

Review Article

Quality Measures for Multidisciplinary Tumor Boards and Their Role in Improving Cancer Care

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ABSTRACT

While multidisciplinary tumor boards (MTBs) are widely used in managing patients with cancer, their impact on patient care and outcome is not routinely measured in different settings. The authors conducted a literature review in Medline, Google Scholar, Embase, and Web of Science using the following keywords: cancer, multidisciplinary, tumor board, quality performance indicator, lung cancer, and lymphoma. Standards from various accreditation and professional organizations were reviewed to compile relevant standards for MTB. A list of quality performance indicators that can be used to improve MTBs' performance and impact was compiled. Specific examples for non-Hodgkin lymphoma and lung cancer MTBs were presented. Guidance was provided to help MTB team members select implement the appropriate quality measures. The functions and impact of MTBs should be monitored and evaluated by a set of measures that help guide MTBs to improve their performance and provide better care to their patients.

Keywords: quality performance indicators, cancer, multidisciplinary teams, tumor board, lung cancer, lymphoma

INTRODUCTION

In a study of tumor boards in 138 Veteran Administration (VA) medical centers, authors observed that tumor boards have little association with measures of use, quality, or survival. The authors concluded that:

It might also mean that tumor boards are only as good as their structural and functional components and the expertise of the participants, and because tumor boards likely vary in their efficacy depending on these factors, measuring only the presence of a tumor board may not be sufficient to understand their effects.^[1]

Delivering medical care for patients with cancer is becoming increasingly complex, with rapid advancement in diagnostic approaches, drug development, and constantly evolving clinical evidence and guidelines. Having an established system to organize multilayered care for patients with cancer has become the standard to provide state-of-the-art care.^[2,3]

With increasing subspecialization in pathology, medical, and surgical oncology, most academic centers have shifted to disease-specific tumor boards.^[4] Advances in precision medicine led to the development of molecular tumor boards, enabling providers to interpret the testing results

and incorporate them into patient care.^[5,6] Finally, the COVID-19 pandemic has led to the evolution of virtual tumor boards, which have continued to function since the pandemic subsided.^[7]

Although multidisciplinary tumor boards (MTBs) are widely practiced, standardized quality measures are not commonly used by individual MTBs and oncology leadership. Such quality measures allow continuous monitoring and improvement of the team's performance in various practice settings, especially because there is great variation in the process, expertise, and resources available for each MTB.^[8] Publishing data about the functions and impact of tumor boards on patient management and outcomes in various resource settings may help improve cancer care across borders.

In this manuscript, the authors present a review of the structure and functions of MTBs and present samples of suggested quality measures to enhance the performance of MTBs, improve their positive impact on patient care, and overcome some of the challenges encountered.

METHODS

The authors conducted a literature review in Medline, Google Scholar, Embase, and Web of Science using the

following keywords: cancer, multidisciplinary, tumor board, quality performance indicator, lung cancer, and lymphoma.

Furthermore, the authors compiled a list of measures that can guide involved individuals in improving their MTB's performance and provided some examples for disease-specific MTBs, namely non-Hodgkin's lymphoma (NHL) and lung cancer. The authors selected these measures from reviewing accrediting agency standards, such as the American College of Surgeons and National Quality Measures database, CMS Measures Inventory Tool, International Library of Measures from Joint Commission International, Agency for Health Research and Quality, and other professional societies related to the subject.^[9-14] A summary of the MTB functions, benefits, and structures was generated.

RESULTS

Overview of MTB Function and Potential Benefits

MTB is the setting to discuss various management aspects of cancer cases. Besides hematologists and medical oncologists, surgical oncologists, general and nuclear medicine radiologists, pathologists, and radiation oncologists, MTBs may include palliative medicine, molecular biologists, research coordinators, and clinical research pharmacists, all providing input relevant to their fields.^[15] The presence of research team members facilitates identifying potential clinical trials appropriate for such patients. The MTB setup allows healthcare professionals to share their expertise and make evidence-based decisions, improving adherence to guidelines.^[16,17] MTBs also play a significant role in educating young faculty members, fellows, residents, and mid-level healthcare workers.^[15]

MTBs help minimize miscommunication and arduous care coordination issues. In many cases, they can lead to diagnosis and disease stage changes.^[18,19] They are associated with better documentation of disease stage and performance status; both are very important documentation elements to ensure personalized care for patients with cancer.^[20] In some cases, MTBs may result in changing the disease management.^[21,22] They improve patients satisfaction,^[23] expediting care delivery and shortening the time to initiate treatment by shortening the time needed for sequential consultation.^[24,25] Finally, MTBs are linked to a decreased risk of death, improvement in survival,^[26,27] and decreased risk of overtreatment.^[28]

MTBs are particularly important in low-income countries and may provide virtual access to expert oncologists and hematologists otherwise inaccessible to those patients. MTBs have been implemented in many countries in Africa.^[29,30] Such MTB can also be beneficial for developing or adapting international guidelines, taking into account patient population and available resources.

