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ORIGINAL RESEARCH

A Survey-Based Assessment of the Practices Governing Morbidity and Mortality Conferences and the Effects of the COVID-19 Pandemic

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Background: Morbidity and mortality (M&M) conferences are essential components for resident education and provide a valuable tool to improve patient safety and quality of care. M&M conferences help identify important gaps in safety and reduce avoidable events in future patient care. Active methods to improve the utilization of M&M conferences have been shown to enhance their educational value for residents, faculty and multidisciplinary teams in healthcare institutions.

Objective: The purpose of this study was to use a survey-based methodology to assess how morbidity and mortality conferences are conducted in residency programs, including characteristics such as frequency, involvement of personnel and the effects of COVID-19.

Methods: From February to October 2021, a validated 19 question survey was electronically distributed to residency program directors in anesthesiology, emergency medicine and general surgery, after a search for email addresses in the ACGME database. The survey was created and hosted on Google Forms.

Results: A total of 125 of 713 program directors (17.5%) responded to the survey. Eighty-three percent of respondent programs reported mandatory participation for residents, with residents providing most of the presentations. Case presentations utilized various formats including SBAR, adverse event analysis and root cause analysis as the most common modalities. Though most programs reported no change in frequency of M&M conferences due to COVID-19, most respondents reported a shift to a virtual or hybrid platform.

Conclusion: M&M conferences are an important educational and quality improvement modality, and many residency directors changed practice to incorporate virtual platforms due to the COVID-19 pandemic to maintain uninterrupted educational sessions. Nonetheless, significant variation still exists in how these conferences are conducted between different institutions.

Keywords: morbidity and mortality, graduate medical education, quality assurance

Introduction

Morbidity and mortality (M&M) conferences are an important educational tool mandated during training by the Accreditation Council of Graduate Medical Education.[1] However, their structure and content vary greatly between institutions.[1–3] Despite this inherent variability, the M&M conference is understood to be a valuable tool for quality improvement and promotes patient safety initiatives.[4,5] These educational meetings may be intra-departmental and may include physicians, nurses or key administrative leaders who work in conjunction to address errors identified during case review.[6] M&M conferences have been shown to produce numerous positive effects for patient care, including the reduction of "avoidable" events following educational analysis and discussion.[7,8]

The use and utility of morbidity and mortality conferences is long established in emergency medicine, general surgery and anesthesiology, amongst numerous other specialties.[9–11] Survey utilization has also been shown to be an effective investigative tool to elucidate efficacy of various educational modalities.[12,13] The goal of this study was to utilize a survey to assess common practices regarding M&M conferences in anesthesiology, emergency medicine and general surgery including the frequency,

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delivery, structure and participation of such meetings. It was also to determine what changes (if any) occurred to these practices during the global COVID-19 pandemic.

Methods

After obtaining IRB approval from Rutgers University, a 19 question survey was developed to assess the utilization of M&M conferences, and potential changes that may have occurred due to the COVID-19 pandemic. Questions were constructed with the following goals: identification of residency program and type, assessment of frequency and role of participants in M&M conferences, identification of supervisor of M&M presentations, use of tools to evaluate cases, and the effects of COVID-19 on conferences. These questions included several short answer responses for demographic and program information. Multiple-choice questions were used to query frequency, presentation type, presenter and supervisor of M&M conferences, as well as the effects of COVID-19 on delivery and frequency of morbidity and mortality conferences. Criteria and formatting of these conferences, as well as case selection, was also assessed using multiple-choice questions. Each question also allowed for a write-in option. Multiple-choice questions offered respondents two to six answer choices. Categorical variables are presented as frequencies. The survey was validated intra-departmentally.

The decision was then made to proceed with distribution of the M&M survey to three specialties- general surgery, emergency medicine and anesthesiology. This is due to their close association and working relationship in the operating room, emergency room and trauma theater, where interactions and working conditions cause frequent overlap. In addition, these three departments often have complications that necessitate review in two or more of these departments. The ACGME website was reviewed, and a list of 713 email addresses was created, representing the program directors for each of the residency programs in these 3 specialties. A recruitment letter was then designed in which all the essential characteristics of the study were identified, and the survey was uploaded into Google Forms.

Beginning in February 2021, 713 program directors were emailed with the recruitment letter and a link to the Google Form with the survey. Reminder emails were sent monthly for the ensuing 8 months, to ensure maximal response. The correct email address for each of the returned email addresses was ultimately located by searching the corresponding residency program's website. Compilation of data and statistical analysis was performed in Microsoft Excel. Approximately 25–30 emails were returned and were unable to reach the intended recipient.

