

Pediatric Clinician Comfort Discussing Diagnostic Errors for Improving Patient Safety: A Survey

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ABSTRACT

Introduction: Meaningful conversations about diagnostic errors require safety cultures where clinicians are comfortable discussing errors openly. However, clinician comfort discussing diagnostic errors publicly and barriers to these discussions remain unexplored. We compared clinicians' comfort discussing diagnostic errors to other medical errors and identified barriers to open discussion. **Methods:** Pediatric clinicians at 4 hospitals were surveyed between May and June 2018. The survey assessed respondents' comfort discussing medical errors (with varying degrees of system versus individual clinician responsibility) during morbidity and mortality conferences and privately with peers. Respondents reported the most significant barriers to discussing diagnostic errors publicly. Poststratification weighting accounted for nonresponse bias; the Benjamini–Hochberg adjustment was applied to control for false discovery (significance set at $P < 0.018$). **Results:** Clinicians ($n = 838$; response rate 22.6%) were significantly less comfortable discussing all error types during morbidity and mortality conferences than privately ($P < 0.004$) and significantly less comfortable discussing diagnostic errors compared with other medical errors ($P < 0.018$). Comfort did not differ by clinician type or years in practice; clinicians at one institution were significantly less comfortable discussing diagnostic errors compared with peers at other institutions. The most frequently cited barriers to discussing diagnostic errors publicly included feeling like a bad clinician, loss of reputation, and peer judgment of knowledge base and decision-making. **Conclusions:** Clinicians are more uncomfortable discussing diagnostic errors than other types of medical errors. The most frequent barriers involve the public perception of clinical performance. Addressing this aspect of safety culture may improve clinician participation in efforts to reduce harm from diagnostic errors. (*Pediatr Qual Saf* 2020;2:e259; doi: 10.1097/pq9.000000000000259; Published online February 27, 2020.)

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INTRODUCTION

Addressing diagnostic errors is considered as the next patient safety challenge for health-care organizations.¹ However, few health-care organizations have made diagnostic safety a priority. In a Leapfrog survey of healthcare organization leaders, only 40% reported plans to address diagnostic errors in the next 6 months, many citing several barriers to addressing diagnostic safety.² Furthermore, care teams may not be aware of diagnostic errors involving their patients.³ A culture of diagnostic safety is instrumental for health-care organizations to identify and learn from diagnostic errors.^{4,5}

Learning from diagnostic errors also requires that they are analyzed and discussed. However, when medical errors resulting in adverse events are identified and reported, they are infrequently discussed explicitly as errors and occasionally not discussed at all.⁶ Because diagnosis involves uncertainty and evolves, diagnostic errors, in particular, pose several additional challenges.⁷ During the discussion, clinicians may debate whether a diagnostic error occurred, what the actual error was, or be disillusioned by the paucity of easy solutions compared with other types of error (eg, medication error).⁸ Meaningful conversations about diagnostic errors require that clinicians are comfortable discussing and addressing



diagnostic errors in a nonpunitive environment and accept accountability for what is within their control.^{9,10} Local safety culture impacts the ability to identify and learn from diagnostic errors. Clinicians may hesitate to be seen as judgmental of others' care or fear that professional relationships may be harmed if they bring diagnostic errors to colleagues' attention.¹¹ These findings underscore the importance of understanding the culture surrounding the discussion of diagnostic errors to identify them better and learn from them.

Although both individual actions and systems factors contribute to many medical errors,¹² errors attributable to individual clinician decision-making that receive scrutiny in public venues such as morbidity and mortality conferences (MMCs) may be particularly distressing to clinicians and diminish their willingness to discuss them openly.¹³⁻¹⁵ Thus, addressing diagnostic errors requires a better understanding of how the type of error and the associated degree of clinician accountability impacts a clinician's willingness to discuss them openly in public venues like MMCs. Thus, we evaluated clinicians' comfort in discussing diagnostic error in comparison to other types of medical errors and assessed comfort levels in both confidential peer-to-peer settings and publicly at MMCs. We hypothesized that clinicians would be less comfortable discussing diagnostic errors in MMCs compared with private conversations with peers and that they would be less comfortable discussing diagnostic errors compared with other types of error. We also explored differences in comfort related to clinician type, time in practice, and the clinician's institution as well as perceived barriers to discussing diagnostic errors in MMCs.

METHODS

Setting and Participants

Pediatric clinicians from 4 free-standing children's hospitals of varying sizes (190–743 beds) located in the Midwestern (2), Southern, and the Western United States were invited to participate in a survey-based study. Physicians, advanced practice providers (APPs) and trainees (residents and fellows) in general pediatrics, pediatric subspecialties, child neurology, adolescent gynecology, and child psychiatry were eligible. Surgical specialties, anesthesiologists, radiologists, and pathologists were excluded, given inherent differences in the diagnostic process for these clinicians. Institutional review boards for 2 institutions exempted the study from review; 1 determined the study to be a quality improvement project not requiring review; the fourth institutional review board approved the study.

Survey Development

The survey instrument was developed iteratively with input from various stakeholders. Initial survey items were developed de novo by the principal investigator (J.A.G.) and survey methodologist (S.I.Z.). Survey questions were refined using input from general pediatricians,

pediatric subspecialists, APPs, and residents obtained during 2 focus groups. The principal investigator piloted the original set of survey items with 3 pediatric subspecialty groups at 1 institution.¹⁶ Based on the results of the pilot survey, additional investigators (G.S., H.S., C.L.C., R.E.M.) performed a second round of revisions. Finally, pediatricians who were not members of the medical staff at participating institutions provided input on the survey.

