Increasing Pediatric Morning Report Educational Value Through Quality Improvement

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abstract

BACKGROUND: Morning report (MR) is a common case-based conference in graduate medical education. Recent studies highlight participant dissatisfaction with the educational value of MR, but data are lacking on means for improvement. We aimed to increase MR quality and participant satisfaction at our academic pediatric residency program.

METHODS: Improvement science was used to develop and implement a new standardized pediatric MR process (intervention), with 5 core educational elements and structured resident–faculty mentorship. Educational elements were measured via feedback forms and tracked using a run chart. Residents and faculty were surveyed regarding MR quality and satisfaction at baseline and 6 months postintervention; responses were analyzed using mixed effects logistic regression.

RESULTS: The median of educational elements increased from 3 to 5 (5 maximum) during the 6-month study period and 12-months poststudy. Baseline and postintervention survey response rates were 90% (18 of 20) for residents and 66% (51 of 77) for faculty. Residents reporting high quality MR changed from 50% to 72% ($P = .20$), and faculty from 29% to 85% ($P < .001$). Satisfaction with MR content increased for both residents (50%–89%, $P = .03$) and faculty (25%–67%, $P < .001$). Resident satisfaction with faculty mentorship before MR increased from 28% to 78% ($P = .01$); satisfaction with faculty feedback after MR increased from 11% to 56% ($P = .02$).

CONCLUSIONS: Improvement science can be used to develop a new pediatric graduate medical education process. Requiring core educational elements and providing structured mentorship were associated with improvements in pediatric MR quality and participant satisfaction.

Morning report (MR) is a case-based conference commonly used in graduate medical education (GME).[1,2] It provides a shared forum for residents and faculty to discuss patient cases and review evidence-based medical practice. Despite its national practice and acclaimed educational value, there are no published or accepted standards for MR educational content, format, or process, nor metrics for measuring conference quality.[2–4]

Recent studies demonstrate participant dissatisfaction with MR educational value, but data are lacking on means for improvement.[1,5,6] Although many MR educational interventions have been trialed to improve participant satisfaction and conference quality, including several in pediatrics, few used quality improvement methodology to document sustainable improvement.[1–3,6–8]

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Similar to national data, our pediatric residency MR did not have a defined process or quality standards. Both residents and faculty were dissatisfied with the variability in MR educational value, as expressed by verbal feedback within the department and a focus group of graduating pediatric residents.

Our global aim was to develop a new MR educational process to yield consistent and high educational value. We defined high MR educational value by the dyad of (1) inclusion of core educational elements for high quality presentations, and (2) participant satisfaction and report of MR quality. This led to the creation of 2 equally important specific aims to improve MR value. The first specific aim was to increase the median number of core educational elements in MR presentations from 3 to 5 in 6 months after intervention implementation. The second specific aim was to increase the percentage of residents and faculty who reported MR as a high-quality educational activity (baseline: residents 50%; faculty 36%), and who were satisfied with MR medical content (baseline: residents 50%; faculty 31%), to ≥80% after 6 months (Table 1).

METHODS

Context

Study Setting

This study was conducted by the pediatric residency program at the University of Vermont (UVM) Children's Hospital, which is a rural academic tertiary-care facility. UVM pediatric MR is a 30-minute presentation occurring twice a week and led by a categorical pediatric resident. Residents from all 3 years regularly participate as learners and leaders, with attendance documented by the program. Each resident is required to lead 2 MRs annually, scheduled in advance by the chief resident, whose main conference role is to coordinate MR.

Before 2020, residents were encouraged to select a faculty mentor to attend the presentation, but expectations were neither defined for the MR format nor the faculty mentor role. Project planning started in the spring of 2019, followed by a 6-month study period (January–June 2020) and a 12-month poststudy period (July 2020–June 2021). The project remains active at the time of manuscript submission, having transitioned to a third academic year (2021–2022).

Study Population

All categorical pediatric residents (20) and pediatric faculty (77) employed by UVM in the 2019–2020 academic year were eligible for study inclusion. Guest attendees (examples: visiting residents or faculty, noncategorical trainees, fellows, medical students, nursing students, or other hospital and allied professional staff) were invited to MR but not included in the study given baseline variability in clinical training, GME background, and attendance expectations.