Results

Of the 713 intended recipients, 125 residency program directors completed the morbidity and mortality (M&M) conference survey for a response rate of 17.5%. More than one-fifth, or 21.6%, of the respondents were from anesthesiology programs. General surgery programs represented 32.8% of respondents, and the remaining 45.6% are attributed to emergency medicine programs. Nearly half of all respondents' programs reported programs with 26–50 total residents (44.8%), followed closely by programs reporting 1–25 residents (26.4%), and 51–75 residents (23.2%). Only 6 survey respondents had programs with more than 75 residents (5.6%). The survey also assessed program location, with the highest quantity of program directors located in the Mid-Atlantic region. A comprehensive breakdown of the demographics of the programs captured by the survey responses is provided in Table 1.

All 125 program directors (100%) reported regular morbidity and mortality conferences at their program. Nearly half of all respondents conduct M&M conferences on a monthly basis (47%) and 36% reported weekly reviews (Figure 1). A significantly higher number of surgical programs reported conducting weekly conferences than anesthesiology or emergency medicine programs ($p < 0.00001$). Survey takers were next queried regarding the clinical role of attendees at their departmental morbidity and mortality conferences. One hundred percent reported that residents were present, with 99% reporting that faculty were also present (Figure 2A). Only slightly more than half of respondents stated that secondary providers such as nurse practitioners or nurse anesthetists were also present at these educational events.

Residency program directors were also questioned regarding mandatory attendance for M&M conferences, with 83% reporting that residents were required to be present (Figure 2B). Only 32% required faculty members to be present, with lower percentages reported for medical students and secondary providers. Interestingly, 10% reported that attendance was not mandatory for any personnel. Respondents also reported that residents present the cases in 97% of their programs,

Table 1 Demographics for Residency Program Directors Who Successfully Completed the Survey Regarding Morbidity and Mortality Conferences

	Type of Residency Program			
	Anesthesiology N (%)	**Surgery N (%)**	**Emergency Medicine N (%)**	**Overall N (%)**
Number of Responses from Program Directors	27 (21.6)	41 (32.8)	57 (45.6)	125 (100)
Total Residents in Program				
1–25	5 (18.5)	15 (36.6)	13 (22.8)	33 (26.4)
26–50	9 (33.4)	19 (46.4)	28 (49.1)	56 (44.8)
51–75	8 (29.6)	6 (14.6)	15 (26.3)	29 (23.2)
>75	5 (18.5)	1 (2.4)	1 (1.8)	7 (5.6)
Region				
New England	3 (11.1)	2 (4.9)	4 (7.0)	9 (7.2)
Mid-Atlantic	5 (18.5)	13 (31.7)	18 (31.6)	36 (28.8)
East North Central	3 (11.1)	7 (17.1)	11 (19.3)	21 (16.8)
West North Central	6 (22.2)	1 (2.4)	3 (5.3)	10 (8.0)
South Atlantic	5 (18.5)	4 (9.8)	10 (17.5)	19 (15.2)
East South Central	0 (0)	0 (0)	1 (1.8)	1 (0.8)
West South Central	2 (7.4)	2 (4.9)	3 (5.3)	7 (5.6)
Mountain	0 (0)	4 (9.8)	0 (0)	4 (3.2)
Pacific	3 (11.1)	6 (14.6)	6 (10.5)	15 (12.0)
Territory	0 (0)	2 (4.9)	1 (1.8)	3 (2.4)

with only 42% reporting that faculty also present morbidity and mortality cases at these educational gatherings (Figure 2C).

Faculty moderators supervise the presentations at 117 of 125 (94%) residency programs. M&M cases are presented anonymously at 48% (60 of 125) of responding programs with 52% of programs offering an option to break anonymity when discussing the case. Clinicians are involved in the presentation of their own cases in 42% of programs, with another 42% of respondents including the clinicians involved sometimes, depending on the case.

Survey respondents were also asked about the case selection and presentation processes at their respective institutions. Eighty-three percent of program directors reported that cases selected for presentation at M&M conferences were self-reported complications (Figure 3A). Selection by a faculty member reviewing quality assurance events was selected by 66% of respondents, and referrals by other services are conducted in 59% of survey respondents' institutions. Program directors were also queried regarding any specific formatting used for the presentation of M&Ms in their respective institutions, with 26% reporting use of a root cause analysis framework, 24% selecting an adverse event analysis technique such as Fishbone diagrams and 14% indicating use of the Situation-Background-Assessment-Recommendation (SBAR) format[14] (Figure 3B). Other presentation methods included oral board testing formats, Croskerry cognitive bias framework,[15] or other home-grown models.

