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Effect of an Educational Intervention on Faculty and Resident Satisfaction with Real-time Feedback in the Emergency Department

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Abstract

Objectives—Effective real-time feedback is critical to medical education. This study tested the hypothesis that an educational intervention related to feedback would improve emergency medicine (EM) faculty and resident physician satisfaction with feedback.

Methods—This was a cluster-randomized, controlled study of 15 EM residency programs in 2007–2008. An educational intervention was created that combined a feedback curriculum with a card system designed to promote timely, effective feedback. Sites were randomized either to receive the intervention or to continue their current feedback method. All participants completed a web-based survey before and after the intervention period. The primary outcome was overall feedback satisfaction on a 10-point scale. Additional items addressed specific aspects of feedback. Responses were compared using a generalized estimating equations model, adjusting for confounders and baseline differences between groups. The study was designed to achieve at least 80% power to detect a one-point difference in overall satisfaction ($\alpha = 0.05$).

Results—Response rates for pre- and post-intervention surveys were 65.9% and 47.3% (faculty), and 64.7% and 56.9% (residents). Residents in the intervention group reported a mean overall increase in feedback satisfaction scores compared to those in the control group (mean increase 0.96 points, SE $\pm$ 0.44, $p = 0.03$), and significantly higher satisfaction with the quality, amount, and timeliness of feedback. There were no significant differences in mean scores for overall and specific aspects of satisfaction between the faculty physician intervention and control groups.

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The authors have no conflicts of interest to report.

Conclusions—An intervention designed to improve real-time feedback in the ED resulted in higher resident satisfaction with feedback received, but did not affect faculty satisfaction with the feedback given.

Introduction

Feedback, “an informed, non-evaluative, and objective appraisal of performance that is aimed at improving clinical skills,” is both crucial in medical education, and valued by adult learners.^{1,2} Recent multidisciplinary research on expert performance suggests that in the absence of adequate feedback, efficient learning is impossible, and improvement only minimal, even for highly motivated subjects.³ Elements of effective feedback have been proposed as “timely, specific, and respectful” and some specific techniques for delivering feedback have been published.^{4,5} Although medical training program requirements mandate the delivery of “timely and regular performance feedback” by faculty, the best mechanism to deliver feedback is not specified.⁶

One intervention that has been proposed to prompt feedback is a written card, which serves to facilitate timely and specific discussions about learner performance in the clinical teaching environment. Prior studies of feedback card interventions in non-emergency medicine (EM) learners suggest that the face-to-face feedback is well-received, that feedback written on cards correlates with clinical performance ratings on the learners' final grades, and that faculty using feedback cards provide feedback over a range of competencies.⁷⁻⁹ However, feedback card interventions have yet to be studied in EM residency programs.

Factors such as the unpredictable and variable educational conditions in the emergency department (ED) and the time pressures posed by overcrowding and the fast-paced ED environment make delivery of consistent and frequent feedback during faculty-resident interactions difficult.¹⁰⁻¹² Despite these barriers, the frequent opportunities for direct observation and multiple face-to-face interactions that occur when faculty and residents work side by side for an entire shift render the ED well-suited to studying faculty-resident feedback interactions.

We created an educational intervention that combined a feedback curriculum and a standardized feedback card designed to promote effective feedback in the ED. Drawing from adult education theory and prior knowledge about effective educational feedback, this intervention was designed to improve learner and educator satisfaction with feedback. This study tested the hypothesis that this educational intervention would improve EM faculty and resident physician satisfaction with feedback delivery in the ED.

Methods

Study Design

This was a prospective, cluster-randomized, controlled study of 15 EM residency programs to assess the effectiveness of an educational intervention designed to improve feedback. The unit of randomization was the residency program. This study was reviewed and approved by the local institutional review board at each site.

Study Setting and Population

This study was conducted at 15 Accreditation Council for Graduate Medical Education (ACGME) accredited EM residency programs in the United States. All residents and core clinical faculty in each program were eligible to participate. Study investigators were exempt from participating. Each site had one to two study investigators. All faculty

physicians had primary teaching appointments and worked the majority of their clinical shifts with residents. Participation was voluntary and confidential.