The survey instrument was designed to determine respondents' comfort discussing different medical errors using a 5-point ordinal scale ranging from "not at all comfortable" to "very comfortable." It included 5 different medical error types with brief clinical examples for each representing a spectrum of direct clinician responsibility. Three scenarios described errors that hospitals often have standard practices in place to prevent. (1) Laboratory specimens were switched between 2 patients resulting in a delayed diagnosis of leukemia for one patient and an unnecessary referral for the other. (2) The clinician had 2 records open at the same time and ordered laboratory tests on the wrong patient resulting in a treatment delay for one patient and an unnecessary painful procedure for the other patient. (3) The clinician ordered ibuprofen for a patient with chronic kidney disease resulting in a decline in renal function. Two scenarios described diagnostic errors in which the clinician initially diagnosed a common less serious condition but later identified a more serious diagnosis with different times between the initial and final diagnosis: (4) sepsis initially diagnosed as influenza (short time delay) and (5) brain tumor identified after herniation in a patient initially diagnosed with new migraine headaches (long time delay). For all 5 errors, respondents were instructed to assume that they were the clinician caring for the patient when the error occurred. Respondents were asked to indicate their comfort in discussing these errors in private with a colleague and in public venues such as MMCs.

Respondents indicated what they perceived to be the 3 most significant barriers to discussing at MMCs their diagnostic errors resulting in harm. To minimize biasing responses related to clinician comfort, survey items assessing perceived barriers to discussing errors followed the questions related to clinician comfort with these discussions. Respondents also estimated the self-reported frequency of making diagnostic errors regardless of patient harm and the frequency of making diagnostic errors that caused an adverse event. These questions were constructed similarly to prior surveys of pediatricians regarding diagnostic error frequency for easier comparison of results with prior studies of diagnostic error among pediatricians.¹⁷⁻¹⁹ Demographic information collected included age, gender, years in practice since completing training, and institution.

Survey Administration

Investigators at each site distributed the survey in their institutions via e-mail and encouraged participation by

enlisting the support of local institutional leaders (eg, department chairs, chief medical and safety officers). Survey distribution occurred between May 1, 2018, and June 30, 2018. After the initial invitation to complete the survey, reminders were sent at 6, 12, and 22 days to maximize participation, given the variability in clinical schedules and service responsibilities. The survey was available for 30 days following the initial invitation. Responses were collected electronically using Research Electronic Data Capture (REDCap), a secure web-based platform for managing online surveys and databases, hosted by the University of Colorado Clinical and Translational Sciences Institute. We provided no incentive for survey completion.

Statistical Analysis

We report descriptive statistics at the respondent level. Analyses accounted for the clustering of respondents within institutions by using Stata's survey data analysis procedures and poststratification weights. These analytical weights were created by the institution using iterative proportional fitting procedures.²⁰ Within each institution, the marginal distributions of eligible respondents were known for respondent age, gender, clinician type, and years in practice. Information for these variables for eligible respondents was obtained from the medical staff offices of each participating institution. One institution would not release information regarding the ages of trainees and APPs and the years in practice for all providers; this applied to 163 (4.2%) and 218 (5.6%) eligible respondents, respectively. Because response rates were significantly different across these variables (except gender) and our pilot study demonstrated a relationship between clinician type and several variables of interest,¹⁶ poststratification weights were applied to correct for any nonresponse bias introduced into our estimates.²¹ Additionally, we used the Benjamini–Hochberg method to control the type I error rate of the study²²; thus, although the significance level was set a priori at $P < 0.05$, the new critical P value for statistical significance was determined to be $P < 0.018$. Statistical comparisons were performed between categorical variables using the F-test for comparison of proportions. We performed all analyses using Stata 14.2 (StataCorp, 2015; College Station, TX Stata Statistical Software: Release 14).

RESULTS

Survey invitations went to 3,881 eligible medical staff (2,078 physicians, 1,144 APPs, and 659 residents). Nine hundred fifteen respondents accessed the survey; 838 responded to more than half the items, constituting the evaluable cohort. The overall response rate was 22.6% (range: 10.3%–34.9%) across institutions.²³ The Table shows the comparison of eligible clinicians to respondents. The proportion of respondents in all strata of each demographic characteristic differed significantly from

the eligible population (except gender), justifying the use of poststratification weights to account for nonresponse bias. We expect that weighted respondent proportions more closely reflect the eligible cohort.

The majority of respondents (82.3%) self-reported making a diagnostic error that harmed a patient, indicating that this is a common experience for clinicians. More trainees than faculty self-reported making diagnostic errors at least quarterly (73% versus 45%, $P = 0.010$). More trainees than faculty also reported making diagnostic errors that harmed patients at least 1–2 times per year, although this difference was not significant (58% versus 39%, $P = 0.114$). Respondents indicated that diagnostic errors resulting in harm were less frequent than diagnostic errors in general (Fig. 1).

Overall, respondents were significantly less comfortable discussing all error types in public settings like MMCs compared with private conversations with colleagues (Fig. 2; $P < 0.004$ for all error types). Respondents were also significantly less comfortable discussing both short and long delay diagnostic errors compared with other error types ($P < 0.018$ for each comparison).

There were no significant differences in respondents' comfort discussing errors publicly when assessed relative to clinician type or time in practice. Significantly fewer clinicians at Hospital D reported that they were "pretty or very comfortable" discussing diagnostic errors but not other errors in public (Fig. 3; $P < 0.018$).

The most significant barriers to discussing their diagnostic errors at MMCs cited by clinicians include "feeling like a bad clinician," concerns that their reputation as a clinician is at stake and concerns that their decision-making and knowledge base are being judged. Physicians, APPs, and trainees did not differ significantly in the barriers they identified (Fig. 4). When stratified by hospital, barriers showed similar overall frequencies to those stratified by clinician type. At Hospital D, where clinicians were significantly less comfortable publicly discussing diagnostic errors, clinicians were also significantly more concerned about job security being affected by a discussion of diagnostic errors compared with peers at other institutions (23% versus 8% versus 13% versus 5%; $P < 0.018$).