MTBs can potentially allow members to come up with different research ideas by providing valuable insights and identifying potential areas for improvement pertinent to the served patient population. Such research can be instrumental in advancing the field of cancer care and guiding future clinical practice.

Establishing and Optimizing MTBs

Overseeing the implementation of the MTB recommendation is an essential part of ensuring quality care is delivered to patients with cancer. Any process related to patient care must be reviewed and audited by the corresponding medical team to ensure no gaps exist. Multidisciplinary teams' discussion during MTB is a multistep process that involves different teams/specialties, and all efforts should be made to confirm that they are of the best quality and that their recommendations are appropriately followed.

MTBs should keep up with the rapid evolution of clinical trials, emerging evidence, patient-centered care, the tremendous advances in molecular knowledge and precision medicine, and the impact of COVID-19 on healthcare delivery.^[31,32]

The corresponding organization leadership is not only responsible for establishing MTBs but also for optimizing their performance, ensuring that they are conducted appropriately and that the generated recommendations are followed. Although MTBs are regularly conducted per each institutional policy, the quality assessment varies significantly between different institutions.^[33]

Some approaches that can help improve the function of MTBs include the following^[4,15,34]:

- Assuring leadership support and making MTBs an institutional function, not an individual department function.
- Developing standardized MTB forms that include all the important elements required for diagnosis, risk stratification, and response assessment and are applicable to each cancer category.^[35]
- Involving all specialties, including relevant medical and surgical specialties, diagnostic specialties, such as radiology, nuclear medicine, interventional radiology, pathology, and molecular biology, based on needs of the MTB.
- Regular, fixed, and predictable scheduling (although ad-hoc MTBs can be held on as needed basis).
- Booking cases early enough to allow different specialists to prepare for the meeting.
- Ensuring that MTB documentation is included in patients' records and is easily accessible in inpatient and outpatient clinical care settings.
- Allowing time for educational topics related to the cases discussed.
- Performing regular audits to ensure adherence to MTB recommendations and sharing audit results with MTB team members.^[36]

Table 1. Examples of universal measures that can be used by multidisciplinary tumor board (MTB) to assess quality

Measure Category	Example	Definition
Organizational	MTB meeting compliance Physician attendance—per specialty Number of cases presented	Adherence to noncancellation of MTB Track of physicians' attendance in the assigned MTB Total number of cancer cases presented in MTB
Process	Percentage of new cases presented Adherence to guidelines Change in disease management Change in radiology findings Change in staging determination Change in pathology findings Adherence to TB recommendations	Percentage of newly diagnosed cases presented in MTB Percentage of MTB recommendations adhere to the disease guidelines Percentage of cancer cases with change in management after presentation in MTB Percentage of cases with change in radiologic/pathologic finding and stage after MTB discussion Percentage of compliance with MTB recommendations and reasons for noncompliance
Outcome	Time-to-start treatment Disease-free survival Overall survival	Time interval to start definitive treatment after decision to treat Time interval after treatment completion without signs of recurrence Time interval from the diagnosis date until death
Balancing	Staff satisfaction Patient satisfaction Cost and expenses Publications	Satisfaction level of staff concerning TB functions and its impact on patient care Level of patient satisfaction concerning care management due to cases presented in MTB Cost involved in MTB function Number of publications initiated from the MTB

Quality Performance Indicators for MTBs

By collecting accurate and relevant audits, we can identify service areas in need of improvement to ensure that quality care is delivered to each patient with cancer.^[36] The first step in improving the quality of care is to gain insight into the current practice using quality performance indicators (QPIs) defined as “measurable elements of practice performance for which there is consensus or evidence that can be used to assess and change the quality of care provided.”^[37] These indicators are used to improve the quality of cancer care and help fill the gaps. Different types of measures and sets of QPIs can be used to assess various aspects of any activity in health care, including organizational, process, outcome, and balancing measures.^[38]