Study Protocol

We created an educational intervention that combined a feedback curriculum with a card system designed to promote timely, effective, feedback. The curriculum included a training session for both residents and faculty that was comprised of a didactic component, a handout, and a video training module. The content was based on recommendations from the medical education literature regarding giving and receiving effective feedback.¹ The standardized feedback card was created by a subcommittee of the Council of Emergency Medicine Residency Directors (CORD) Standardized Evaluation Methods Committee. Examples of feedback cards currently in use were solicited from all CORD members, and then a standardized feedback card was created by expert consensus from subcommittee members that incorporated the strengths of the feedback cards that are currently in use. Literature-based recommendations (that feedback be specific, timely, face-to-face, based on behaviors, aiming to improve performance, and soliciting learner involvement) were also used to guide design.¹ The card was designed to be used in real time during ED shifts, and to prompt a brief, timely discussion between the resident and the faculty physician that would convey specific information for the purpose of improving the resident's performance. The card included an area for resident self-evaluation and an area for the educator to give one specific suggestion for improvement, and listed level-based expectations for each of the core competencies to prompt the educator to give competency-based feedback. Both the feedback curriculum and the card were piloted at the principal investigator's residency program and subsequently revised based on feedback from residents and faculty physicians at that site. The feedback card used at all sites is attached (Figure 1).

Residency programs were randomized either to receive the intervention (intervention group) or continue their current method of feedback (control group) based on a randomization plan produced by a pseudo-random numbers generator using PROC PLAN in SAS 9.1.3 (SAS Institute Inc., Cary, NC). All sites described their current method of feedback as informal, meaning there was a general expectation that faculty would deliver feedback to residents, but there had been no recent formal feedback training and there was no documentation of feedback occurring at the time. One site had previously implemented a daily shift evaluation card process that was no longer in place at the time of enrollment in this study, but felt that participation in this process was informal, and that the focus of the card had been to serve as an evaluation of the shift performance rather than to prompt real-time educational feedback. Eligible residents and faculty physicians at all sites received invitations to participate, along with study information sheets via e-mail. All participants completed a web-based survey via SurveyMonkey (www.surveymonkey.com) before and after the study period. The baseline surveys (available as a Data Supplement) were conducted at each program during a one-month period between November 2007 and March 2008 to assess perceptions about receiving and giving feedback. Completion of the survey was considered consent to participate. During the baseline survey month, two additional e-mailed reminders were sent to encourage participation. The results from the baseline survey describing resident and faculty perceptions in the ED have been previously published.¹³

After the baseline survey administration period was closed, intervention sites piloted the curriculum and feedback card system over a one-month period, and then implemented the feedback cards in practice for three months. Participants were instructed to use the cards as a prompt to elicit or give feedback, and residents were given primary responsibility for initiating this feedback process. Residents were asked to turn in approximately one card per shift for at least two-thirds of their shifts that month. A research assistant or residency coordinator at each intervention site was assigned to contact residents at regular intervals to

track compliance with the feedback card system. After completion of the intervention period, both intervention and control sites completed a post-intervention survey that was identical to the baseline survey. Similarly to the baseline survey, all eligible residents and faculty physicians received an e-mail invitation to take a survey via SurveyMonkey, and received two additional e-mail reminders to encourage participation.

Measurements

The pre- and post-intervention web-based surveys were designed using the Tailored Design Method, and were reviewed by a group of clinician-educators with experience in instrument development in order to maximize the construct validity of the instrument.¹⁴ Tailored Design encourages applying social exchange theory to survey development and administration in order to improve both response rates and information quality in survey studies. Specific emphasis is placed on establishing respondent trust, and increasing the rewards while decreasing the social costs associated with participating in the survey. Content was determined based on available literature and as a result of focus groups conducted by the principal investigator with residents and faculty at the pilot site. The surveys were further revised based on feedback from residents and faculty about ambiguous items after the pilot. Common items on the surveys for the two groups were worded identically, except for grammatical changes needed to reflect that the items referred to the process of *receiving feedback* on the resident survey, and *giving feedback* on the faculty survey.

