# Lessons Learned From the Surgical Morbidity and Mortality Conference

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**OBJECTIVE:** The Morbidity and Mortality (M&M) conference is both a quality improvement and an educational conference. We sought to evaluate the educational and quality improvement value of different learners who attend the surgical M&M conference. Furthermore, we sought to evaluate if an educational intervention directed at medical students (MS) would improve their experience at this conference.

**DESIGN:** Over a 2-month period, we used a third party, real-time audience polling software during 4 M&M conferences using questions concerning medical error, loop closure, learning value, applicability, and professionalism. After baseline data were obtained in Phase 1, MS attended a seminar on the subject of error as part of their orientation. Additionally, to facilitate their preparation, MS were supplied the cases to be presented at that week's conference, a few days before M&M. After this intervention, 3 additional M&M conferences were polled, as described above, as part of Phase 2. Differences between faculty (FAC) and MS experience were assessed by chi-square and ANOVA analyses as appropriate. Study was reviewed and received a waiver from the IRB.

**SETTING:** Rhode Island Hospital, Providence, Rhode Island, a tertiary care academic teaching hospital of Brown University.

**PARTICIPANTS:** Audience participants were informed of the voluntary nature of this survey and asked to self-identify as MS, PA/NPs, junior residents, senior residents, or FAC. In phase 1, there were an average of $289 \pm 18.7$ responses per session, while in phase 2 there were an average of $267 \pm 9.29$ responses per session.

**RESULTS:** In Phase 1, when asked to characterize the error as practitioner, system, both practitioner and system or neither, FAC were more likely to assign error as practitioner error than MS ($15/38 - 39.5\%$ vs $6/41 - 14.6\%$, $p = 0.021$). This trend continued in Phase 2, FAC ($19/33 - 57.6\%$) vs MS ($8/29 - 27.6\%$), $p = 0.011$. In terms of whether learners felt the conference was useful to their education (5 point scale − strongly agree to strongly disagree) the FAC felt conference more useful than MS ($4.0$ vs $3.63$ $p = 0.005$). This trend continued even after intervention ($4.24$ vs $3.71$ $p < 0.001$). The FAC and MS had the same opinion as to the closure of the case being "education at conference," change in policy/procedure, both, neither, no response − average: 75, 3, 9, 6, 7%. Both the FAC and the MS felt the environment was professional (Phase 1: $4.42$ v $4.18$, $p = 0.321$) (Phase 2: $4.43$ v $4.37$, $p = 0.1002$).

**Conclusion:** Despite an educational intervention, we found FAC and MS maintained very divergent opinions as to what is practitioner error, and system error, and FAC found the M&M discussion more educational than MS. To maximize learning for MS during surgical M&M more interventions are needed. (J Surg Ed 76:174−181. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** M&M conference, Practitioner error, System error, Medical student education, Surgical education

## INTRODUCTION

The Morbidity and Mortality (M&M) conference is well known across the medical community and serves as a venue for surgeons, residents, and students to learn from the experience of their colleagues. While the overarching goal of the M&M conference is effective surgical education, it also serves a secondary purpose of identifying and addressing errors in practice and systems-based problems in order to improve patient care and outcomes. Given the right environment, that M&M conference can be an inclusive and safe space for educational purposes.[1]

A potential problem associated with the modern-day M&M conference is lack of standardization, both in the structure and goals of the conference.[2,3] Moreover, considering that one of the primary functions of the M&M conference is to educate young physicians and trainees, assessment and maximization of the quality of this conference is of utmost importance. All of this must be accomplished in the setting of a work environment that increasingly demands efficiency and optimization of time.

The M&M conference typically consists of several different learners, ranging anywhere from medical students (MS) and residents, to advanced practice providers (APP) and attendings. This variability introduces an additional challenge of catering to the different learning styles of attendees, at all levels of training, with the intent that discussion will lead to change in each of these individuals' future practice style.[4] This is a tall task to achieve, given that MS and residents are just beginning to develop practice habits, while long-standing faculty (FAC) may have already settled into a practice style based on their training and years of experience. Therefore, the M&M conference is at a unique intersection that potentially could be beneficial to all parties involved if executed effectively.