Intervention

This project was conducted by a team of pediatric residents, chief resident, and faculty. We interviewed graduating residents and faculty to learn about the current state of MR and categorize key factors contributing to dissatisfaction and decreased educational value (Fig 1). The lack of a consistent conference framework and mentorship were common themes leading to variability in educational value. Our first specific aim emphasizes the development of a standardized process based on adult learning theory, which highlights the concepts of self-motivation, applicability of knowledge, and reliance on previous experiences to expand learning.[9] The concept of structured mentorship was based on

TABLE 1 Updating MR: Project-Specific Aims

Specific Aim		Baseline (%)	Aim (%)
First specific aim			
Increase the median number of core educational elements included in MR presentations.	UVM pediatric residency program	3	5
Second specific aim			
Increase respondents (%) who agree that MR is consistently a high-quality educational activity.	Residents	50	80
	Faculty	36	80
Increase respondents (%) who are consistently satisfied with MR medical content.	Residents	50	80
	Faculty	31	80
Additional specific aims			
Increase respondents (%) who report MR increased their medical knowledge.	Residents in attendance	67	80
	Residents presenting	67	80
	Faculty	33	80
Increase respondents (%) who report consistently clear MR expectations.	Residents	17	80
	Faculty	24	80
Increase residents (%) who consistently receive formative feedback before and after MR presentations.	Before	28	80
	After	12	80

January 2020 to June 2020.

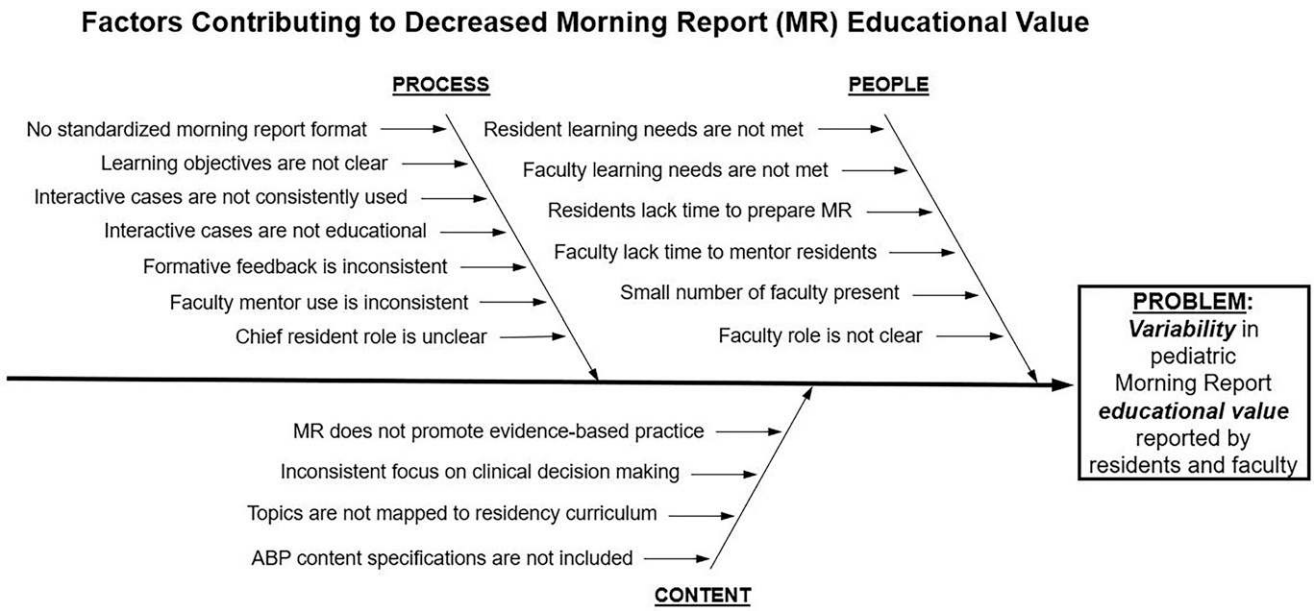

FIGURE 1
Fishbone diagram of factors contributing to decreased MR educational value.

literature demonstrating its importance to resident education,[10,11] making it central to improving resident presentation quality.

