OS: Overall Survival.

TEFF: Tumor Board Establishment Facilitation Forum.

VMTB: Virtual Multidisciplinary Tumor Board.

AUTHORS' CONTRIBUTION

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

Nimrata Kumari: Study Design, Methodology, Data analysis and interpretation, Writing Draft.

Arisha Issa: Study Design, Methodology, Data analysis and interpretation, Writing Draft.

Muhammad Abdul Rehman: Conceptualization, Methodology, Data analysis and interpretation, Writing draft, Critical review and revision the manuscript.

Areesha Mansoor: Methodology, Data analysis and interpretation, Writing draft.

Fatima Shaukat and **Agha Muhammad Hammad Khan**: Critical review and revision the manuscript, Final approval, Final proof to be published.

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ETHICAL DECLARATIONS

Data Availability

The data was stored in encrypted document format in a password protected cloud drive.

Ethical Approval

Not applicable.

Consent to Participate

Not applicable.

Consent for Publication

Consented.

Conflict of Interest

Declared none.

Competing Interest/Funding

Declared none.

Use of AI-Assisted Technologies

The authors declare that no generative artificial intelligence (AI) or AI-assisted technologies were utilized in the writing of this manuscript, in the creation of images/graphics/tables/captions, or in any other aspect of its preparation.

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