DISCUSSION

This study finds that most pediatric clinicians self-report committing diagnostic errors at least quarterly and over 80% self-report committing a diagnostic error that harmed a patient at least once in their career, similar to prior studies.^{17–19} These clinicians were significantly less comfortable discussing several types of medical errors in public venues like the MMC compared with discussing them privately with peers even when the error involves no direct clinician responsibility (eg, specimens switched in the laboratory). More notably, clinicians were significantly less comfortable discussing diagnostic errors compared with other medical errors. Although the data did

Table. Comparison of Eligible (N = 3,881) Versus Participating (n = 838) Clinicians

Characteristic (n = Number Who Provided Any Response)	Eligible N (%)	Respondents n (%)*	Response Rate† (%)	Weighted Response (%)
Age, y (n = 774)‡				
Younger than 30	464 (12.5)	46 (5.9)	9.9	11.7
30–39	1,500 (40.3)	295 (38.1)	19.7	40.7
40–49	978 (26.3)	205 (26.5)	21.0	27.1
50–59	499 (13.4)	149 (19.3)	29.9	12.6
60 or older	277 (7.5)	79 (10.2)	28.5	7.8
Gender§ (n = 776)‡				
Female	2,588 (66.7)	519 (68.2)	20.1	67.0
Male	1,036 (33.7)	257 (31.8)	19.9	33.0
Clinician type (n = 777)				
Advanced practice nurse/physician assistant	1,144 (29.5)	183 (23.5)	16.0	28.6
Physician	2,078 (53.5)	478 (61.5)	23.0	54.7
Trainee	659 (17.0)	109 (14.0)	16.5	16.7
Other		7 (0.9)		0.0
Years in practice (n = 773)‡				
Still in training	580 (16.3)	94 (12.2)	16.2	16.6
Younger than 1 year	347 (9.7)	33 (4.3)	9.5	7.2
1–2 years	268 (7.5)	36 (4.7)	13.4	7.2
3–5 years	594 (16.7)	109 (14.1)	18.4	16.3
6–10 years	618 (17.3)	157 (20.3)	25.4	18.3
11 years or older	1,158 (32.5)	344 (44.5)	29.7	34.4
Last experience with diagnostic error resulting in harm¶ (n = 773)				
Younger than 1 year	—	187 (25.7)	—	29.5
1–5 years ago	—	285 (39.1)	—	36.7
Older than 5 years ago	—	139 (19.1)	—	16.1
Never	—	118 (16.2)	—	17.7

*Percentages describe the proportion of respondents in each stratum of the given characteristic relative to the other strata.

†Percentages are the proportion of respondents participating in each stratum compared with those eligible (n/N = response rate).

‡Not all participating sites would release data for eligible participants.

§1 nonbinary, 14 preferred not to answer.

¶Information not available for eligible participants; 44 preferred not to answer.

not identify significant differences in comfort relative to clinician type or years in practice, clinicians at Hospital D reported significantly less comfort discussing diagnostic errors compared with peers at other hospitals. The most frequently cited barriers to discussing diagnostic errors in public venues include feeling like a bad clinician, concerns about peer judgment of knowledge base, decision-making, and professional reputation; more than 40% of respondents cited these barriers. Although the frequency of barriers identified was similar across clinicians and institutions, clinicians at Hospital D cited significantly greater concerns about their job being at stake, raising the possibility that institutional culture may influence the willingness to discuss diagnostic errors publicly. Because efforts to reduce harm arising from diagnostic error require that diagnostic errors be discussed to uncover the underlying reasons for the error, these findings are likely to have important implications for health care organizations seeking to reduce patient harm related to diagnostic errors.

This survey was conducted nearly 2 decades after the publication of “To Err is Human: Building a Safer Health System” and highlights that much work remains to be done.^{24–26} Clinicians in the study were significantly less comfortable discussing all types of errors in MMCs compared with private conversations with peers and were specifically least comfortable discussing diagnostic errors publicly, suggesting the need for strategies to improve the safety culture. Diagnostic reasoning receives scrutiny during MMCs, where participants often explain their

clinical reasoning during the diagnostic process.²⁷ Clinical reasoning and system errors are both frequent topics of forums like MMCs.^{28,29} System problems and clinical reasoning errors usually coexist when diagnostic errors occur,³⁰ but the degree of direct clinician responsibility varies depending on the type of error. In an ethnographic study of individual accountability in patient safety, Aveling et al¹² assert that individual clinicians are integral to the system in which they practice as “they create, modify and are subject to the social forces” of patient safety culture. Their study demonstrated that while forums like MMCs contributed positively to maintaining standards of professional competence, such benefits were often thwarted by conditions that made individual clinicians fearful of challenging peers about their performance, especially when individuals were harshly blamed for situations largely beyond their control. Similarly, Danielsson et al³¹ found that physicians perceive an individual duty to contribute to patient safety through efforts to improve clinical decision-making. However, they acknowledge that cultural norms that expect error-free clinical decision-making from physicians negatively affect their willingness to discuss mistakes to learn from them.³¹ A culture that is not open to discussions about mistakes is a barrier to accountability and improvement.³² As clinicians are the agents of diagnosis, they are central to efforts to reduce diagnostic errors and should participate in the analysis needed to uncover lessons to both improve systems and improve individual clinical reasoning.⁸ Therefore, efforts to enhance diagnostic safety will need to address cultural