These QPIs and measures vary based on the tumor type, the different treatment modalities applicable to the specific tumor type, and the required follow-up. An ideal QPI is well defined (explicitly defined inclusion and exclusion criteria), specific (few false-positives), sensitive (few false-negatives), valid (has robust selection process or development), reliable (minimal interobserver or intraobserver variability), able to discriminate (ability to detect variation or change for comparison), based on evidence and clinically relevant (an acceptable identifiable event for user), and feasible or measurable (can be measured with data that are available).^[39]

Quality Measures for MTBs

The measures must be selected with a clear purpose in mind of how they will be used. Ideally, QPIs should be selected from a reliable source, such as accrediting agencies, as that may help the organization get accredited, enable the team to use validated measures with the

ability to benchmark, assess trends, and get external guidance when needed.^[14,29,38,40]

There are two categories of measures that can be used to assess the quality of MTB work as follows: universal measures that can be used to assess any MTB and specific measures that are used to assess disease-specific MTB functions.

Universal measures assess the quality of MTB work irrespective of the disease site. They are usually used to describe the efficiency and productivity of the team and the impact on healthcare delivery or the patient experience. Table 1 depicts an example of universal measures.

Disease-specific measures capture data relevant to the disease, pertaining to work-up, treatment, and outcome, and vary from one disease to another. The peculiarities of each disease dictate the importance of the experts in managing the disease to select relevant measures of the most important values on patient care and outcome. The following are two examples of malignant hematology and solid tumors to illustrate certain measures that can be selected, with an example list of disease-specific measures listed in Table 2.

Lymphoma MTB

The lymphoma MTB covers cases of Hodgkin's lymphoma and NHL. These cases may be newly diagnosed, primary refractory, or relapsed, and cases with atypical presentations or rare subtypes. Lymphoma MTB approaches were found to not only positively impact the outcome of lymphoma patients but also enhance the interdisciplinary interactions and education for multiple levels of the healthcare provider team.^[41] A typical lymphoma MTB will include a general radiologist, a nuclear medicine radiologist, a pathologist with expertise in interpreting lymphoma

Table 2. Examples of quality performance indicators (QPIs) that can be used for non-Hodgkin lymphoma and lung cancer multidisciplinary tumor boards (MTBs)

Type of measure	Non-Hodgkin Lymphoma	Lung Cancer
Diagnostic and staging indicators	<ul style="list-style-type: none"> • Taking a biopsy • Evaluation for morphology and immunohistochemistry • Cytogenetic/FISH testing (applicable to Burkitt and high-grade B-cell lymphoma) • World Health Organization classification • Imaging CT/PET • Documentation of Ann Arbor staging • Documentation of IPI risk score • Obtaining echocardiogram 	<ul style="list-style-type: none"> • Pathologic diagnosis • Evaluation for morphology and immunohistochemistry • Molecular tumor profiling (NGS) • Mediastinal staging • Imaging CT/PET • Brain Imaging
Treatment/follow-up indicators	<ul style="list-style-type: none"> • Choosing the optimal regimen • Optimizing the dose intensity • Interim and end of therapy response assessment • Fertility counseling 	<ul style="list-style-type: none"> • Surgical resection in early non-small cell lung cancer • Choosing the optimal systemic regimen in non-small cell lung cancer • Radiotherapy in inoperable lung cancer • Stereotactic ablative therapy in nonoperable stage I non-small cell lung cancer • Chemoradiation therapy in locally advanced non-small cell lung cancer • Chemotherapy in small cell lung cancer • Optimizing the dose intensity • Response assessment
Organizational indicators	<ul style="list-style-type: none"> • Diagnostic period of 3 weeks after the first visit to the hospital • Integrated reporting of pathology techniques • Pathology reports include (origin of tissue, tissue characteristics, biopsy method, recipient of material, whether tissue was frozen or no) • Results of pathology are all available before starting therapy • Start of therapy within 2 weeks after the diagnostic period • Case discussion in MTB 	<ul style="list-style-type: none"> • Diagnostic period of 3 weeks after the first visit to the hospital • Integrated reporting of pathology techniques • Pathology reports include (origin of tissue, tissue characteristics, biopsy method, recipient of material, whether tissue was frozen or no) • Results of pathology are all available before starting therapy • Start of therapy within 2 weeks after the diagnostic period • Case discussion in MTB

CT/PET: computed tomography/positron emission topography; FISH: fluorescence in situ hybridization; IPI: international prognostic index; NGS: next-generation sequencing.

cases, a radiation oncologist, and hematologists and oncologists. Research and stem cell transplant or chimeric antigen receptor T-cell therapy coordinators may be included as feasible. Other specialists might be involved in a case-by-case fashion.

