PJSS Vol. 81, No. 2, July-December, 2026

PJSS PHILIPPINE JOURNAL OF SURGICAL SPECIALTIES

Assessing Decision-Making Fatigue in Multidisciplinary Tumor Board Meetings Using the MDT-MODe Tool

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Rationale: Multidisciplinary teams (MDTs) have become the standard of care in the management of patients, particularly patients with cancer. The literature, however, describes decision-making fatigue as one of the factors that may affect team performance during MDT meetings. This study sought to assess changes in multidisciplinary meeting processes that may be consistent with decision-making fatigue using the MDT-MODe tool.

Methods: Through a retrospective cohort study design, the investigators reviewed video and audio recordings from the Division of Colorectal Surgery and evaluated the weekly MDT meetings using the MDT-MODe tool.

Results: The authors evaluated 16 multidisciplinary meetings. 134 patients were discussed during these meetings. The average meeting duration was 57 (range 28-98) minutes with 8 (range 5-14) patients discussed at each meeting. An average of 7 (range 1-15) minutes was spent discussing each patient. No statistically significant difference was observed in the MDT-MODe scores of the team in the first halves compared to the second halves of the meetings.

Conclusion: No statistically significant differences in MDT-MODe scores were observed between the first and second halves of colorectal MDT meetings. However, these findings cannot establish the presence or absence of decision-making fatigue because MDT-MODe evaluates meeting processes rather than fatigue directly.

Key words: Multidisciplinary team, multidisciplinary meeting, decision-making fatigue, evaluation, MDT-MODe

Multidisciplinary teams (MDT) have been vital in delivering quality patient care especially to those afflicted with cancer; and these have been proven beneficial in both complex benign and malignant cases.[1-3] The literature, however, describes several inefficiencies in the process of MDT meetings.[1,4,5] One characteristic of MDT meetings that requires attention is decision-making fatigue. A study by Soukup et al showed that high workload and prolonged decision-making in meetings have become the norm resulting in fatigue. This may affect the team's performance during the meeting and management decisions that are of little benefit, or even detrimental, to the patient.[6]

This study sought to assess changes in MDT meeting processes that may be consistent with decision-making fatigue using the Metric for the Observation of Decision-making in Multidisciplinary Tumor Boards (MDT-MODe) tool during the conduct of colorectal MDT meetings. It also aimed to identify which characteristics or aspects of the meetings may have positive or negative effects on the overall decision-making process. Finally, it aimed to determine the reliability of a trained nurse evaluator using the MDT-MODe tool.

Methods

Through a retrospective cohort design, the investigators reviewed all available video and audio recordings of MDT meetings from the files of the Division of Colorectal Surgery from May 2020 to June 2021. Meeting duration, number of patients per meeting, and average time spent per patient were recorded for each meeting. The MDT-MODe tool was then used to evaluate the decision-making process for each patient in each meeting.

At the Philippine General Hospital, the Division of Colorectal Surgery has a weekly MDT meeting for colon and rectal cancer patients. The team consisted of colorectal surgeons, medical oncologists, radiation oncologists, radiologists, pathologists, gastroenterologists, and colorectal nurse coordinators who regularly attended the meetings. Additional specialists (e.g., plastic surgeons, urologists, and palliative care physicians) attended

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meetings when required by case complexity. The MDT meetings were conducted online and recorded for subsequent review when necessary.

MDT-MODe is an observational assessment tool developed by Lamb et al. to objectively evaluate the quality of multidisciplinary cancer meetings by assessing the quality of information presented and the quality of team discussion.[7] It is a validated scoring system which has been used to assess various cancer MDT meetings and includes these aspects when discussing a patient in a meeting: information, discussion, and outcome. The quality of information includes six variables on a 5-point scale (history, ancillary procedures, pathology, psychosocial issues, comorbidities, and patient's own views). The quality of discussion, likewise, has variables to consider, namely the chair of the meeting, surgeons, oncologists, radiologists, histopathologists, nurses, and other related specialty during that patient discussion. The 12 variables were scored from 1 to 5, with 1 being the worst and 5 being the best score.[6,7] The scores for the information and discussion domains were summed to obtain the total MDT-MODe score. A higher score indicates a better decision-making process per patient (Figure 1).[6]

			INFORMATION						DISCUSSION								OUTCOME	
#	Site	Point	Hx	X-ray	Patho	Psy/soc	Comorb	Patient view	Chair	Surg	IM	Onco	Nurse	Radio	Patho	MDTC	Y/D/N	Free Text
1																		