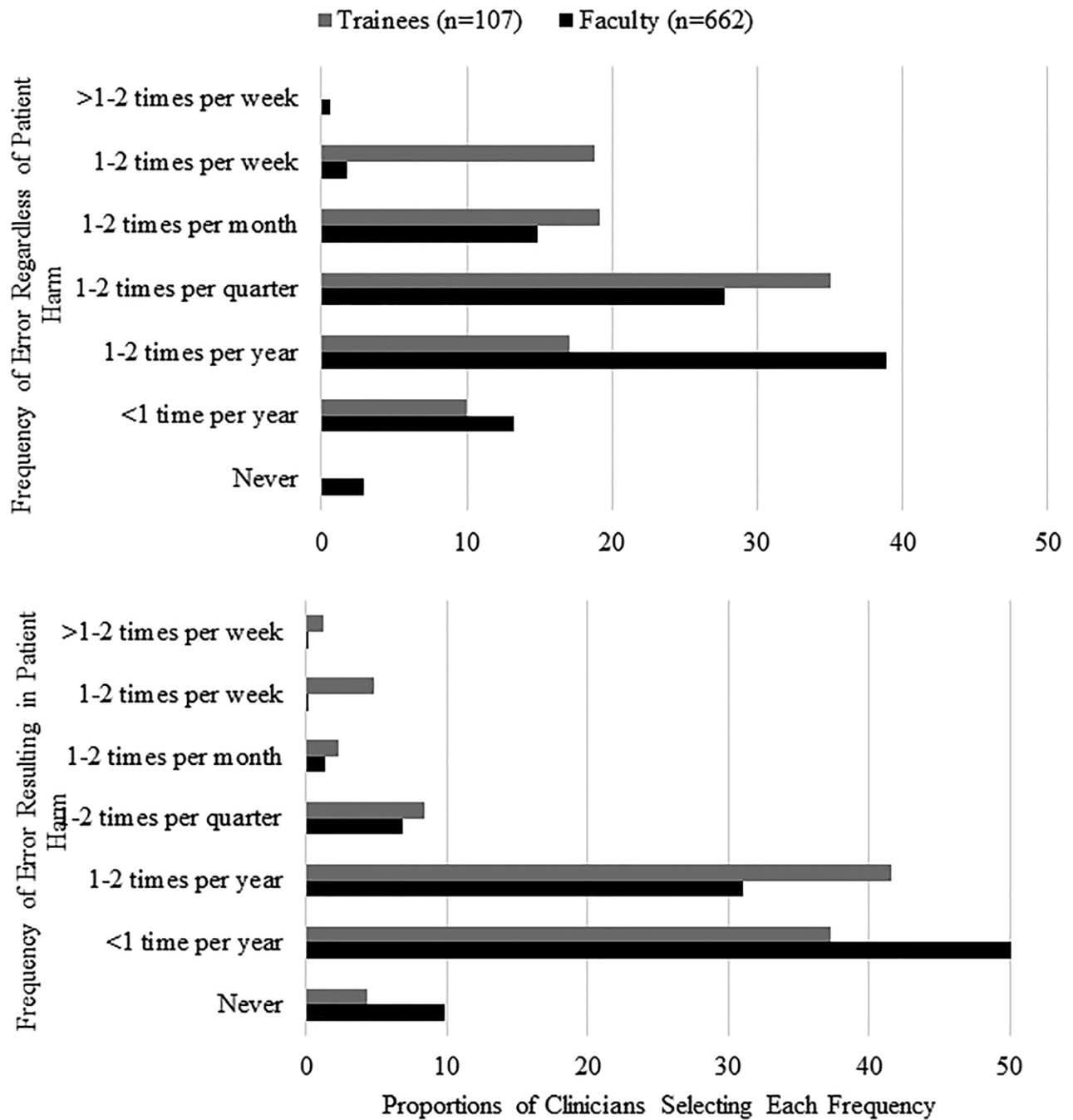


Fig. 1. Clinicians' self-report of the frequency of committing diagnostic errors.

forces that impede frank conversations regarding diagnostic reasoning while simultaneously strengthening the system to reduce the risk of diagnostic errors.

One way to mitigate clinician discomfort is to build safer environments for error discussion during MMCs that promote a nonpunitive culture.³³ Key drivers of clinician engagement include supportive institutional leadership and well-defined mutual expectations between institutions and clinicians.³⁴ Psychological safety is also critical to promoting a nonpunitive culture; it is the degree to which one feels comfortable taking interpersonal risks in group

settings (eg, eliciting feedback on performance) without fear of retaliation.³⁵ However, a tension exists between a blame-free systems approach to addressing medical errors and the need for accountability in a just culture of patient safety.³⁶ Clinicians tend to view their local safety cultures as punitive and worry that they are treated unfairly when reporting errors.^{37,38} The willingness to report safety concerns is positively correlated with perceptions that errors are handled appropriately, and the culture promotes learning from errors.³⁹ Conversely, low psychological safety has been linked to a decreased willingness