The purpose of our study was to better understand the educational and quality improvement (QI) value of our M&M conference in teaching multiple learners. The study also sought to evaluate how error is perceived across different levels of trainees, and hopefully shed insight into how these different experiences in training affect the way error (human, technical, or systems-based) is interpreted and discussed. Additionally, through an educational intervention aimed at MS on the topic of error, we investigated whether this would improve their learning experience at the conference. With the knowledge from this study, we hope that the conversation about error continues in a way that is useful and professional, and ultimately translates into improvements in patient care.

## MATERIALS AND METHODS

Over a 2−month period, we used a third party, real-time audience polling software (Poll Everywhere®) during 4 M&M conferences using questions concerning medical error, loop closure, learning value, applicability and professionalism (Table A1). Questions were specifically crafted to universally fit the myriad of cases presented at the conference, and which would also allow for continuity of monitoring after an intervention was implemented. Audience participants were informed of the voluntary nature of this survey and asked to self-identify accordingly to level of training: attending, senior resident (PGY3-5), junior resident (PGY1-2), advanced practice provider: NP/PA, or medical student.

**TABLE A1.** Survey Questions

Survey Questions
1. This case was predominantly about
a. Practitioner Error b. System Error c. Both d. Neither e. Unclear
2. After this conference, I will read about the complication presented in the near future
a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
3. The complication and management presented in this case is useful and fitting for my stage of learning
a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
4. Loop closure can be in the form of education and improved awareness or development of a new policy/procedure. This case's loop closure was:
a. Education and improved awareness b. Development of a new policy/procedure c. Both education and development of new policy/procedure d. Neither
5. The loop closure of this case will impact my understanding and future management of similar patients.
a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
6. The M&M conference maintains a professional environment that offers efficient transfer of ideas and is conducive to learning.
a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree

After baseline data were obtained in Phase 1, the MS attended a seminar on the topic of error as part of their orientation. The seminar focused on topics such as discussing different types of error, how to talk about error, and how this information is applicable to the field of surgery. This included a discussion on the current emphasis in healthcare to identify systems-based errors, but also the need to acknowledge and be comfortable with practitioner error, specially in highly technical fields such as surgery. This was meant to be more of a dialogue, and so students were not tested afterwards. Additionally, to facilitate their preparation prior to attending the conference, MS were supplied with the cases to be presented that week, a few days before the conference. After this intervention, 3 additional M&M conferences were polled as described above as part of Phase 2. Differences between the participants' experience were assessed by chi-square and ANOVA analyses as appropriate. We chose ANOVA because the distribution of answers on Likert scale appeared reasonably normally distributed with a central tendency. Of note, we were particularly interested in seeing the difference of responses between learners at both ends of the training spectrum (FAC vs MS). The study was reviewed and received a waiver from the IRB by our institution.

## Percentage of Responses Characterizing Error as "Practitioner Error" (Phase 1)
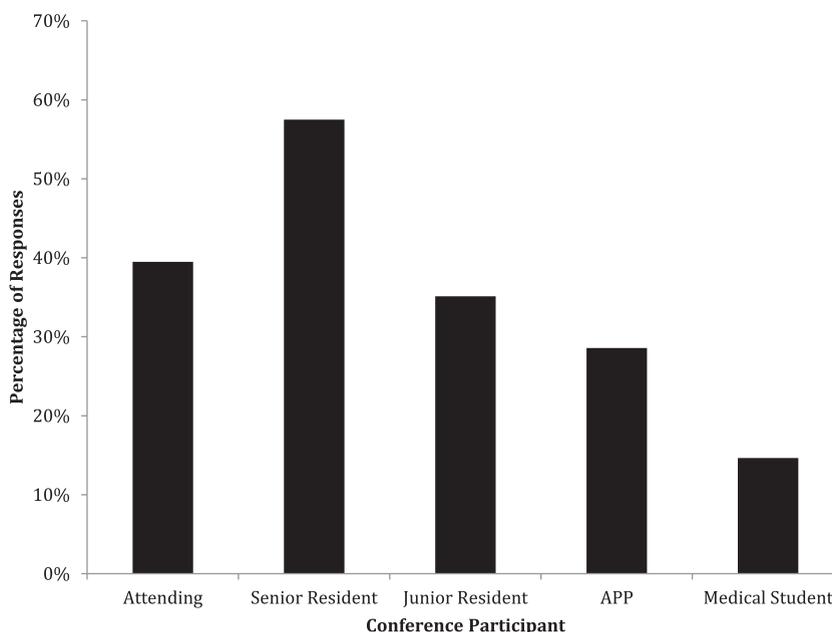


**FIGURE 1.** Percentage of responses when M&M conference participants who answered "Practitioner Error" when prompted to characterize error. In phase 1, it appeared that it was more common that FAC and Senior Residents likely to have similar responses (Question 1, p = 0.021).