Educational theory helped inform the development of a key driver diagram to identify elements of high-quality MR (Fig 2). On the basis of these key drivers and group consensus, we developed and implemented the new standardized MR process (Fig 3) to include core educational elements and structured resident–faculty mentorship. The 5 core educational elements in the new MR process were: (1) conference objectives, (2) American Board of Pediatrics content alignment, (3) evidence-based literature, (4) board review question, and (5) take-home points.

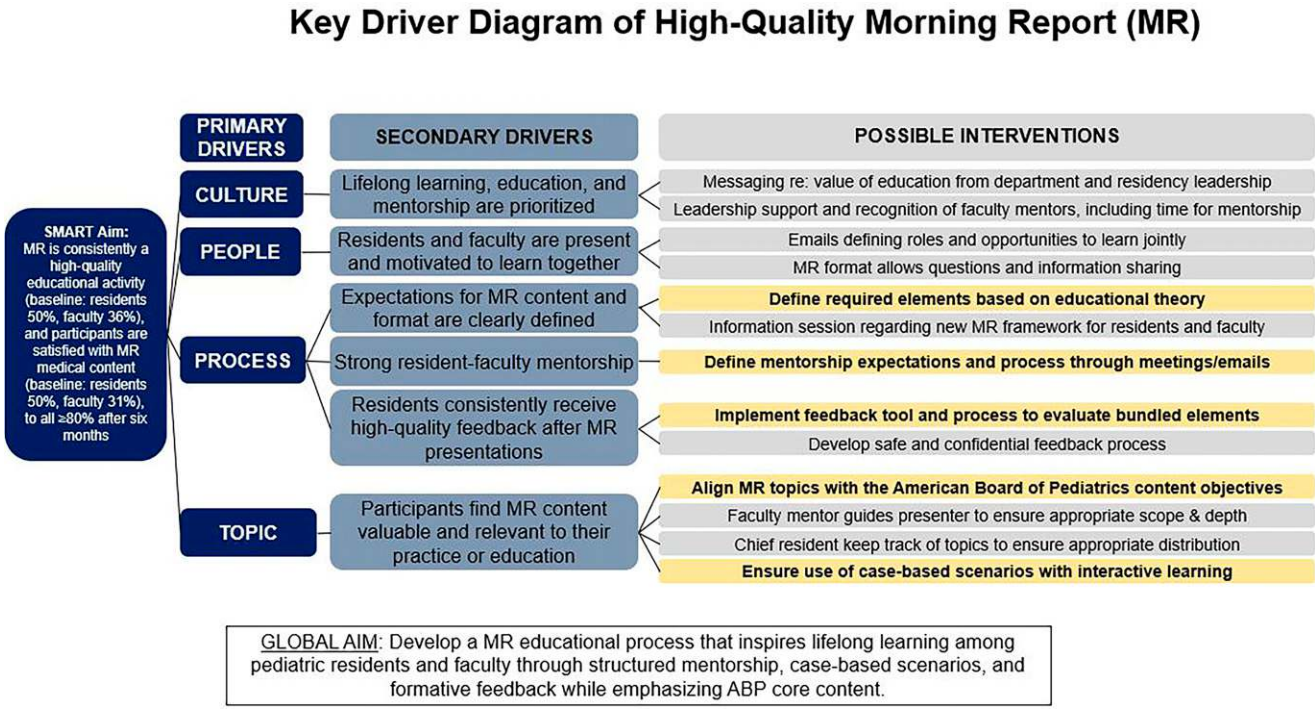

FIGURE 2
Key driver diagram of MR with high-quality and participant satisfaction. The new MR educational process (project intervention) was based on the possible interventions listed on the right, with the most important ones highlighted in yellow.

Faculty feedback to residents after MR was standardized using a framework of 6 observable domains of lecture performance adapted from a validated feedback tool,[12] and included: (1) specific goals and objectives, (2) content relevance, (3) content expertise, (4) presentation design and structure, (5) audience engagement, and (6) lecture presence. To better structure resident–faculty mentorship, each resident selected an MR topic and identified a faculty mentor (all departmental faculty were eligible) at least 4 weeks in advance. The faculty mentor role was to review presentation content before MR (at least 1 week in advance), attend MR, and provide feedback after MR (within 2 weeks after the presentation). A feedback form (see Supplemental Fig 9) was developed to track the 5 required core educational elements and provide feedback on the 6 observable lecture performance domains. An exploratory sixth educational element (use of an active learning technique) was included in the feedback form to provide a baseline for future interventions, given specific enthusiasm for incorporating this teaching method at our academic institution.