Finally, residency directors were queried regarding changes to the M&M conferences following the start of the COVID-19 pandemic (Figure 4A and B). Eighty-one percent of residency program respondents experienced no changes

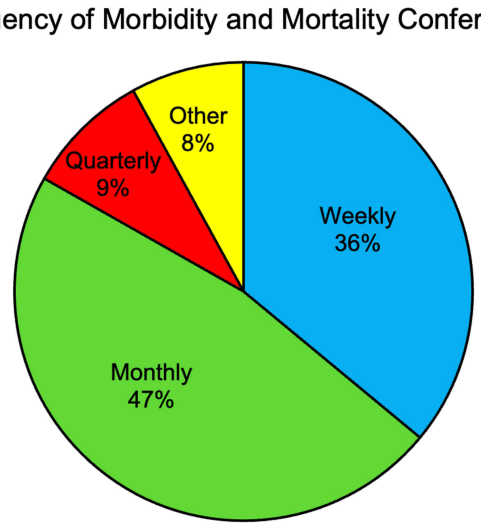

Figure 1 Survey responses regarding frequency of morbidity and mortality conferences for respondents from anesthesiology, emergency medicine and general surgery residency training programs.

in frequency of M&M conferences during the pandemic, with only 5% indicating a pause in reviews, and 8% indicating a decrease in frequency. Survey participants were also asked about delivery format changes occurring as a result of COVID-19, and 73% indicated a change to a virtual platform and 22% to a hybrid format, mixing virtual and in-person presentations.

Discussion

The utilization of targeted interventions has been demonstrated to increase the efficacy of M&M conferences to improve patient safety. These include methods such as the utilization of a system-oriented morbidity and mortality review resulting in increased efficiency during case review[11,16] and improving the subsequent application to quality control interventions.[17,18] When assigned prior to the commencement of a conference, active interventions such as the incorporation of dual process theory, metacognition,[19] and the use of a predetermined teaching point have been shown to enhance morbidity and mortality discussions.[20] Giesbrecht et al discuss past studies suggesting that the most essential components of a successful M&M conference included defining the role of the review committee, involving stakeholders, detecting and selecting appropriate cases, structuring goal-directed discussion, and producing recommendations with timely follow-up.[21]

The Morbidity and Mortality conference has a long history as an essential component of resident education, as well as a methodology to review medical errors and critical decision-making within a medical department.[22] M&M conferences have been used to fulfill the ACGME's 6 core competencies including patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.[23] M&M also provides trainees with the ability to identify cognitive errors and biases within both themselves and peers in a learning and constructive environment.[24] In addition, the M&M conference has also been shown to be potentially superior to the NSQIP (National Surgical Quality Improvement Program) database when identifying potential interventions, due to its ability to identify singular failures in an adverse event.[25]

The purpose of this study was to elucidate the common practices related to conducting M&M conferences in anesthesiology, emergency medicine and general surgery residency programs, in addition to assessing how (or if) these conferences were affected by COVID-19. Not unexpectedly, all respondents stated that they conduct M&M conferences, though less than half conducted them monthly, and about a third holding them weekly. Further study is required to determine the appropriate time intervals for these conferences to improve their effect on quality improvement and education.

Surprisingly, only 83% of respondents stated that attendance is mandatory for residents, given the requirement by ACGME for this educational modality, and the indication in surveys that 100% of conferences are attended by residents. Faculty members were only required to be present in 32% of respondents' institutions. This stands in contrast to