## RESULTS

A total of 7 cases were polled for this study, 4 of which were for baseline data for phase 1, and 3 after the student intervention as phase 2. In phase 1, there were an average of 289 ± 18.7 responses per session, while in phase 2 there were an average of 267 ± 9.29 responses per session.

### Phase 1

When asked to characterize the error as practitioner, system, both practitioner and system or neither (question 1), FAC were more likely to assign error as practitioner error than MS (15/38 − 39.5% vs 6/41 − 14.6%, p = 0.021) (Figure 1).

In evaluating whether the case prompted the attendee to read further about the case presented (question 2), answers varied between groups. These results were not statistically significant.

In terms of whether learners felt the conference was useful to their education (5 point scale − strongly agree to strongly disagree, question 3) the FAC felt conference more useful than MS(4.0 vs 3.63 p = 0.005) during phase 1 (Figure 2).

When prompted about possible types of error loop closure (question 4), FAC and MS (as well as other conference participants) had the same opinion as to the

closure of the case being "education at conference," change in policy/procedure, both, neither, no response − average: 75, 3, 9, 6, 7% (Figure 3). Meanwhile, when asked about whether if the loop closure discussed would impact future management (question 5), overwhelmingly conference responses fell between "Strongly Agree" and "Neutral." This result was not statistically significant.

### Phase 2

When asked to characterize the error as practitioner, system, both practitioner and system or neither (question 1), as in phase 1, FAC were more likely to assign error as practitioner error than MS, FAC (19/33 − 57.6%) vs MS (8/29 − 27.6%), p = 0.011. Differences between all other responses were not statistically significant. Few responses (n = 3) cited only system errors in this second phase of conferences (Figure 4).

In evaluating whether the case prompted the attendee to read further about the case presented (question 2), answers varied between groups. As in phase 1, these results were not statistically significant.

In terms of whether learners felt the conference was useful to their education (question 3, 5 point scale − strongly agree to strongly disagree) the trend that FAC

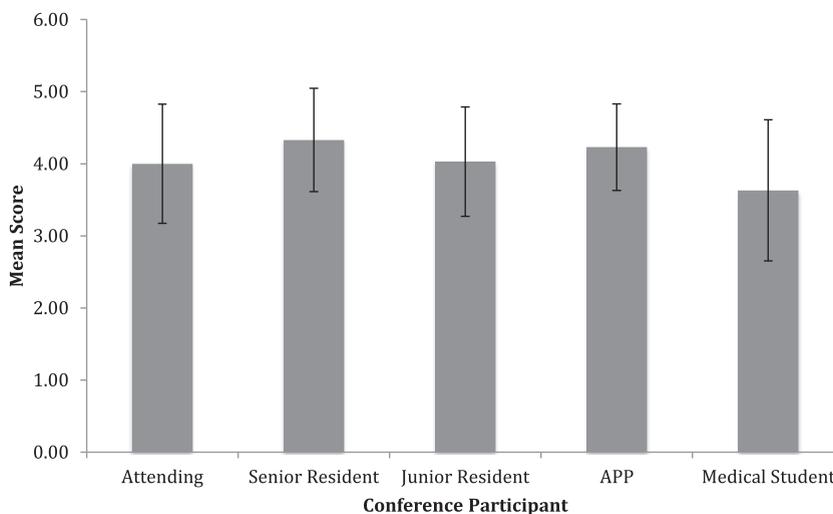## Mean Number of Responses on the Question of Usefulness (Phase 1)



**FIGURE 2.** Mean number of responses when M&M conference participants were prompted to characterize whether the case presented was useful to their stage of learning (Question 3, p > 0.005).