Before live implementation, the project team tested the feedback form by using it to score 5 previously recorded pediatric MR presentations. Each recorded MR was reviewed by 3 team members at different training levels (senior faculty, junior faculty, and resident) and the form was further adapted for best fit and tested for interrater reliability.

The intervention underwent several Plan–Do–Study–Act cycles after initial implementation. Within the first month, the chief resident started sending resident and faculty reminders about the new MR process, clarifying the new MR structure and reinforcing educational expectations for presenters, mentors, and learners. Two months after intervention implementation, the MR process was adapted to a virtual format because of the coronavirus disease 2019 (COVID-19) pandemic. In-person MR presentations and feedback were shifted to a secured online platform. No other components of the MR process changed as a result of the shift to a remote format. After noting several presentations missing a primary literature source, the chief resident clarified this element, leading to increased primary literature source utilization. The conclusion of the study period coincided with a transition to the new academic year; the next chief resident presented the MR process to incoming residents and reviewed the process with current residents during a resident meeting.

Intervention: New Standardized Morning Report (MR) Process*

Components of Standardized MR Process	
Core Educational Elements	1. Objectives 2. American Board of Pediatrics content 3. Evidence-based literature 4. Board-review question 5. Take-home points
Structured Resident-Faculty Mentorship	Faculty mentor responsibilities: 1. Review presentation before MR 2. Attend MR 3. Provide feedback after MR
Feedback Form	Evaluated by: 1. Faculty mentor 2. Co-resident 3. Chief resident

Adapted to virtual format due to COVID-19

FIGURE 3
Intervention: MR educational process.

Study of the Intervention

The intervention was introduced to all residents and faculty by in-person presentations (resident and faculty meetings) and electronically (departmental e-mail). Before study initiation, project team members modeled the new educational process for residents and faculty. Feedback forms were designed to be completed after every MR by the chief resident, faculty mentor, and 1 senior resident. The faculty mentor was then responsible for reviewing the feedback forms with the resident and providing summative feedback. The study team reviewed the feedback forms monthly to ensure process utilization and identify components requiring additional clarification or reinforcement.

To calculate a baseline number of core educational elements included in MR presentations, study team members reviewed 20 MR presentations between November 2018 and January 2020. Baseline preintervention surveys were developed by the study team to assess MR quality and participant satisfaction (Supplemental Figs 10 and 11). Surveys included multiple-choice questions with a 5-point scale and optional free-response. Surveys were electronically distributed via REDCap to all UVM pediatric residents and all pediatric faculty; survey data were collected and managed using REDCap electronic data capture tools hosted at UVM.[13,14] Preintervention survey results provided baseline data about key drivers of MR educational value. Additional project-specific aims (Table 1) were then defined with the

goal of increasing percentage of respondents who agree with each key driver of educational value to ≥80% after the first 6 months of intervention implementation. Postintervention surveys were electronically distributed via REDCap at the end of the study period (Supplemental Figs 12 and 13).

Measures

Our main outcome measures were:

1. The number of core educational elements present in each MR (feedback forms); and

2. MR educational quality and satisfaction with MR medical content (surveys).

Additional outcome measures were: satisfaction with mentorship, MR contribution to medical knowledge, and clarity of MR expectations (surveys). Process measures were frequency of faculty mentorship and feedback (surveys and feedback forms). Balancing measures were time burden of preparing or mentoring an MR presentation (surveys) and institutional pediatric board exam pass rate (aggregate internal program data). Pre- and postintervention surveys also evaluated the impact of MR on resident teaching skills, importance of faculty participation during MR, value of and satisfaction with the core educational elements and structured mentorship, and satisfaction with the remote platform.

Analysis

Adherence to core process elements was analyzed using a run chart. To evaluate how similarly the 3 groups of respondents rated the same presentation, mixed effects ordinal logistic regression was used, nesting scores within presentation.