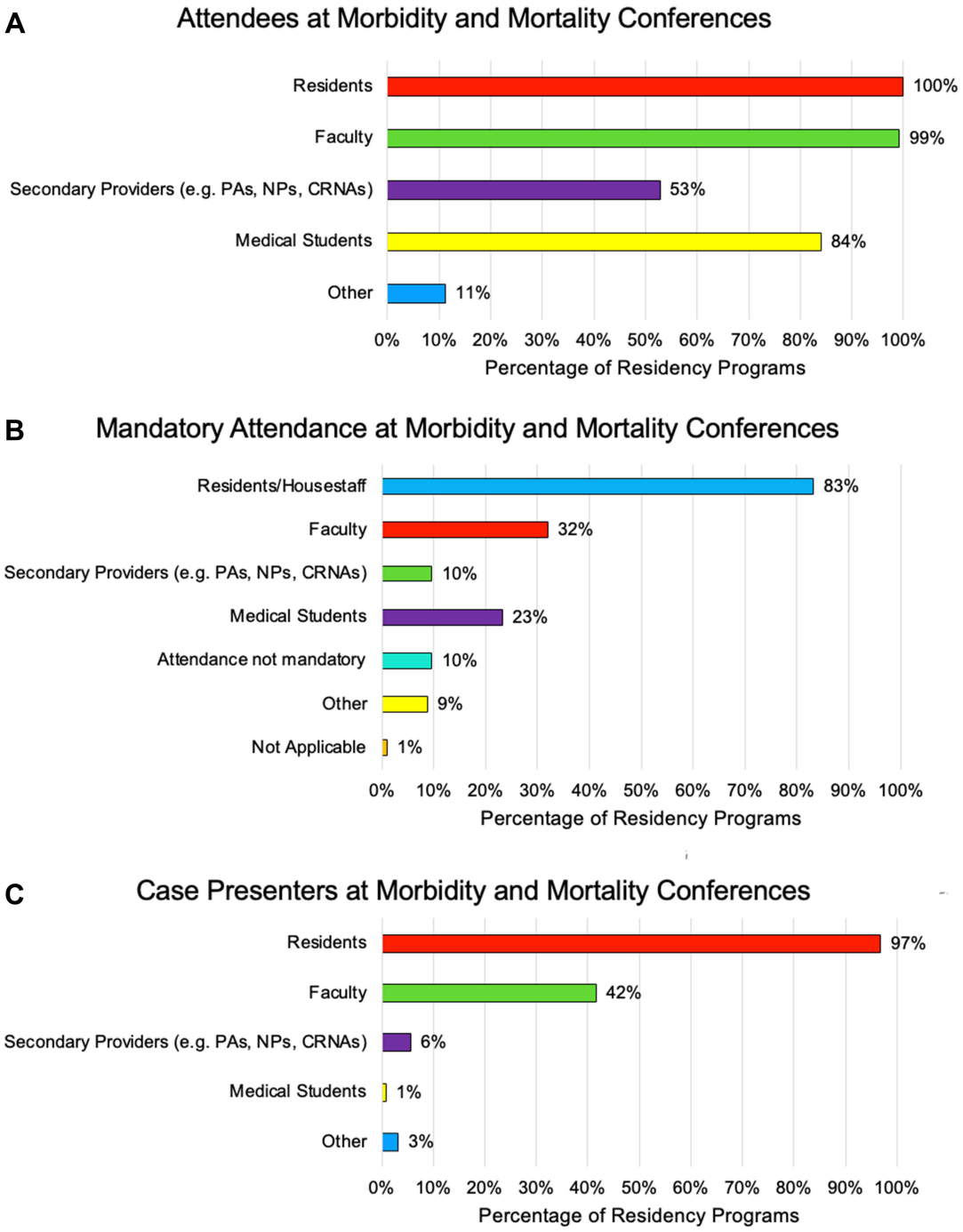

Figure 2 Survey responses regarding attendees of M&M conferences (**A**), requirements for attendance (**B**) and identification of presenters of M&M cases (**C**).

numerous past studies which have reinforced the view that multidisciplinary involvement is essential for the application of lessons learned in M&M conferences to systematic quality improvement.[4,16,20,22,26,27]

Not unexpectedly, the methodology most often used for the identification of M&M cases was self-reporting, especially given past evidence that despite electronic health record documentation, adverse event report is still overwhelmingly reliant on self-reports.[28] Some of the largest variability occurred when assessing what formats are being used to present morbidity and mortality cases. Interestingly, more than a third, or 37%, of survey respondents stated that no standard format was used for presentations (Figure 3B). Between 14% and 26% of respondents stated that they use common formats such as the SBAR format, adverse event analysis such as Fishbone diagrams and root cause analysis,