The survey defined feedback as a specific and timely appraisal of a resident's performance in the ED, verbally communicated to them during or directly after their ED shift by a faculty physician who has been working with them. The survey introduction included several examples of what feedback may include and what is not considered feedback. Respondents were asked to rate overall feedback satisfaction on a 10-point scale, and to rate their satisfaction with three specific aspects of feedback on a 4-point Likert scale (extremely dissatisfied, somewhat dissatisfied, somewhat satisfied, extremely satisfied). Respondents were also prompted to rate the quality of different types of feedback on a 5-point Likert scale (poor, fair, good, very good, excellent) with an N/A category for the case of inadequate information. A separate item addressed who usually initiates feedback in the ED, and another item asked participants whether they gave or received feedback that met their expectation during their most recent shift in the ED.

Data Analysis

The primary outcome was overall resident and faculty satisfaction with feedback in the ED, measured on a 10-point scale. To facilitate analysis, Likert-scale responses to questions regarding satisfaction with specific aspects of feedback were collapsed into two categories, as satisfied ("somewhat satisfied" or "extremely satisfied") versus dissatisfied ("somewhat dissatisfied" or "extremely dissatisfied"). Responses rating the quality of specific aspects of feedback were dichotomized as "very good/excellent" vs. "good/fair/poor." In analyzing the item regarding who initiates feedback, the percentages of subjects who responded that the faculty physician usually initiated feedback were compared between both groups.

Resident and faculty characteristics were summarized using descriptive statistics. Differences in population characteristics between the intervention and control groups at baseline were compared using a chi-square test for residents and faculty. We used a linear generalized estimating equations (GEE) model to compare the change in overall satisfaction from pre- to post-intervention between the intervention and control groups for residents and faculty separately. A "difference of differences" approach was performed by entering the interaction term between group (intervention vs. control) and time period (baseline vs. post-

intervention) into the model. This approach estimates the mean change in overall satisfaction between baseline and post-intervention survey periods for intervention and control groups, separately, and compares this change between intervention and control groups. Therefore this approach uses a net *absolute* change after controlling for both baseline differences and temporal fluctuations to measure the effect of intervention. Temporal fluctuations were measured by the pre- and post-intervention change in the control group since no change was expected in the control group. We confirmed the appropriateness of using a linear model for the outcome of satisfaction on a 10-point scale by checking and satisfying the assumptions of normality and homogenous variances for the linear model. Responses from faculty and residents of the same EM program were not independent, and the GEE approach accounts for this correlation among responses within a single program.

For dichotomized responses, a logistic GEE model was used to assess the effect of intervention. Again, the interaction term of group and time period was used in the model. However, since logistic regression is a multiplicative model, the effectiveness of the intervention was characterized by “ratio of odds ratio (OR)” to reflect a net *relative* change (in odds) after adjusting for baseline differences and temporal change. A ratio of OR larger than (or less than) 1 indicates the intervention leads to a larger increase (or decrease) in the proportion of events compared to the change in the control group. Thus, a significant ratio of OR indicates significant effectiveness of the intervention.

Since there was evidence that the baseline characteristics of faculty and residents were different between the intervention and control groups (Tables 1 and 2), we included these characteristics in the linear and logistic GEE models to control for potential confounding. We did additional sensitivity analyses by only including significant characteristics in the model, which provided similar results on the effectiveness of the intervention. Therefore, we reported results from the model with all characteristics (Tables 1 and 2) for consistency in analysis. In addition, to facilitate the interpretation of the models, we calculated the least square (or marginal) means for overall satisfaction and least square proportions of response categories for dichotomized responses, for intervention and control groups at baseline and after intervention, respectively, from the GEE logistic regression models. Least square means and proportions were estimated means and proportions after having controlled for population characteristics. All reported means and proportions in the results and tables are least square means and proportions. In addition, to correct for multiple comparisons for the dichotomized outcomes, we calculated adjusted P-values by controlling for the false discovery rate as the traditional Bonferroni correction was too stringent.¹⁵ All analyses were performed using SAS 9.1.3 (SAS Institute Inc., Cary, NC) except for calculating adjusted P-values, for which R 2.7.0 was used (The R Foundation for Statistical Computing, Vienna, Austria).