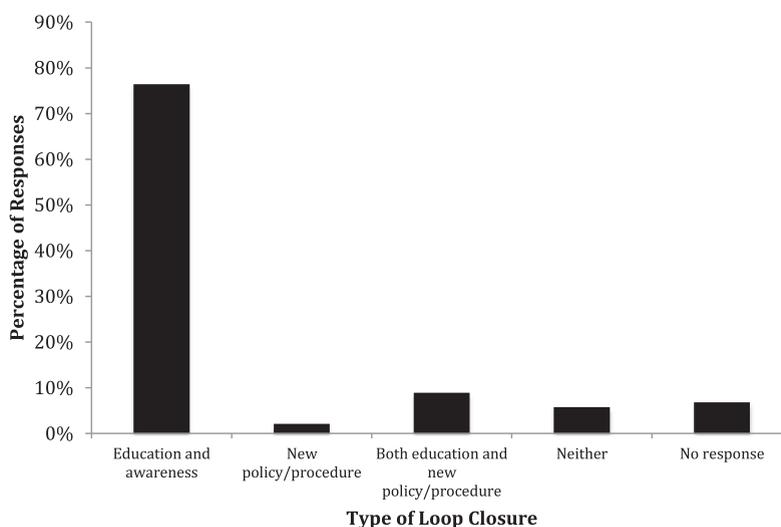## Characterization of Loop Closure by Conference Participants (Phase 1)



**FIGURE 3.** Responses of participants of the conference when asked to characterize what kind of solution was offered to the case presented (Question 4).

felt conference more useful than MS continued even after intervention (4.24 vs 3.71 p < 0.001). (Figure 5).

As in phase 1, education and improved awareness remained the most common type of loop closure response. Again, there was no significant difference in opinion between participants (Question 4, Figure 6). When asked about whether if the loop closure discussed would impact future management (Question 5),

overwhelmingly conference responses fell between "Strongly Agree" and "Neutral," a trend continued from phase 1. This result was not statistically significant.

Lastly, on the question of professionalism, both the FAC and MS felt the environment was professional (Phase 1: 4.42 v 4.18, p = 0.3021)(Phase 2: 4.43 v 4.37, p = 0.1002), as did the rest of the conference participants (Table A2).

## Percentage of Responses Characterizing Error as "Practitioner Error" (Phase 2)
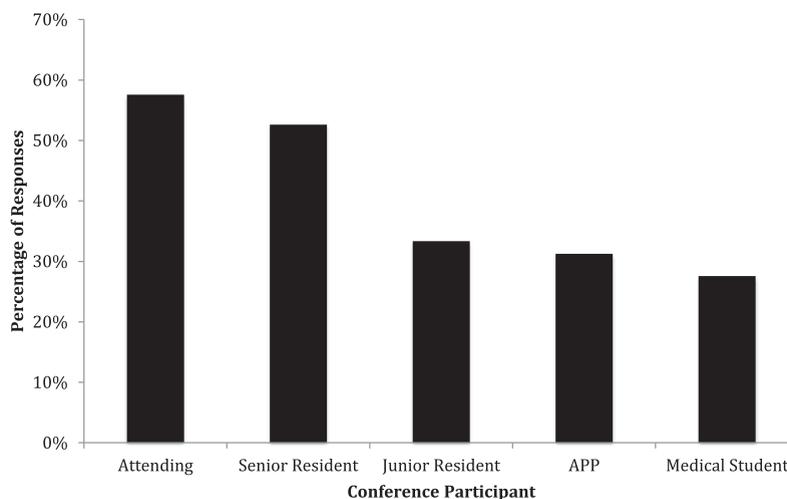


**FIGURE 4.** Percentage of responses when M&M conference participants who answered "Practitioner Error" when prompted to characterize error. As in phase 1, FAC and MS continued to have a difference of opinion in the characterization of error (Question 1).

## Mean Number of Responses on the Questions of Usefulness (Phase 2)
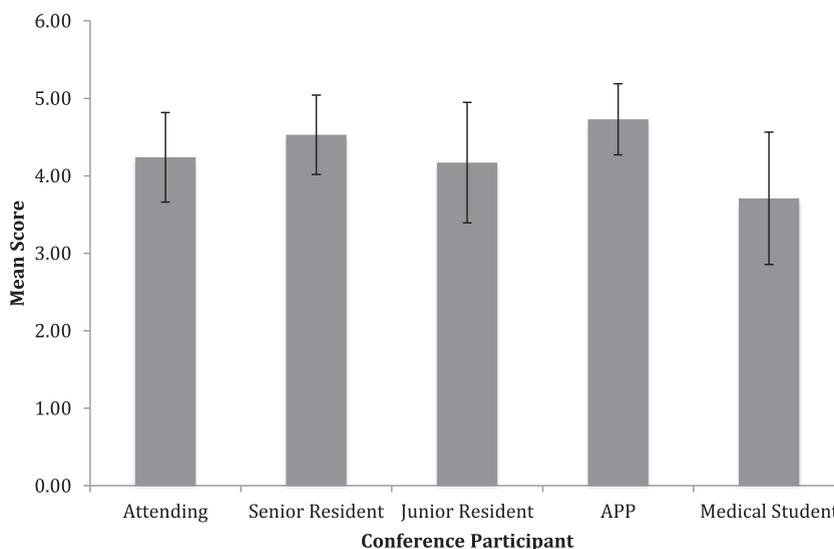


**FIGURE 5.** Mean score and standard deviations when M&M conference participants were prompted to characterize whether the case presented was useful to their stage of learning, after an educational intervention was conducted to MS (Question 3, p < 0.001).