INFORMATION ITEM	SCORE	CRITERIA
Point	Pre Rx	Pre-treatment
	Post Rx	Post-treatment
	R	Recurrence/surveillance
History	5	Fluent, comprehensive case history
	3	Partial case history
	1	No patient case history
X-ray	5	Radiological images
	3	Radiological information from a report/account
	1	No provision of radiological information
Pathology	5	Histopathological information from pathologist
	3	Histopathological information from report/account
	1	No provision of histopathological information
Psychosocial	5	Comprehensive first-hand knowledge of patients' personal circumstances, social and psychological issues
	3	Vague first-hand knowledge or good second-hand knowledge of personal circumstances, social and psychological issues
	1	No knowledge of personal circumstances, social and psychological issues
Comorbidity	5	Comprehensive first-hand knowledge of past medical history and performance status
	3	Vague first-hand knowledge, or good second-hand knowledge of past medical history or performance status
	1	No knowledge of medical history or performance status
Patient's views	5	Comprehensive first-hand knowledge of patient's wishes or opinions regarding treatment
	3	Vague first-hand knowledge, or good second-hand knowledge of patient's wishes or opinions regarding treatment
	1	No knowledge of patient's wishes or opinions regarding treatment
DISCUSSION ITEM	**SCORE**	**CRITERIA**
Chair	5	Good leadership and enhanced team discussion and decision-making
	3	Leadership neither enhanced nor impeded team discussion and decision-making
	1	Poor/inadequate leadership impeded team discussion and decision-making
Members (Surgery, Internal Medicine, Oncology, Nurse, Radiology, Pathology)	5	Clear contribution of specialist
	3	Contribution inarticulate or vague
	1	No contribution
OUTCOME	**SCORE**	**CRITERIA**
Decision	Y	Clear decision about treatment(s) to be offered
	D	Decision to defer to next MDT
	N	No decision/decision unclear
Free Text		

Figure 1. Adapted MDT-MODe scoring rubric for evaluation of MDT meetings after Lamb[7]. PGH, 2022

The primary outcome assessed was the change in MDT-MODe score between the first and second halves of each meeting. The MDT-MODe score per case was obtained and the mean scores for the two halves were compared using a paired-samples t-test. A lower score in the second half was interpreted as a decline in the measured quality of the meeting process, which may be consistent with decision-making fatigue. Each meeting was divided into two periods based on its total duration. Patient discussions that extended beyond the midpoint were included in the first half to avoid dividing a single case discussion between periods. Consequently, the number of cases and actual duration of each period could vary and was not controlled.

The secondary analysis examined whether the quality of information and quality of discussion differed between the first and second halves of multidisciplinary team (MDT) meetings. A repeated-measures MANOVA was used to determine whether the combined scores differed between meeting halves. Since each meeting contributed scores for both halves, meeting half was treated as a within-meeting factor. Separate univariate analyses were also conducted to assess differences in each outcome between the first and second halves.

The final aim of the study was to assess the reliability of a trained nurse evaluator using the MDT-MODe tool. The nurse independently rated recordings of multidisciplinary meetings, and the ratings were compared with those of the principal investigator using an intraclass correlation coefficient.

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 16 multidisciplinary meetings were available for evaluation. One hundred thirty four (134) patients were discussed during these meetings. The average duration per meeting was 57 (range 28-98) minutes with 8 (range 5-14) patients discussed per meeting. An average of 7 (range 1-15) minutes was spent discussing each patient.

Assessment of Decision-Making Fatigue

A paired t-test was done to determine the change in MDT-MODe scores based on the scores of the first halves of the meetings compared to the second halves. There was no significant difference in the mean scores during the first (M=19.31, SD=6.93) and second (M=19.54, SD=6.13) halves of the meetings $t(15) = -0.231$, $P = .821$.

Comparison of the quality of information scores between the first (M=9.92, SD=3.13) and second halves (M = 10.96, SD = 3.54) demonstrated no statistically significant difference, although the mean score was numerically higher during the second half, $t(15)= -1.773$, $P= .097$. Similarly, there was no statistically significant difference in quality of discussion scores between the first (M = 9.40, SD = 3.97) and second halves (M=8.58, SD=2.94) of the meetings, $t(15)= 1.263$, $P= .226$.

Although information scores were numerically higher and discussion scores were numerically lower during the second halves of meetings, neither difference was statistically significant.

Impact of Meeting Characteristics on Decision-Making

A repeated-measures MANOVA was done to determine whether the combined quality of information and quality of discussion scores differed between the first and second halves of MDT meetings (Table 1). The multivariate effect of meeting half was not statistically significant (Wilks' $\Lambda = .692$, $F(2,14) = 3.113$, $P = .076$, partial $\eta^2 = .308$). Separate univariate analyses also showed no statistically significant differences between

Table 1. MANOVA results comparing information quality and discussion quality between the first and second halves of multidisciplinary meetings. PGH, 2022

Outcome	First half, mean ± SD	Second half, mean ± SD	F statistic	*P*-value	Partial η^2
Quality of Information	9.92 ± 3.13	10.96 ± 3.54	3.143	.097	.173
Quality of Discussion	9.40 ± 3.97	8.58 ± 2.94	1.595	.226	.096
Combined outcomes (MANOVA)	—	—	3.113	.076	.308

meeting halves in quality of information ($F(1,15) = 3.143$, $P = .097$) or quality of discussion ($F(1,15) = 1.595$, $P = .226$). These findings did not demonstrate a statistically significant difference in the measured quality of MDT meetings between the first and second halves.