Power and sample size calculation—Based on the primary outcome, the study was designed to achieve at least 80% power to detect a one-point difference in overall satisfaction ($\alpha = 0.05$). Conservatively assuming that the correlation among responses within a single program (intra-cluster correlation) is 0.05, and that there were 25 subjects (faculty or residents) on average from each program, then a total of 14 clusters (programs) (seven per group) was needed to detect the one-point difference with 82% power given an estimate of standard deviation being 2.0 based on our pilot study.

Results

Response rates at baseline- and after-intervention surveys were 301 out of 457 (65.9%) and 216 out of 457 (47.3.1%) for faculty, and 324 out of 501 (64.7%) and 285 out of 501 (56.9%) for residents. Resident and faculty characteristics at baseline by intervention group

are described in Tables 1 and 2, respectively. There were more male residents in the control group than the intervention group (68.5% vs. 48.7%, $P < 0.0001$). Year of residency training and anticipated practice setting were also different between residents in the intervention and control groups.

The intervention significantly improved the overall satisfaction of residents with feedback ($P = 0.0336$) after adjusting for baseline characteristics. For residents in the intervention group, the reported mean score (standard error [$\pm$ SE]) increased to 6.31 (SE $\pm$ 0.48) after intervention from 5.38 (SE $\pm$ 0.39) at baseline, while the mean scores for residents in the control group were 5.44 (SE $\pm$ 0.29) and 5.41 (SE $\pm$ 0.28) before and after intervention, respectively. The mean change in feedback satisfaction score was 0.96 points (95% CI = 0.07 to 1.86) higher in the intervention group compared to the change in score of the control group. In contrast, at baseline and after intervention, faculty reported a mean score of 5.82 (SE $\pm$ 0.20) and 5.62 (SE $\pm$ 0.32) for the intervention group, and 5.83 (SE $\pm$ 0.17) and 5.40 (SE $\pm$ 0.18) for the control group. No significant difference was found in the difference of mean change in satisfaction score between the intervention and control groups ($P = 0.514$).

Intervention also significantly improved the satisfaction of residents with overall quality of feedback, amount of feedback, and timeliness of feedback (Table 3). For example, 89% of residents were satisfied with the overall quality of feedback after intervention compared to 72% at baseline, while the control group did not show any increase (74% at baseline; 67% after intervention). On the other hand, there were no significant changes in the satisfaction of faculty with the overall quality, amount, and timeliness of feedback after intervention (Table 3).

Table 4 reports the comparison of the ratings between intervention and control groups on the quality of specific types of feedback received by residents and given by faculty. Residents in the intervention group were more likely to rate feedback about professionalism as “very good/excellent” after the intervention compared to the control group ($P = 0.03$); there were no differences in the other types of feedback. Again, the intervention had no significant effect on the faculty rating of specific types of feedback (Table 4).

When looking at who usually initiates feedback, there was a significant decrease in the proportion of faculty who state that they usually initiate feedback in the intervention group when compared to the control group (ratio of OR 0.23; $P = 0.0313$). About 88% of faculty in the intervention group stated they usually initiate feedback at baseline and the proportion decreased to 74% after intervention. The proportions were 82% and 89% before and after intervention in the control group. For residents, the intervention had no significant effect on the proportion who state faculty usually initiate feedback compared to the control group ($P = 0.52$), although at baseline a minority of residents stated faculty usually initiate feedback (39% and 43% for the intervention and control group, respectively).