Survey data analysis was conducted using SAS software, Version 9.4 (SAS Institute Inc, Cary, NC).[15] The study team was blinded to individual survey responses; participant pre- and postsurveys were matched through unique identifiers in the SAS software. Descriptive statistics (means, percentages) were reported as appropriate. Pre- and postsurvey responses were compared using mixed effects logistic regression for residents and faculty separately; this approach matched respondents' pre–post answers and retained respondents who completed only 1 survey. Resident and faculty responses to postsurvey questions were compared using the χ^2 test or Fisher's test (when cell counts <5).

Ethical Considerations

The UVM institutional review board categorized this study under educational settings and determined it exempt from full review.

RESULTS

Outcome and Process Measures

A total of 17 MR conferences occurred during the 6-month study period and 29 during the 12 month poststudy period. Core educational element scores were consistent among the chief resident, senior residents, and faculty mentors ($P = .23$). The chief resident attended every MR; their feedback form was used to measure the number of core educational elements present. Additional feedback forms completed by senior residents and faculty were used for post-MR feedback only.

The number of core educational elements present in each MR was tracked using a run chart (Fig 4). The median of core elements present in each MR increased from 3 to 5 (5 maximum) during the 6 month study period and was sustained during the 12-month poststudy period. Compared with preintervention, the study and poststudy periods demonstrated shift with 6 or more consecutive points above the preintervention median.

Primary literature source was the most frequently missed core educational element (29%) during the study period. In the poststudy period, take-home points (21%) and primary literature source (17%) were the 2 most missed elements.

Resident survey response rates were 90% (18 of 20) at baseline and postintervention. Total faculty survey response rates were 66% (51 of 77) at baseline and postintervention; however, only faculty respondents who attended MR since intervention implementation were included in the postintervention analysis (34 of 51, 44% of total faculty). There was a high survey participant retention rate (resident 89%, faculty 63%). Study participants were representative of pediatric resident training year and faculty area of clinical focus at our institution (Table 2).

MR quality and satisfaction with content are reported in Fig 5. Three of 4 measures improved significantly, with 2 reaching the aim of ≥80%. Mentorship utilization (process measure) and satisfaction (outcome measure) are reported in Fig 6. Although changes in rates of mentorship utilization did not reach statistical significance, both measures of resident satisfaction with mentorship increased significantly. The feedback form completion rate was used as a process measure, and varied by role (chief resident 100%, senior residents 88%, faculty mentors 71%).

Both pre- and postintervention, residents reported improved medical knowledge by attending MR (67%–94%, $P = .08$) and presenting at MR (67%–78%, 0.44). Percentage of faculty who reported that attending MR improved their medical knowledge trended toward significance (33%–56%, $P = .05$). Residents who reported clear expectations for the MR