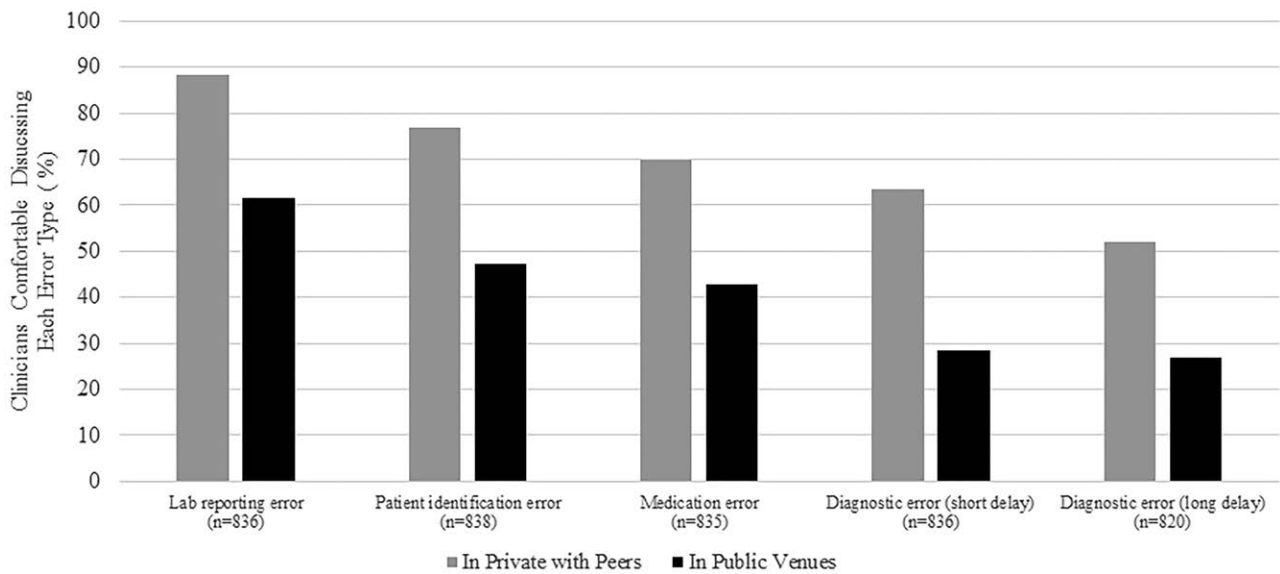


Fig. 2. Clinicians' reported comfort in discussing medical errors in private compared with public venues. Short delay: brief time elapsed before discovering the correct diagnosis. Long delay: extended time elapsed before discovering the correct diagnosis. Clinicians were significantly more comfortable discussing all types of errors in private than in public ($P < 0.004$). Clinicians were also significantly less comfortable discussing diagnostic errors compared with other error types ($P < 0.018$).

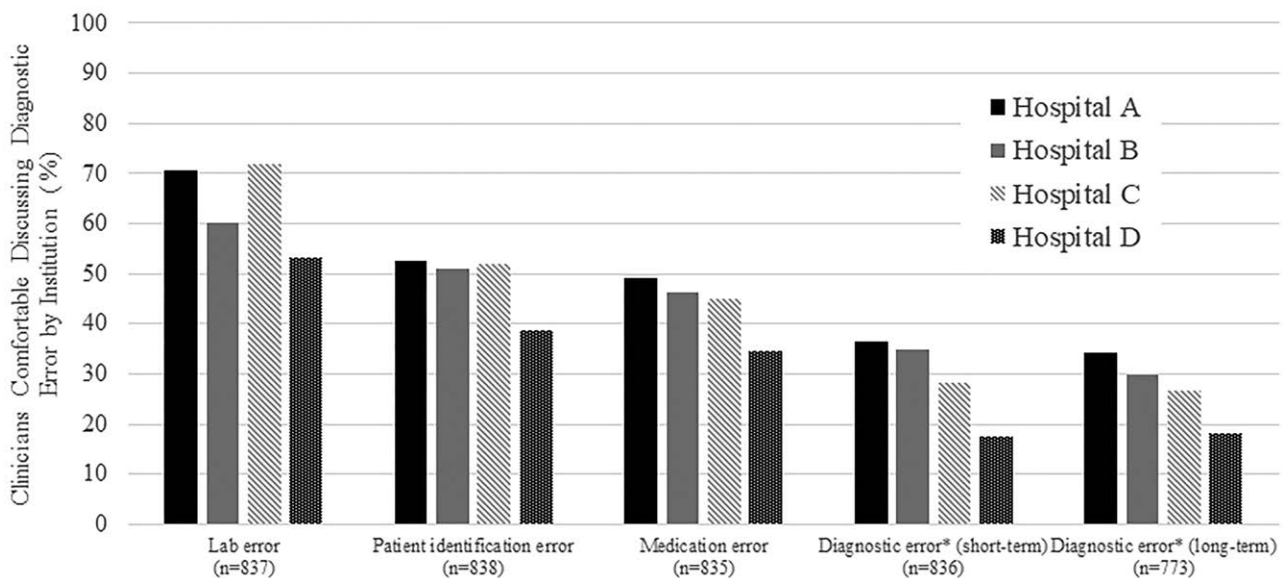


Fig. 3. Clinicians' reported comfort in discussing medical errors in public venues by institution. Short delay: brief time elapsed before discovering the correct diagnosis. Long delay: extended time elapsed before discovering the correct diagnosis. Clinicians at Hospital D were significantly less comfortable discussing diagnostic errors compared with the other hospitals ($P < 0.018$). No other significant differences were noted for any hospital or error type.

to report medical errors.⁴⁰ It is, therefore, reasonable to conclude that a similar association exists between clinicians' perceived psychological safety and their willingness to discuss diagnostic errors during MMCs. For example, physicians and residents in one study were less likely to discuss medical errors if they held fears about harm to their reputation due to an error.⁴¹ In another study, MMC participants perceived a more blaming culture in MMCs where errors were examined without accurate analysis

compared with MMCs in which errors were not discussed at all; this difference in perception of a blaming culture disappeared, however, when participants felt that the error was accurately analyzed.⁴² Creating safer environments for error discussions requires understanding the sources of misgivings held by clinicians.