Finally, the intervention did not significantly affect the proportion of faculty who reported giving feedback that met their expectations during their most recent ED shift (ratio of OR 1.07, 95% CI = 0.49 to 2.31; $P = 0.81$), nor the proportion of residents who answered that they received feedback that met their expectations during the last shift worked (ratio of OR 2.05, 95% CI = 0.81 to 5.17; $P = 0.13$).

Discussion

To the best of our knowledge, our study on feedback is the first to use a randomized, controlled design to test the effect of a feedback intervention, and also to examine satisfaction with feedback as an outcome measure.

Our study showed that overall resident satisfaction with feedback, as well as resident satisfaction with the quality, amount, and timeliness of feedback, was significantly improved in the intervention group as compared to the control group. In contrast, there were no significant differences in any of these measures when comparing the faculty control and intervention groups.

There may be several reasons why our intervention improved resident, but not faculty, satisfaction with the feedback process. One reason might be that faculty physicians were more satisfied at baseline with the feedback they give residents in the ED, and therefore were less likely to report that any intervention would improve upon this already high level of satisfaction. For example, 88% of the control group faculty stated that they were the ones who initiated feedback. Perhaps the improvement in resident satisfaction we found in the intervention group was related to residents becoming more actively engaged in, and more cognizant of, the feedback process. Residents were encouraged to initiate the feedback encounter and were specifically asked to prompt their faculty physicians to fill out a feedback cards if they had not yet received feedback during those shifts. Given that adult learners often value educational experiences that they direct and engage in, the active nature of the intervention might have appealed to the residents.¹⁶

Another reason might be that faculty physicians and residents had different conceptions of the scope, definition, and process of feedback. A previous study showed that while faculty physicians define feedback as *a process leading to a change in behavior*, residents define it as an *exchange of information*.¹⁷ Even though the intervention group received training on our working definition of feedback, residents may have valued the exchange of information more than a resultant change in behavior. This may have been reflected in their reported level of satisfaction. In other words, residents may have been more satisfied by the increased exchange of information resulting from the intervention. We did not design the study to determine whether this increase in feedback ultimately changed resident performance, but this is important to educators and warrants further study.

It does seem that residents increasingly view timely feedback as important, and may refer to the quality and effectiveness of feedback as part of their periodic evaluations of faculty physicians as required by the Residency Review Committee for Emergency Medicine. In addition, regular and effective feedback may have an effect on the perception that residents are actively being taught during their shifts, and are not present only for service. This “service versus education” issue is an important concern of the ACGME, and programs in EM are often cited because of resident perceptions that their programs emphasize service over education.¹⁸

Limitations

Several limitations of this study should be considered. The response rates are lower than optimal for a survey method study. However, we used a conservative method to calculate the response rates that likely underestimate the true response rates. The invitation to participate in each survey was sent by the site investigator at each residency program to all residents and faculty in the program. The number of returned surveys was divided by each site investigator's reported number of total faculty and residents in the program to calculate the response rate. Although each site investigator attempted to ensure that all active faculty and residents received the e-mail invitation, there was no way to determine those who received an e-mail but declined to participate, versus those who never received the e-mail due to full mailboxes, e-mail filters, or errors in sending. Therefore, the denominator for the response rates includes both of these groups.

There may be selection bias, in that the faculty and residents who chose to respond to the survey may have different perceptions than non-responders. While external validity may be limited with our sample of 15 sites, the study sample included large and small medical centers from both urban and community sites that represented a wide range of geographic areas. Therefore, we believe that the findings are likely to be generalizable.

The outcomes measured in this study, namely resident and faculty satisfaction with the feedback, are subjective. However, to our knowledge, there are no more objective measures of feedback effectiveness currently being utilized or studied, i.e., no “gold standard” to measure the quality of educational feedback. Given that the subjects were advanced adult learners, we propose that their perception of whether or not the feedback meets their expectations is the most relevant outcome measure. Future studies may seek to determine if there is an association with resident satisfaction of feedback and more objective performance measures, and to determine if residents who are satisfied with the feedback they receive actually perform better than those who are not satisfied.