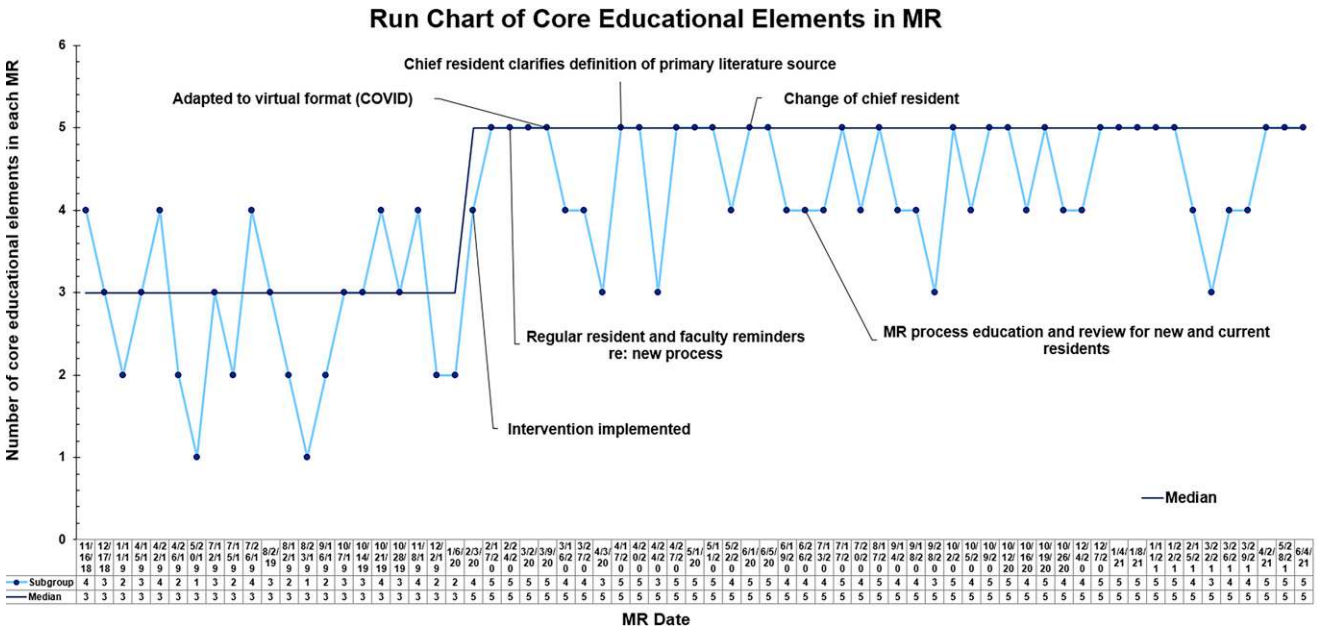

FIGURE 4

Adherence with MR core elements in each MR increased from 3 to 5 (5 maximum) during the 6-month study period and remained at 5 during the 12-month poststudy period.

process increased from 17% to 83% ($P = .002$) and faculty from 24% to 71% ($P < .001$).

Balancing Measures

Residents and faculty who reported that the new MR process was too time-consuming and overwhelming did not significantly change (residents: 39%–28%, $P = .46$; faculty: 4%–3%, $P = .80$). The postintervention board exam pass rate in 2020 was 5% higher than the 5-year rolling average pass rate for 2015 to 2019.

Additional Findings

Most residents reported that presenting at MR is important to the growth of their teaching skills (61%–83%, $P = .16$). Postintervention, all residents reported that faculty participation during MR consistently improved its educational quality (83%–100%, indeterminate P value because of zero cell count, considered nonsignificant).

Residents and faculty were often, but not uniformly, aligned regarding the value of different MR intervention components. Faculty valued conference objectives and primary literature sources more than residents, whereas residents valued American Board of Pediatrics alignment more than faculty (Supplemental Fig 7). Despite this, most residents and faculty were satisfied with implementation of different process components, without significant differences among the groups (Supplemental Fig 8).

Postsurveys assessed impact of the shift to a remote platform (Table 3). For both residents and faculty, the

TABLE 2 Survey Respondent Characteristics: University of Vermont Pediatric Residents and Faculty

	Invited Participants, *n* (%)	Presurvey Respondents, *n* (%)	Postsurvey Respondents, *n* (%)
Residents			
Total	20 (100)	18 (100)	18 (100)
PGY-1	7 (35)	6 (33)	7 (39)
PGY-2	7 (35)	6 (33)	7 (39)
PGY-3	6 (30)	6 (33)	4 (22)
Faculty			
Total	77 (100)	51 (100)	34 (100)[a]
Primary care	11 (14)	9 (18)	3 (9)
Hospitalist/intensivist	29 (38)	18 (35)	14 (41)
Subspecialty	37 (48)	24 (47)	17 (50)
In practice <10 y	—	25 (49)	16 (47)
In practice 10+ years	—	26 (51)	18 (53)

PGY, postgraduate year; —, not applicable.

[a] Only the 34 faculty respondents who attended MR since intervention implementation were included in the postinterventional analysis.

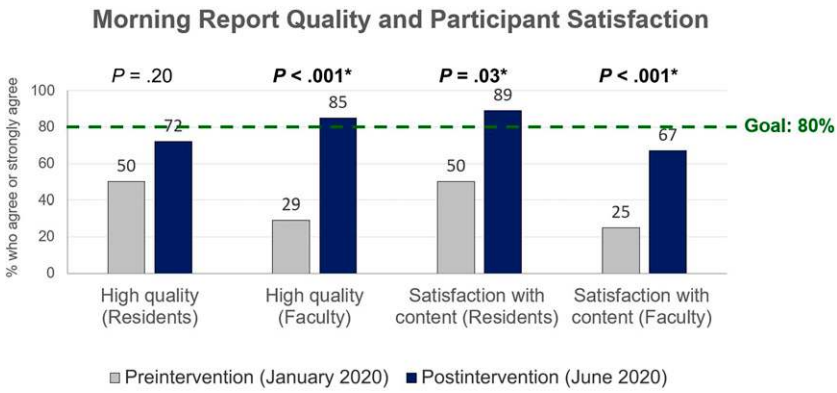

FIGURE 5
MR quality and participant satisfaction as reported in resident and faculty surveys. *P* values represent comparison of pre- and postintervention results on each measure, with * to denote statistical significance ($P < .05$).

remote platform led to increased satisfaction with attendance, decreased satisfaction with resident and faculty interaction, and equal satisfaction with content, time frame, and feedback.