Involving junior faculty members, fellows, and residents in presenting cases with supporting evidence around those specific cases helps enforce an evidence-based culture.

Efforts targeting NHL-specific QPIs may improve the outcome of patients diagnosed with this disease.^[42] Table 2 depicts the quality indicators for NHL that address diagnosis, follow-up, and organization of care.

Thoracic MTB

Another example of MDT is thoracic MTB, where cases of newly diagnosed lung cancer with primary refractory or suboptimal response, relapsed cases, and cases with atypical presentations or rare subtypes. Other thoracic malignancies, such as thymomas or mesothelioma, are also discussed in this board. Thoracic MTB approaches have been found to not only positively impact the

outcome of lung patients with cancer but also be beneficial in enhancing interdisciplinary interactions and education for multiple levels of healthcare providers' teams.^[20] A typical thoracic MTB will include a chest radiologist, thoracic surgeons, a nuclear medicine radiologist, a pathologist with expertise in interpreting lung cancer cases, a radiation oncologist, palliative care, and a medical oncologist. Research coordinators and other staff as applicable.

Involving junior faculty members and fellows may assist in career development and allow for practical mentoring senior physicians provide. By attending such meetings, junior faculty members and fellows can choose a subspecialty or disease of interest to become an expert or researcher. MTB also increases job satisfaction by enhancing the sense of belonging to a professional group.^[43]

There are many published lung cancer QPIs with multiple gaps and a lack of prevention, screening, and early detection QPIs. Efforts targeting lung cancer-specific QPIs

may improve the outcome of patients diagnosed with this disease.^[44]

Examples of MTB indicators for diagnosis, treatment, follow-up, and organizational indicators are shown in Table 2.

DISCUSSION

Although MTBs are widely adopted in all practice settings and different formats, the performance and impact of these MTBs vary. Their success is dependent on multiple factors, including the perception and contributions of individual members, the structure and dynamics of the team, the adherence to evidence-based practice, following thorough in implementing the MTB recommendations, and the practice settings and available resources and support.^[4,33]

Therefore, to evaluate the function and impact of individual MTBs, a set of indicators should be captured and monitored to measure objectively the intended aim of holding MTBs.

MTB members should determine the quality measures to assess teamwork and identify areas of improvement. The following are guiding principles for the selection and implementation of such quality measures^[38]:

1. The team should include all disciplines in selecting the quality measures, and it will be beneficial to include experts in quality improvement, if available.
2. The selection of measures should be evidence-based and preferably form a reliable source of quality measures, such as accrediting agencies and professional societies. This will enable the team to use well-defined measures and make benchmarking feasible.
3. Select indicators that reflect the different types of processes, outcomes, and organizational measures.
4. Only select a few indicators; limit them to the most relevant ones in each, prioritizing patients' outcomes.
5. Delineate how the measures will be collected, analyzed, and reported and the frequency of that.
6. Present the data on a regular basis to the team and leadership and address any area for improvement.
7. Consider adjusting, adding, deleting indicators, and modifying the work process.
8. Evaluate causes of poor compliance with certain indicators, especially if it affects patient care, and implement an improvement plan.
9. Publish the data and impact of MTB on patient care and outcomes using the selected measures with attention to trends and benchmarking. Publication can be institutional reports or actual peer-reviewed publications to share experience with a wider audience.

It was reported that vague or nonspecific MTB recommendations are less likely to be followed, and the same for recommendations that do not follow guidelines or require practice routine changes.^[37] One major challenges

is incorporating patient preferences into the recommendations to enhance compliance with the MTB recommendations and provide better patient-centered care.^[32,45,46]

CONCLUSION

MTBs are a critical component of the standard of care for oncology patients. The impact of MTBs on disease management is well documented; however, there are significant variations in how these teams' meetings work in different settings. Monitoring quality measures would help evaluate the impact of these MTBs on the patient's care and outcome and healthcare delivery.

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