A growing body of literature suggests specific measures that may enhance the psychological safety of MMCs. Cifra and Miller⁴³ cite the need for a structured

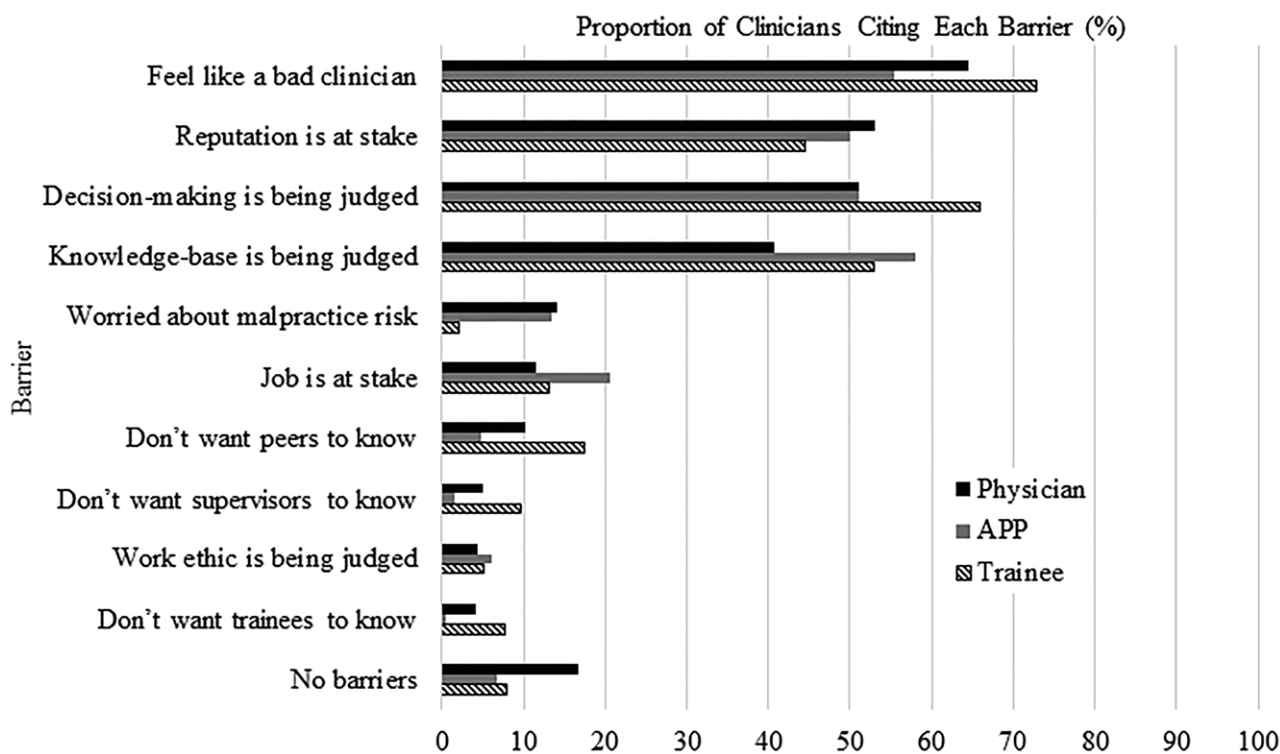


Fig. 4. Barriers to discussing diagnostic errors in public by clinician type. There were no significant differences in barriers identified by physicians, APPs, or trainees.

framework including moderators skilled at counteracting unsupportive or unsympathetic comments as necessary components required to enhance MMC for system improvement. Creating a clear, consistent case review format moderated by trained facilitators increases attendee engagement and the perception of transparent unbiased analysis in MMCs.^{44,45} Although such improvements seem to improve psychological safety indirectly, transparency depends on a nonblaming culture. Our results suggest that fear of criticism regarding knowledge base or decision-making are significant barriers to open discussions of diagnostic error. Gonzalo et al⁴⁶ demonstrated that a consistent, expertly facilitated systems-focused MMC improves resident perception of blame-free case reviews. Blame is also avoided by presenting cases anonymously; anonymous case presentation significantly reduces the perceived punitive nature of MMCs.⁴⁷ However, this study failed to show a concomitant reduction in the perceived focus of MMC on individual clinician error. Yet, individual clinician decision-making contributes to diagnostic error and requires feedback to promote improved diagnostic performance. Meyer and Singh⁴⁸ acknowledge that diagnostic performance requires feedback to calibrate both team and individual diagnostic performance. Regular, well-explained, corrective feedback, including opportunities for performance improvement provided by peers, significantly correlates with psychological safety among individual providers.⁴⁹ Although intentional structural improvements provide specific techniques to

promote psychological safety in MMCs, the latter finding and our data showing greater comfort discussing diagnostic errors privately with peers underscore the need for complementary, private, honest discussions of diagnostic errors with trusted colleagues.

The most significant barriers to discussing diagnostic errors in this study included feeling like a bad clinician, feeling judged about knowledge base and decision-making, and fearing a loss of reputation. The proportion of respondents citing concerns about loss of reputation following harmful errors as a barrier to the discussion is substantially higher than the 15% previously reported by Waterman et al.¹³ Our findings more closely resemble a finding among primary care physicians that more than 50% identified loss of reputation as a significant barrier to disclosing errors.⁴¹ It is essential to address these concerns because feedback received from peers can potentially allow clinicians to calibrate their diagnostic performance and improve their diagnostic accuracy.⁴⁸ Indeed, clinicians believe that discussing errors creates an opportunity to learn from the mistake and also strengthen professional relationships with peers.⁴¹ Perhaps, strengthening peer relationships through discussion of diagnostic errors represents an opportunity to combat the barriers clinicians face when discussing them and warrants further investigation.