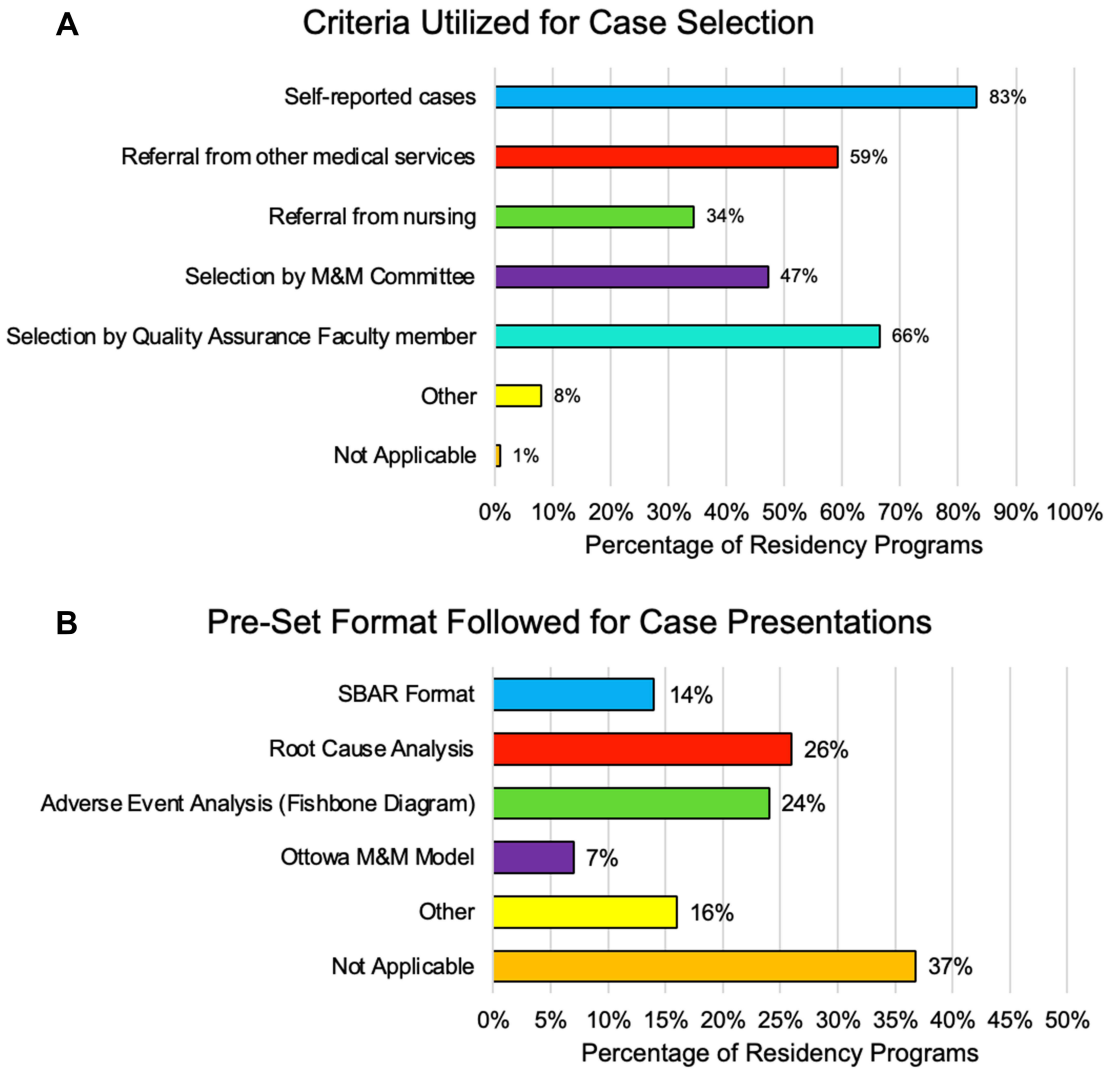

Figure 3 Survey responses regarding criteria for selection of M&M cases (**A**) and formats for presentation of M&M cases (**B**).

with only 7% reporting use of the Ottawa M&M model. These results are in stark contrast to past study data which has shown that use of standard presentation models such as SBAR has produced positive changes including significantly enhanced member engagement during review, increased educational value, and positive impacts on patient care.[29]

COVID-19 had a profound impact on almost all aspects of resident education and training. Past scholarly work has suggested that although clinical caseload decreased, educational didactics increased, and there was a net positive effect of shifting to online instruction.[30] An overwhelming number of respondents to our survey (81%) indicated no change to the frequency of M&M conferences, with only 8% choosing a decrease in frequency (Figure 4A). Ninety-five percent of program directors surveyed indicated that they incorporated utilization of a virtual platform or switched over to an online modality (Figure 4B). This confirms recent literature citing the incorporation of virtual learning, videoconferencing and the incorporation of social media to facilitate resident learning.[31]