Finally, while every effort was made to standardize the training sessions and set consistent expectations for implementing the feedback card system, undoubtedly there was variability in the intervention between sites. Some participants were likely much more compliant with the feedback cards than others. While site coordinators did attempt to track residents' participation in the intervention, not all sites were able to accurately document the exact number of cards each resident used each month, preventing us from reporting these data. However, as this was a study of an educational intervention, we designed the study to test the effect of the intervention when implemented in real-life conditions. We created the intervention and card to be user-friendly and convenient to implement, with the *a priori* assumption that any educational intervention is unlikely to have 100% participation from learners and educators. Therefore, we did not attempt to ensure that all sites were receiving truly identical interventions because we did not feel this would give us a realistic approximation of the effect of the intervention if it was applied in the non-research environment. Similarly, the “intervention” included both a curriculum and a card system because we felt that any tool would ideally be implemented with faculty and resident training in order to increase its utility in real-life conditions. However, because we designed the intervention in this manner, we cannot definitively state whether the card, the curriculum, or a combination of the two accounted for the increase in resident satisfaction with feedback.

Conclusions

An educational intervention and feedback card system is feasible to implement in the ED setting. In our study this intervention improved resident, but not faculty, satisfaction with feedback. Because the ED provides a rich clinical teaching environment for giving feedback, it is likely that successful interventions to improve feedback in the ED setting may be effectively adapted for other clinical settings as well. Future studies should examine the reliability and reproducibility of feedback from different observers, and whether this feedback leads not only to higher levels of satisfaction, but also to enhanced resident performance and patient outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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*Appendix: Study Group Authorship

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360 Residency Chart/D2/D3/D4 Evaluation Card

Instructions: Please complete this card for each resident who has completed the required rotations and is eligible for evaluation.

Resident Self-Evaluation

Faculty Evaluation

Comments: Please provide a brief summary of the resident's performance and any areas for improvement.

Other comments:

Resident Signature: _____

Faculty Signature: _____

Competency	Resident	Faculty
1. History and Physical Examination	1	1
2. Diagnostic Reasoning	1	1
3. Therapeutic Reasoning	1	1
4. Patient Management	1	1
5. Communication	1	1
6. Professionalism	1	1
7. Teamwork	1	1
8. Quality Improvement	1	1
9. Research	1	1
10. Leadership	1	1
11. Teaching	1	1
12. Ethics	1	1
13. Global Health	1	1
14. Health Systems	1	1
15. Population Science	1	1
16. Biostatistics	1	1
17. Epidemiology	1	1
18. Public Health	1	1
19. Health Policy	1	1
20. Health Law	1	1
21. Health Economics	1	1
22. Health Services Research	1	1
23. Health Equity	1	1
24. Health Disparities	1	1
25. Health Promotion	1	1
26. Disease Prevention	1	1
27. Health Behavior	1	1
28. Health Communication	1	1
29. Health Education	1	1
30. Health Marketing	1	1
31. Health Communication Research	1	1
32. Health Behavior Research	1	1
33. Health Services Research	1	1
34. Health Policy Research	1	1
35. Health Law Research	1	1
36. Health Economics Research	1	1
37. Health Systems Research	1	1
38. Population Science Research	1	1
39. Biostatistics Research	1	1
40. Epidemiology Research	1	1
41. Public Health Research	1	1
42. Health Policy Research	1	1
43. Health Law Research	1	1
44. Health Economics Research	1	1
45. Health Systems Research	1	1
46. Population Science Research	1	1
47. Biostatistics Research	1	1
48. Epidemiology Research	1	1
49. Public Health Research	1	1
50. Health Policy Research	1	1
51. Health Law Research	1	1
52. Health Economics Research	1	1
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55. Biostatistics Research	1	1
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57. Public Health Research	1	1
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65. Public Health Research	1	1
66. Health Policy Research	1	1
67. Health Law Research	1	1
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82. Health Policy Research	1	1
83. Health Law Research	1	1
84. Health Economics Research	1	1
85. Health Systems Research	1	1
86. Population Science Research	1	1
87. Biostatistics Research	1	1
88. Epidemiology Research	1	1
89. Public Health Research	1	1
90. Health Policy Research	1	1
91. Health Law Research	1	1
92. Health Economics Research	1	1
93. Health Systems Research	1	1
94. Population Science Research	1	1
95. Biostatistics Research	1	1
96. Epidemiology Research	1	1
97. Public Health Research	1	1
98. Health Policy Research	1	1
99. Health Law Research	1	1
100. Health Economics Research	1	1