DISCUSSION

Summary

We used improvement science to develop, implement, and evaluate a standardized MR educational process with core educational elements and structured mentorship. Six months after intervention implementation, the core educational element median increased, which has continued for 12 months beyond the study period. There was improvement in all quality and satisfaction aims, and the majority with statistical significance. This project established a clear MR process for both residents and faculty and increased rates of faculty mentorship. Utilizing the new MR process did not adversely impact MR time burden or pediatric board exam pass rate. This educational process was easily adaptable to a remote format, which improved ease of attendance and maintained satisfaction with content, time frame, and feedback.

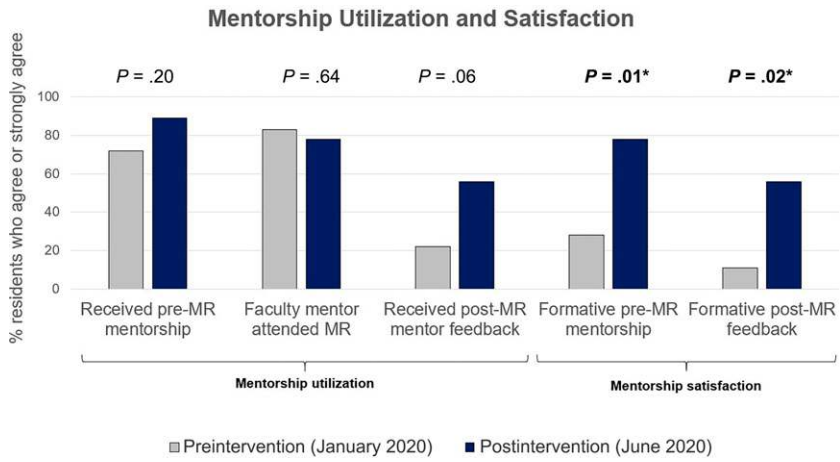

FIGURE 6
MR mentorship utilization and satisfaction as reported in resident and faculty surveys. *P* values represent comparison of pre- and postintervention results on each measure, with * to denote statistical significance ($P < .05$).

Interpretation

Improvement science can be used to develop and measure adherence to a new GME process. Increased use of core educational elements and structured mentorship were associated with improvements in pediatric MR educational quality and satisfaction among residents and faculty.

One factor that contributed to project success was matching the program intervention (a new standardized process) to the source of participant dissatisfaction (variability in educational value), without which an intervention may not lead to the expected improvements.[6] Utilizing improvement science to standardize the MR process established clear educational expectations for residents and faculty, decreasing MR variability and increasing its educational value.

The importance of a defined MR process is consistent with previous studies demonstrating that providing a structured framework for developing teaching sessions improves satisfaction among residents,[1] and providing guidance to resident presenters increases perception that MR met the educational needs of the audience.[3] The intervention was strengthened by basing it on educational theory, and improvements were consistent with previous studies on adult learning theory and the importance of mentorship.[9–11]

Although satisfaction with mentorship increased, the lowest satisfaction was with faculty feedback after MR, which occurred only slightly more than half of the time. This highlights a need to better understand current faculty barriers to attending MR and

TABLE 3 Resident and Faculty Satisfaction With Remote Compared With In-Person MR Experience

	More Satisfaction With Remote MR (%)	Equal Satisfaction (%)	More Satisfaction With In-Person MR (%)
Ability to attend MR			
Residents	78[a]	17	6
Faculty	56[a]	29	3
Interaction with residents			
Residents	17	33	50[a]
Faculty	3	35	50[a]
Interaction with faculty			
Residents	33	28	39
Faculty	3	38	47
Teaching necessary content			
Residents	28	67[a]	6
Faculty	9	62[a]	18
Content fits allotted time			
Residents	28	50[a]	22
Faculty	21	59[a]	9
Formative feedback			
Residents	22	72[a]	6
Faculty	12	65[a]	12

Responses reported from postintervention survey, June 2020.
[a] Satisfaction ≥50%.

providing feedback after MR, and opportunities to continue and improve mentorship processes in a remote or hybrid format.