The response rate of 22.6% is slightly lower than previously published rates for email-invited web-based surveys^{50,51} and lower than 2 of 3 previously published

surveys of pediatricians regarding diagnostic error (range: 16%–54%), which presents a limitation. However, the frequency of making diagnostic errors as reported by respondents to this survey is consistent with findings from these prior studies.^{17–19} The current study is the largest to date to explore pediatric clinician comfort with discussing diagnostic error; it includes more clinicians than the 3 previous studies combined and is the first to include APPs. The response rate was also substantially higher than that of pediatric clinicians responding to the Hospital Survey on Patient Safety Culture³⁸; additionally, we used post-stratification weighting to account for nonresponse bias. Only tertiary referral academic centers participated; thus, these findings may not be broadly generalizable. However, clinicians at all participating institutions cited barriers to discussing diagnostic errors with similar frequency, suggesting that practice location may not be a major influence despite the noted difference concerning fears of job loss at 1 center. We did not collect information about the size, frequency, audience composition, or facilitation of MMCs at the participating institutions, and these characteristics may have influenced participants' responses.

CONCLUSIONS AND IMPLICATIONS

Pediatric clinicians acknowledge frequently committing diagnostic errors, an important source of patient harm. Our results confirmed our hypothesis that pediatric clinicians are significantly less comfortable publicly discussing diagnostic errors compared with other medical errors. This lack of comfort may be related to concerns about their psychological safety in venues such as the MMC. Although the most common barriers to these discussions seem relatively universal, clinicians at some institutions identified more concern regarding job security. The greater comfort during private peer-to-peer discussions represents a potential opportunity to bolster psychological safety.

As healthcare organizations begin to address the challenge of reducing diagnostic errors, patient safety leadership can capitalize on clinicians' sense of professional responsibility by addressing the specific barriers they face when discussing errors during MMCs. Increasing institutional visibility of system-wide improvements directly attributable to open conversations about diagnostic errors may change clinicians' perspective from a fear of recrimination to professional pride in helping advance patient safety during the diagnostic process.

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

REFERENCES

1. Graber ML, Trowbridge R, Myers JS, et al. The next organizational challenge: finding and addressing diagnostic error. *Jt Comm J Qual Patient Saf.* 2014;40:102–110.
2. Newman-Toker DE, Austin JM, Derk J, et al. Are health care provider organizations ready to tackle diagnostic error? A survey of Leapfrog-participating hospitals. *Diagnosis (Berl).* 2017;4:73–78.
3. Croskerry P, Singhal G, Mamede S. Cognitive debiasing 1: origins of bias and theory of debiasing. *BMJ Qual Saf.* 2013;(22 suppl 2):ii58–ii64.
4. Singh H, Graber ML, Hofer TP. Measures to improve diagnostic safety in clinical practice. *J Patient Saf.* 2016; 15(4):311–316.
5. Sevdalis N, Jacklin R, Arora S, et al. Diagnostic error in a national incident reporting system in the UK. *J Eval Clin Pract.* 2010;16:1276–1281.
6. Pierluissi E, Fischer MA, Campbell AR, et al. Discussion of medical errors in morbidity and mortality conferences. *JAMA.* 2003;290:2838–2842.
7. Zwaan L, Singh H. The challenges in defining and measuring diagnostic error. *Diagnosis (Berl).* 2015;2:97–103.
8. Wachter RM. Why diagnostic errors don't get any respect—and what can be done about them. *Health Aff (Millwood).* 2010;29:1605–1610.
9. Trowbridge RL, Dhaliwal G, Cosby KS. Educational agenda for diagnostic error reduction. *BMJ Qual Saf.* 2013;(22 suppl 2):ii28–ii32.
10. Giardina TD, Haskell H, Menon S, et al. Learning from patients' experiences related to diagnostic errors is essential for progress in patient safety. *Health Aff (Millwood).* 2018;37:1821–1827.
11. Lipitz-Snyderman A, Kale M, Robbins L, et al. Peers without fears? Barriers to effective communication among primary care physicians and oncologists about diagnostic delays in cancer. *BMJ Qual Saf.* 2017;26:892–898.
12. Aveling EL, Parker M, Dixon-Woods M. What is the role of individual accountability in patient safety? A multi-site ethnographic study. *Sociol Health Illn.* 2016;38:216–232.
13. Waterman AD, Garbutt J, Hazel E, et al. The emotional impact of medical errors on practicing physicians in the United States and Canada. *Jt Comm J Qual Patient Saf.* 2007;33:467–476.
14. Newman MC. The emotional impact of mistakes on family physicians. *Arch Fam Med.* 1996;5:71–75.
15. Luu S, Leung SO, Moulton CA. When bad things happen to good surgeons: reactions to adverse events. *Surg Clin North Am.* 2012;92:153–161.
16. Grubenhoff JA, Ziniel SI, Bajaj L, et al. Pediatric faculty knowledge and comfort discussing diagnostic errors: a pilot survey to understand barriers to an educational program. *Diagnosis (Berl).* 2019;6:101–107.
17. Singh H, Thomas EJ, Wilson L, et al. Errors of diagnosis in pediatric practice: a multisite survey. *Pediatrics.* 2010;126:70–79.
18. Perrem LM, Fanshawe TR, Sharif F, et al. A national physician survey of diagnostic error in paediatrics. *Eur J Pediatr.* 2016;175:1387–1392.
19. Rinke ML, Singh H, Ruberman S, et al. Primary care pediatricians' interest in diagnostic error reduction. *Diagnosis (Berl).* 2016;3:65–69.
20. Kolenikov S. Calibrating survey data using iterative proportional fitting (raking). *Stata J.* 2014;14:22–59.
21. Groves RM. Nonresponse rates and nonresponse bias in household surveys. *Public Opin Quart.* 2006;70:646–675.
22. Benjamini Y, Hochberg Y. Controlling the false discovery rate - a practical and powerful approach to multiple testing. *J R Stat Soc B.* 1995;57:289–300.
23. American Association of Public Opinion Research. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys.* 9th ed. 2016.
24. Bates DW, Singh H. Two decades since to err is human: an assessment of progress and emerging priorities in patient safety. *Health Aff (Millwood).* 2018;37:1736–1743.
25. Mueller BU, Neuspiel DR, Fisher ERS, Council On Quality I, Patient Safety COHC. Principles of pediatric patient safety: reducing harm due to medical care. *Pediatrics.* 2019;143(2):e20183649.
26. Kohn LT, Corrigan J, Donaldson MS. *To Err is Human: Building a Safer Health System.* Washington, D.C: National Academy Press; 2000.
27. Katz D, Detsky AS. Incorporating metacognition into morbidity and mortality rounds: the next frontier in quality improvement. *J Hosp Med.* 2016;11:120–122.
28. Wittels K, Aaronson E, Dwyer R, et al.; EM M&M Culture of Safety Research Team. Emergency medicine morbidity and mortality