## DISCUSSION

The M&M conference serves as one of the primary methods of education for surgical trainees. Since the conference brings together several types of providers, it can be used as both a means of reviewing medical literature as well as identifying potential sources of error and how to fix them. As such, the M&M conference naturally forces providers to continue the discussion of error in medicine. Our study sought to understand how useful the conference was for its participants as a venue for education, and also how error is perceived at different stages

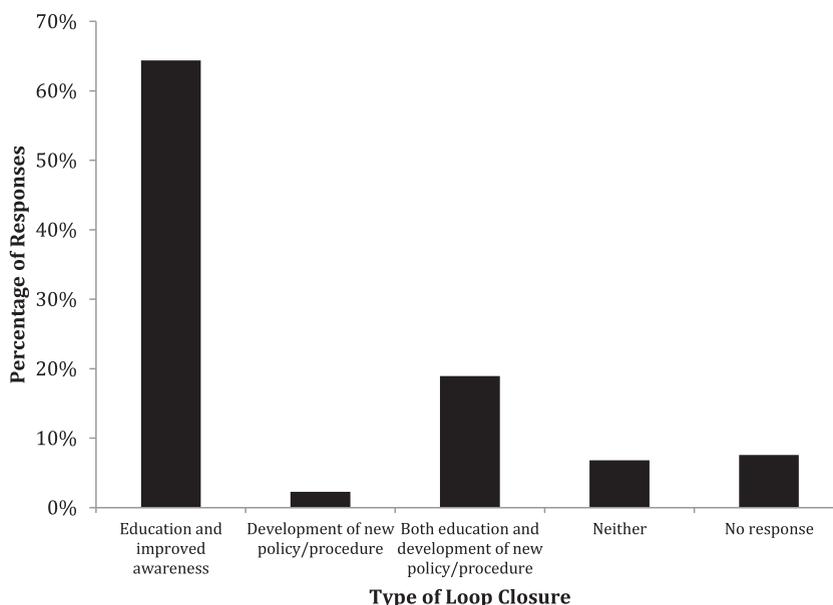## Characterization of Loop Closure by Conference Participants (Phase 2)



**FIGURE 6.** Percentage of responses from participants of the conference when asked to characterize what kind of solution was offered to the case presented (Question 4).

**TABLE A2.** Average Score on the Question of Maintained Professionalism Throughout the Conference (Phase 1 p = 0.3021, Phase 2 p = 0.1002)

| Participant | Phase 1 | Phase 2 |
|---|---|---|
| Attending | 4.42 ± 0.56 | 4.43 ± 0.68 |
| Senior Resident | 4.32 ± 0.66 | 4.10 ± 0.64 |
| Junior Resident | 4.23 ± 1.00 | 4.13 ± 0.68 |
| NP or PA | 4.62 ± 0.51 | 4.53 ± 0.52 |
| Medical Student | 4.18 ± 0.64 | 4.37 ± 0.49 |

of learning, particularly between FAC and MS: polar opposites on the training spectrum.

Direct experience in patient care is one of the cornerstones of medical education. Having just moved from the classroom to the patient-care aspect of medicine, MS may be more likely to apply a systems-based error curriculum, acquired during the pre-clinical years, when it comes to characterizing possible sources of error. Alternatively, after having already trained in a residency program and practicing medicine for an extensive period of time, FAC may be more comfortable with assigning practitioner error as a possible source of error which is in keeping with traditional paradigms of the causes of error. Although not statistically significant, an interesting trend in our study demonstrated that senior residents and FAC tended to share similar opinions, while junior residents and MS also responded with similar results (Figures 1 and 4). This would support the theory that as time goes on through residency training, a shift in opinion occurs when it comes to the discussion of error.