The lower satisfaction with mentorship, especially with post-MR feedback, may partially explain why resident reports of increased MR quality neither reached the 80% aim nor statistical significance, compared with faculty (residents 72%, faculty 85%). Unlike faculty, residents are both attendees and presenters at MR. Although the experience as attendees may be comparable between residents and faculty, as presenters, residents may perceive educational quality from improving their teaching skills, which is difficult without formative feedback. Thus, improving mentorship may lead to improvements in resident reports of MR quality.

Resident and faculty satisfaction with MR content also differed. Although postsurvey scores were significantly higher for both groups, the resident scores reached the aim of 80%, whereas faculty scores did not. This may be because faculty were starting from a lower baseline satisfaction with content. Additionally, faculty valued inclusion of a primary literature source more than residents; because it was the most missed element, this could have impacted faculty satisfaction with content more compared with resident satisfaction.

A trade-off of the new process was the increase in chief resident administrative effort coordinating MR (feedback by 2 chief residents). This increased effort was intentionally added to the chief resident role description, and was considered justified given the focus of the chief residency role on promoting departmental GME.

Sustainability of the new MR process was demonstrated with ongoing process utilization in a 12 month poststudy period. Ongoing utilization is especially notable amid the challenges brought by the COVID-19 pandemic, including the shift to a remote platform, as well as the start of a new academic year with a new chief resident. Future process sustainability will require ongoing prioritization of MR administrative tasks within the chief resident's workload, as well as continued utilization of improvement science to ensure the process is meeting the educational needs of participants and increasing mentorship.

LIMITATIONS

The UVM pediatric residency program is both small and in a rural setting, thus not all findings may be uniformly generalizable across GME environments. However, despite the program size, the high survey retention rate reduces the likelihood that individual variability accounts for the reported pre–post differences.

Although study team members were blinded to individual survey responses, response bias may have contributed to reported improvements on surveys. Although natural progression through the academic year may have confounded the noted improvements on survey questions, it is unlikely to fully account for the improvements because many of the presenters were senior residents who had previous years of experience presenting at MR. Additionally, rapid improvement in core element inclusion after intervention implementation, and the sustained increase in core element inclusion throughout a subsequent academic year, suggests the intervention had a true impact on the MR educational experience. It is important to note that, although the MR feedback forms were adapted from published validated tools, the surveys were designed by our team and have not yet been independently evaluated for reliability and validation.

Notably, over half of the study period occurred during the COVID-19 pandemic, which may have led to 2 limitations. First, the pandemic-related workload changes may have contributed to the lower postintervention faculty response rate. Second, the shift to the remote platform may have affected learners and mentors, and their experience of the MR process, in unanticipated ways

that were difficult to quantify using surveys. Despite this, the shift to a remote platform is unlikely to fully account for the noted improvements in reported educational value because attendance was the only attribute in which participants were more satisfied with the remote platform.

Finally, a common goal of GME is to improve clinical outcomes. Utilizing the Kirkpatrick Model as an educational framework,[16] the study outcomes can be classified as level 1: measuring participant reactions to a training program. In the next steps of this project, additional data would be needed to link improvements in educational value to knowledge acquisition (surveys, in-training exams; level 2), patient care practices (clinical performance evaluations; level 3), and clinical outcomes (review of patient safety reports, resident performance on medical center patient care quality measures; level 4).

CONCLUSIONS

Improvement science can be used to increase MR educational value for pediatric residents and faculty. Requiring core educational elements and providing structured mentorship were associated with improvements in pediatric MR quality and participant satisfaction. Next steps at our institution include improving feedback satisfaction, honing resident teaching skills, continuing to track process sustainability, and connecting GME to clinical outcomes. We anticipate this MR process could be transferrable to other GME environments, given its short format and educational theory foundations. Additional studies should evaluate the effects of this new pediatric MR process on resident teaching skills, educational outcomes, and patient care.

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ABBREVIATIONS

MR: morning report
GME: graduate medical education
UVM: University of Vermont

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