- conference and culture of safety: the resident perspective. *AEM Educ Train*. 2017;1:191–199.
29. Chu D, Xiao J, Shah P, et al. How common are cognitive errors in cases presented at emergency medicine resident morbidity and mortality conferences? *Diagnosis (Berl)*. 2018;5:143–150.
 30. Okafor N, Payne VL, Chathampally Y, et al. Using voluntary reports from physicians to learn from diagnostic errors in emergency medicine. *Emerg Med J*. 2016;33:245–252.
 31. Danielsson M, Nilsson P, Rutberg H, et al. The professional culture among physicians in Sweden: potential implications for patient safety. *BMC Health Serv Res*. 2018;18:543.
 32. Bell SK, Delbanco T, Anderson-Shaw L, et al. Accountability for medical error: moving beyond blame to advocacy. *Chest*. 2011;140:519–526.
 33. Szekendi MK, Barnard C, Creamer J, et al. Using patient safety morbidity and mortality conferences to promote transparency and a culture of safety. *Jt Comm J Qual Patient Saf*. 2010;36:3–9.
 34. Taitz JM, Lee TH, Sequist TD. A framework for engaging physicians in quality and safety. *BMJ Qual Saf*. 2012;21:722–728.
 35. Edmondson AC. The local and variegated nature of learning in organizations: a group-level perspective. *Organ Sci*. 2002;13:128–146.
 36. Wachter RM. Personal accountability in healthcare: searching for the right balance. *BMJ Qual Saf*. 2013;22:176–180.
 37. Alsafi E, Baharoon S, Ahmed A, et al. Physicians' knowledge and practice towards medical error reporting: a cross-sectional hospital-based study in Saudi Arabia. *East Mediterr Health J*. 2015;21:655–664.
 38. Gampetro PJ, Segvich JP, Jordan N, Velsor-Friedrich B, Burkhart L. Perceptions of pediatric hospital safety culture in the United States: an analysis of the 2016 hospital survey on patient safety culture. *J Patient Saf*. Epub ahead of print; 2019. doi: 10.1097/PTS.0000000000000602.
 39. Liao JM, Etchegaray JM, Williams ST, et al. Assessing medical students' perceptions of patient safety: the medical student safety attitudes and professionalism survey. *Acad Med*. 2014;89:343–351.
 40. Derickson R, Fishman J, Osatuke K, et al. Psychological safety and error reporting within veterans health administration hospitals. *J Patient Saf*. 2015;11:60–66.
 41. Kaldjian LC, Forman-Hoffman VL, Jones EW, et al. Do faculty and resident physicians discuss their medical errors? *J Med Ethics*. 2008;34:717–722.
 42. Lecoanet A, Vidal-Treca G, Prate F, et al. Assessment of the contribution of morbidity and mortality conferences to quality and safety improvement: a survey of participants' perceptions. *BMC Health Serv Res*. 2016;16:176.
 43. Cifra CL, Miller MR. Envisioning the future morbidity and mortality conference: a vehicle for systems change. *Pediatr Qual Saf*. 2016;1:e003.
 44. Spielman DB, Hsueh WD, Choi KY, et al. From morbidity and mortality to quality improvement: effects of a structured and interactive otolaryngology conference. *OTO Open*. 2017;1:2473974X17692775.
 45. Endicott KM, Zettervall SL, Rettig RL, et al. Use of structured presentation formatting and NSQIP guidelines improves quality of surgical morbidity and mortality conference. *J Surg Res*. 2019;233:118–123.
 46. Gonzalo JD, Bump GM, Huang GC, et al. Implementation and evaluation of a multidisciplinary systems-focused internal medicine morbidity and mortality conference. *J Grad Med Educ*. 2014;6:139–146.
 47. Jansson PS, Schuur JD, Baker O, et al. Anonymity decreases the punitive nature of a departmental morbidity and mortality conference. *J Patient Saf*. 2019;15:e86–e89.
 48. Meyer AND, Singh H. The path to diagnostic excellence includes feedback to calibrate how clinicians think. *JAMA*. 2019;321:737–738.
 49. Al-Mutairi A, Meyer AN, Thomas EJ, et al. Accuracy of the safer dx instrument to identify diagnostic errors in primary care. *J Gen Intern Med*. 2016;31:602–608.
 50. McMahon SR, Iwamoto M, Massoudi MS, et al. Comparison of e-mail, fax, and postal surveys of pediatricians. *Pediatrics*. 2003;111(4 Pt 1):e299–e303.
 51. Cunningham CT, Quan H, Hemmelgarn B, et al. Exploring physician specialist response rates to web-based surveys. *BMC Med Res Methodol*. 2015;15:32.