Figure 1. Feedback card

Table 1
Resident Respondent Characteristics at Baseline

Characteristics	Intervention, n (%)	Control, n (%)	P-value
Male	55/113 (48.7)	139/203 (68.5)	0.0005
Residency year	<u>n = 113</u>	<u>n = 203</u>	
EM1	36 (31.9)	72 (35.5)	<0.0001
EM2	28 (24.8)	76 (37.4)	
EM3	34 (30.1)	54 (26.6)	
EM4	15 (13.3)	1 (0.5)	
Residency setting	<u>n = 112</u>	<u>n = 202</u>	
Academic	85 (75.9)	150 (74.8)	0.55
Community	13 (11.6)	50 (15.4)	
Equal mix of academic and community	14 (12.5)	34 (9.9)	
Anticipated practice setting	<u>n = 113</u>	<u>n = 203</u>	
Academic	14 (12.4)	19 (9.4)	0.0011
Community	29 (25.7)	95 (46.8)	
Equal mix of academic and community	65 (57.5)	87 (42.9)	
Other	5 (4.4)	2 (1.0)	

Note: The denominator for each characteristic reflects the number of total respondents who answered each question.

All reported means and proportions are least square means and proportions.

Table 2
Faculty Respondent Characteristics

Characteristics	Intervention, n (%)	Control, n (%)	P-value
Male	98/128 (76.6)	126/165 (76.4)	0.97
Academic rank	<u>n = 130</u>	<u>n = 166</u>	
Clinical Instructor	19 (14.6)	37 (20.5)	
Assistant Professor	72 (55.4)	79 (47.6)	0.43
Associate Professor	26 (20.0)	32 (19.3)	
Professor	13 (10.0)	21 (12.7)	
Length of time teaching residents	<u>n = 129</u>	<u>n = 166</u>	
0-5 years	43 (33.3)	118 (41.6)	
6-10 years	37 (28.7)	69 (15.1)	
11-15 years	15 (11.6)	39 (12.7)	0.04
15-20 years	18 (14.0)	38 (12.1)	
>20 years	16 (12.4)	47 (18.7)	
Academic track	<u>n = 129</u>	<u>n = 166</u>	
Clinician-educator	83 (64.3)	101 (60.8)	
Clinician-researcher	20 (15.5)	29 (17.5)	0.90
Clinician-administrator	24 (18.6)	32 (19.3)	
Other	2 (1.6)	4 (2.4)	
Primary setting	<u>n = 129</u>	<u>n = 167</u>	
Academic	93 (72.1)	127 (76.1)	
Community	18 (14.0)	22 (13.2)	0.85
Equal mix of academic and community	11 (13.2)	17 (10.2)	
Other	7 (0.8)	1 (0.6)	

Note: The denominator for each characteristic reflects the number of total respondents who answered each question.

All reported means and proportions are least square means and proportions.

Comparison of the proportion of satisfaction between intervention and control groups on specific types of feedback received by residents and given by faculty based on the GEE logistic regression model*.