Past studies, however, have identified limitations in the efficacy of M&M conferences. A retrospective study has shown that these conferences are effective for identification of potential safety events, but there is a relative lack of study to assess whether or not proactive interventions may target cognitive and system related contributing factors that are revealed during M&M conferences.[32] In addition, a lack of standardization to scoring M&M events may limit the efficacy of these educational gatherings. Structures such as the Morbidity and Mortality Assessment Tool (MMAT) have been proposed for widespread use to facilitate longitudinal collection of data from adverse event review in order to recognize patterns and facilitate quality

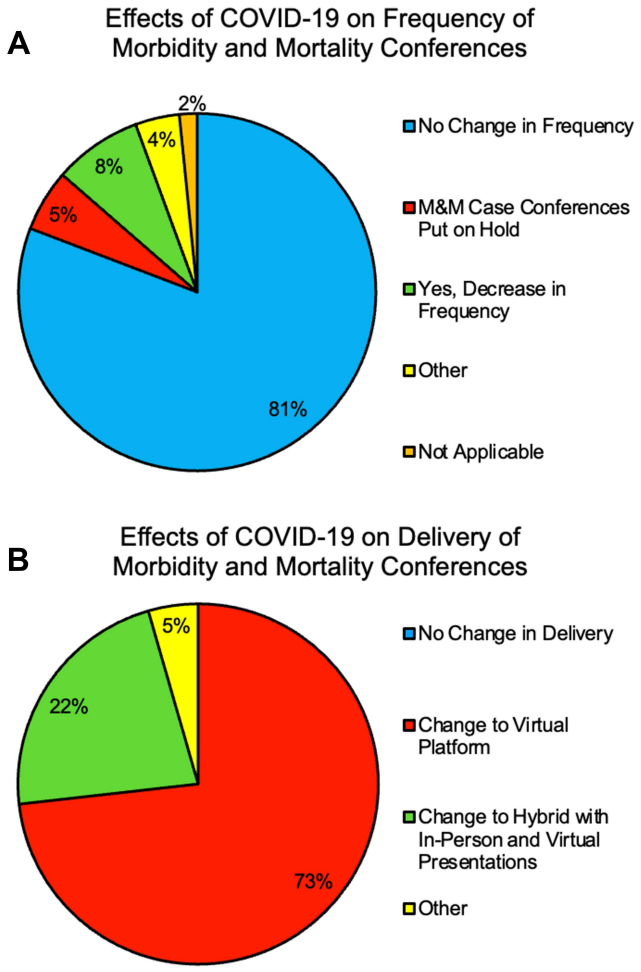

Figure 4 Survey responses regarding the changes of frequency (**A**) and format (**B**) of M&M conferences following the start of the COVID-19 pandemic.

improvements.[33] A structured format has also been shown to improve M&M efficacy, especially when used in a multidisciplinary format, including midlevel providers, students, nurses and hospital quality personnel.[34] Another important suggestion from past studies to improve efficacy of the M&M review is to provide anonymity, which does not affect education, but ameliorates the punitive nature of the conference.[35]

Limitations to this study include the relatively low response rate, despite frequent reminders via email directed to the residency program directors. In addition, it is unclear if anesthesiology, emergency medicine and general surgery residency programs are representative of all residency education, affecting the degree to which one may extrapolate these results for all trainees.

Conclusion

The morbidity and mortality conference is an essential component of resident education, which can successfully lead to improved patient safety and quality improvement for a healthcare institution. A survey-based assessment of trainee programs in anesthesiology, emergency medicine and general surgery revealed that resident participation and attendance is high in M&M conferences, with many institutions incorporating multidisciplinary review teams and presentations being done by both residents and faculty. Formatting for presentations is variable between institutions despite past evidence that standardization and utilization of a set format improves application to patient safety. Though many institutions shifted practices to incorporate a virtual component for M&M presentations and conferences, very few decreased the frequency of these didactic sessions following the start of the COVID-19 pandemic. This study revealed the ongoing importance of morbidity and mortality

conferences in medical education and quality assurance, although the lack of standardization between institutions offers an opportunity for further study, and possibly investigational analysis to determine the best methodology for such analyses.

Abbreviations

M&M, morbidity and mortality; COVID-19, SARS-COV2 virus; ACGME, Accreditation Council of Graduate Medical Education; SBAR, Situation-Background-Assessment-Recommendation; MMAT, Morbidity and Mortality Assessment Tool.

Disclosure

The authors report no conflicts of interest in this work.

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