Despite an educational intervention for MS on the topic of error, we found that attending FAC and MS had opposite opinions when asked to describe the error in a case as practitioner error versus system error. As we move forward in medical education, it is important to understand these differences in opinion, especially as they relate to quality improvement, which is becoming more important in everyday medicine.[5] One possible reason for this divergence of opinion could be due to the fact that medical education has changed significantly in the last few decades, especially the M&M conference, where there is now increased focus on identifying systems-based errors at earlier stages in medical training.[6,7]

To address this discrepancy in opinions, we exposed MS to additional training in medical error, with a focused seminar on the nature of error. Although we expected a change in the perception of error with this intervention, this was not the case in our study. In an era where providers face ever increasing demands in patient care and education, perhaps more needs to be done to address the topic of medical error with MS.[8] A dedicated set of teaching objectives to complement the experiences of the clinical medical student could potentially offer more background knowledge for students and make them

more comfortable with the subject.[9] A structured M&M conference (like the one in our institution) helps maximize the learning potential for all attendees, and having students familiar with such a structure might also have an impact on the type of opinions which are generated about errors from cases.

Additionally, the overall impact on the educational value of the M&M conference could be affected by such changes. Our study found that compared to MS, FAC felt that the M&M discussion had more educational value. At first, this may be an intuitive finding, given that attending physicians are more used to this style of learning and the fact that traditionally, the M&M conference has been focused on resident education, as evidenced by the fact that it is a requirement of the ACGME.[10] There are numerous reasons why MS might not find the conference to be as useful as attendings. Perhaps if the goal of the conference is to learn from our errors and improve upon practice, this may be difficult to achieve for MS, since they are just starting to form patterns themselves. Moreover, if students are associating the error with system-based errors and system-based solutions are expected and not being addressed, this dissonance might explain why they found the conference to be less relatable. Again, ongoing discussions and curricula about error at all levels of training could, potentially, normalize the expectations of the resolutions presented at this conference. Lastly, although different opinions in error and usefulness were elucidated from our study, the professional exchange of ideas is a cornerstone of the modern M&M conference and is directly related to its usefulness in education.[4,11] Across the board, the majority of attendees felt that our conference maintained a high of degree professionalism (Table A2, question 6). Admittedly, this question was intended to examine the degree of professionalism in our M&M, however it inadvertently also questioned about a separate topic, the transfer of ideas, and in doing so makes it difficult to draw concrete conclusions. Nonetheless, we can reasonably infer that our M&M maintained a professional environment–an example of this being that despite the fact that medical students felt the conference was not useful (Figures 2 and 5), they still answered favorably to the question on professionalism (Table A2). Overall, professionalism is of utmost importance in any discussion of error, with the ultimate goal to be to improve patient care by learning from past mistakes.

On a separate note, the design of this study used the attending physician's experience in the the M&M as the "gold standard," in which it would be basis for comparison and drawing the conclusions described above. This presents an obvious bias in the study, but a bias the authors chose so as to provide a clear reference point. This does not invalidate the experience that medical students or residents have, and in fact allows the reader to interpret the data based on their own biases. It would be interesting to continue exploring these conclusions with different lenses as the "gold standard."

Overall this data mean that more work needs to be done in the intersection of medical education and the discussion of error. Discussions about error in medicine are often difficult in a time where litigious influences are abundant, but it is nevertheless a critical adjunct in medical education as it relates to improving the quality of patient care. Additional interventions aimed at all levels of training, in the form of lectures, conferences, and hands-on clinical experience are important for trainees to learn how to appropriately identify error in practice and learn effective strategies to reflect upon these experiences to guide self-improvement.[12] It would also be helpful continuing to track junior resident's opinions on the sources of error, identifying at what point in training the shift in thought occurs, in an effort to better understand this process. Armed with this information, we may continue to improve upon the M&M conference in order to optimize its educational potential for learners at all levels, and ultimately improve upon the quality of patient care provided.

## CONCLUSIONS

Our study showed that despite an educational intervention FAC and MS continued to have opposing viewpoints on ascribing practitioner error versus system error. In general, FAC found the conference to be more useful than MS, even after students were given a chance to prepare for conference by familiarizing themselves with the topic ahead of time. However, despite this discrepancy in usefulness, our M&M conference continued to be a professional environment for the discussion of error. All in all, to maximize the learning for all of the conference attendees including MS, more interventions need to be implemented, as well as ongoing research about the effectiveness of the M&M conference.

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## SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jsurg.2018.07.002.