Table 3

Satisfaction with specific aspects of feedback	Proportions of rating as Satisfaction				Ratio of OR (95% CI)	P-value	
	Intervention		Control			Raw	FDR controlled
	Before	After	Before	After			
Residents							
Overall quality of feedback	0.72	0.89	0.74	0.67	4.43 (1.66-11.79)	0.003	0.012 [†]
Amount of feedback	0.42	0.78	0.52	0.50	5.35 (2.27-12.60)	0.0001	0.0012 [†]
Timeliness of feedback	0.59	0.81	0.60	0.54	3.80 (1.62-8.92)	0.002	0.012 [†]
Faculty							
Overall quality of feedback	0.76	0.73	0.78	0.74	1.06 (0.44-2.57)	0.89	0.89
Amount of feedback	0.47	0.49	0.48	0.49	1.10 (0.47-2.62)	0.82	0.89
Timeliness of feedback	0.66	0.71	0.71	0.65	1.60 (0.76-3.37)	0.22	0.71

* For resident, the model adjusted for sex, residency year, residency setting, and anticipated practice setting. For faculty, the model adjusted for sex, academic rank, length of time teaching residents, academic track, and primary setting.

[†] P-value < 0.05.

All reported means and proportions in the results and tables are least square means and proportions.

FDR = false discovery rate

Table 4

Comparison of the ratings between intervention and control group on the quality of specific types of feedback received by residents and given by faculty based on the GEE logistic regression model*.

Quality of Specific Types of Feedback	Proportions of rating as “very good/excellent”				Ratio of OR (95% CI)	Raw	FDR controlled	P-value
	Intervention		Control					
	Before	After	Before	After				
Residents								
Positive feedback	0.39	0.59	0.40	0.44	1.92 (0.84-4.40)	0.12		0.17
Constructive feedback	0.21	0.40	0.32	0.33	2.34 (0.97-5.63)	0.06		0.12
Feedback on fund of knowledge	0.22	0.35	0.22	0.25	1.60 (0.69-3.74)	0.27		0.32
Feedback about communication skills	0.30	0.60	0.35	0.39	2.83 (1.03-7.75)	0.04		0.10
Feedback about professionalism	0.37	0.62	0.32	0.35	2.55 (1.24-5.26)	0.01		0.03 [†]
Feedback about procedural skills	0.51	0.67	0.47	0.54	1.54 (0.64-3.75)	0.34		0.37
Feedback about documentation	0.38	0.49	0.36	0.47	1.01 (0.47-2.19)	0.97		0.97
Feedback about management of ED flow	0.36	0.62	0.33	0.38	2.30 (0.87-6.06)	0.09		0.15
Feedback about evidence-based decision making	0.23	0.43	0.30	0.31	2.33 (0.77-7.04)	0.13		0.17
Faculty								
Positive feedback	0.48	0.54	0.46	0.40	1.58 (0.65-3.80)	0.31		0.71
Constructive feedback	0.24	0.26	0.26	0.22	1.42 (0.61-3.31)	0.42		0.71
Feedback on fund of knowledge	0.17	0.16	0.20	0.14	1.34 (0.37-4.84)	0.66		0.88
Feedback about communication skills	0.21	0.20	0.19	0.14	1.29 (0.75-2.22)	0.36		0.71
Feedback about professionalism	0.25	0.25	0.22	0.20	1.11 (0.48-2.57)	0.81		0.89
Feedback about procedural skills	0.48	0.43	0.38	0.41	0.73 (0.32-1.71)	0.47		0.71
Feedback about documentation	0.35	0.42	0.31	0.29	1.52 (0.92-2.52)	0.10		0.71
Feedback about management of ED flow	0.38	0.49	0.32	0.33	1.43 (0.57-3.58)	0.45		0.71
Feedback about evidence-based decision making	0.26	0.26	0.24	0.29	0.76 (0.37-1.56)	0.46		0.71

* For resident, the model adjusted for sex, residency year, and anticipated practice setting. For faculty, the model adjusted for sex, academic rank, length of time teaching residents, academic track, and primary setting.

[†] P-value < 0.05.

All reported means and proportions in the results and tables are least square means and proportions.

FDR = false discovery rate