Determining the reliability of a trained nurse evaluator using the MDT-MODe tool

An intraclass correlation coefficient (ICC) was used to assess agreement between MDT-MODe scores assigned by the trained nurse evaluator and the principal investigator. There was a high degree of agreement noted between the scores of the nurse and of the investigator using a two-way mixed-effects model with absolute agreement. The single-measures ICC was 0.847 (95% CI 0.699–0.925), while the average-measures ICC was 0.917 (95% CI 0.823–0.961) (Table 2). These findings suggest that a trained nurse evaluator may reliably use the MDT-MODe tool for the purpose of evaluating future multidisciplinary meetings.

Discussion

Multidisciplinary teams and meetings have become standard practice for the care of patients, especially ones battling cancer. Several studies have identified that several factors adversely affect decision-making during meetings and several strategies may mitigate these negative effects.[1]

Although numerical differences were observed, no statistically significant differences in MDT-MODe scores were demonstrated between meeting halves. The repeated-measures MANOVA did not demonstrate statistically significant differences in the combined quality of information and quality of discussion score. Neither outcome showed a statistically significant difference when analyzed individually. Lastly, the findings also suggest that a trained nurse evaluator may reliably use MDT-MODe to assess multidisciplinary meetings. The tool then may help in the evaluation of multidisciplinary meetings for feedback and for further improvement of processes involved.

This study has several limitations. This was a retrospective study. External factors, such as emergent calls, poor internet connectivity, and other distractions, were not controlled. Case complexity was not controlled and may have differed between the first and second halves of meetings. Likewise, this only included a small amount of obtainable recorded video and audio files available in one division only. A larger scale prospective observational study with direct fatigue assessments may provide more insight on decision making process and possible effect of fatigue in multidisciplinary meetings.

It should also be noted that this study used the MDT-MODe tool as an indirect measure of decision-making fatigue. The evaluation tool was designed to assess the quality of information presented and the quality of discussion during multidisciplinary team meetings and does not directly measure cognitive fatigue or decision-making capacity among MDT participants. It was assumed that the deterioration in these meeting processes could indicate decision-making fatigue, although this relationship has not been directly established. Other factors may also affect MDT-MODe scores, including differences in case complexity, the number and types of cases discussed, the availability and completeness of clinical information, variations in participant engagement, and time constraints. The study also did not use participant-reported measures of mental fatigue or objective cognitive performance assessments, which could be compared with MDT-MODe scores in future research.

Some aspects of the tool may need adjustment depending on how certain teams already conduct their meetings. For example, our division tends to discuss

Table 2. Inter-rater reliability of MDT-MODe scores between the trained nurse evaluator and the principal investigator using the intraclass correlation coefficient (ICC). PGH, 2022

	Intraclass Correlation Coefficient	95% Confidence Interval	*P*-value
Single Measures	.847	0.699-0.925	<.001
Average Measures	.917	0.823-0.961	<.001

post-operative patients, which may have been discussed in a former meeting, in the earlier parts of the meeting, and only a few are involved in the decision-making process during the first half. As the conferences progress, other services are more inclined to discuss the cases because their inputs may have a significant change in management or plan. Although this is a common practice in this setting, it may be a potential strategy to manage participation during meetings, as members can determine when their contributions are most relevant. While this is not investigated in the present study, this should be explored in future research.

The MDT-MODe tool assesses multidisciplinary meetings at the team level rather than evaluating individual participants. As a result, when more than one specialist from the same discipline attends (i.e., two surgeons or two medical oncologists) their combined participation may affect the score for that factor. Likewise, the effects of seniority, experience, or attitude are not considered in the validated tool. Future development of assessment tools that incorporate these factors may be done.

Lastly, this study is focused on assessing meeting-process changes potentially associated with decision-making fatigue in a multidisciplinary meeting. This does not presuppose any substantial effect on the actual patient care or patient related outcomes. This research, therefore, cannot yet be directly associated with measurable patient outcomes.

Conclusions

This study found no statistically significant differences in MDT-MODe scores between the first and second halves of multidisciplinary colorectal cancer meetings in the institution. Neither the quality of information nor the quality of discussion showed statistically significant differences between meeting halves. However, it is important to reiterate that these findings do not necessarily indicate the presence or absence of decision-making fatigue, as the MDT-MODe tool evaluates meeting processes rather than directly measuring fatigue. Finally, a trained nurse evaluator demonstrated good agreement with the principal investigator, suggesting that the MDT-MODe tool may be reliably used by nurse evaluators to assess multidisciplinary meetings. Future studies involving a larger number of meetings, direct measures of fatigue, and additional meeting-level characteristics are warranted to further evaluate factors that may influence multidisciplinary decision-making and fatigue.

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