# Instituting a Postoperative Feedback Process for Orthopedic Surgery Residents

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**COMPETENCIES:** Medical Knowledge, Interpersonal and Communication Skills, Practice-Based Learning and Improvement

## INTRODUCTION

A chief concern in medical education is integrating performance feedback into daily work for resident physicians.[1-3] Similarly, the most common complaint made by our orthopedic surgery residents is the lack of immediate and granular feedback from clinical faculty. A study found surgical residents are less satisfied with the timing, amount, and specificity of feedback compared to clinical faculty.[4] These differences in perception between faculty and residents can create a gap not only in providing feedback, but also in the perception that one has received adequate feedback on their work performance.[5]

In an attempt to address this problem, in early 2016, the Department of Orthopedic Surgery at Virginia Commonwealth University invited an educational consultant to help improve resident education and improve feedback processes. A major aim was to institute a simple, applicable, and effective process for faculty to provide immediate, structured, and specific feedback to residents. The surgical setting was identified as an ideal area to test this intervention. With the guidance of our consultant, we elected to use Pendleton's Rules as our feedback model because of its simplicity, ease of use, a proven track record, and because it could be readily implemented into our workflow.[6] Pendleton's Rules is a formative feedback tool meant to inform learners of positive aspects of performance first and then discuss areas for improvement.[6] The structured approach allows for reflection and self-assessment on performance rather than solely focusing on criticisms.[7] Such an approach allows active engagement between learner and teacher rather than the ineffective one-way feedback process from teacher to learner.[7] A typical feedback dialogue would consist of 4 questions: Surgeon to resident: what do you think went well with the surgery? Resident to surgeon: what do you think went well with the surgery? Surgeon to resident: what would you do differently next time? Resident to surgeon: what would you do differently next time? While Pendleton's Rules and other feedback models are frequently discussed in surgical medical education,[7,8] we could not find research articles that formally evaluated effectiveness of the application of Pendleton's Rules in the operating room and subsequent impact on closing the gap between faculty and residents' perceptions on whether feedback was given effectively to trainees. A recent literature review on feedback in surgical education concluded that while numerous models of feedback have been discussed in medical literature, the actual value of such models is still unclear when applied to practice.[8]

Along with training the department's faculty and residents on the feedback methodology in April, 2016, departmental leadership selected several clinical faculty and 2 residents to be the "champions" of the project to support and sustain the change effort. Using a train-the-trainer model, the champions were formally trained on how to effectively give feedback using Pendleton's Rules.[6,9] The champions subsequently lead a formal training session for the remaining faculty and residents, and both the faculty and residents pledged to engage in the feedback process as much as possible immediately after surgical cases. Furthermore, residents were asked at the end of the academic year whether each departmental faculty member engaged in the feedback process after the operative case; these data were then reviewed during each faculty member's one-on-one performance meeting with the chairman to foster accountability in engaging in the desired behavior.

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  1931-7204/$30.00
https://doi.org/10.1016/j.jsurg.2019.03.007

**TABLE 1.** Wilcoxon Signed-Ranks Test Before and After Implementation of Postoperative Feedback Process on a 5-point Likert Scale (0 = never, 4 = Every Time)

| Survey Item | Before Post-Op Feedback Process Mean ± SD | After Post-Op Feedback Process Mean ± SD | Wilcoxon Signed-Ranks Test |
|---|---|---|---|
| Residents | | | |
| After each operative case, my attendings asked me what went well during the case. | 1.24 ± 0.75 | 2.47 ± 0.51 | $p < 0.001$ |
| After each operative case, my attendings told me what went well during the case. | 1.29 ± 0.69 | 2.47 ± 0.51 | $p < 0.001$ |
| After each operative case, my attendings asked me what could be improved. | 1.12 ± 0.70 | 2.41 ± 0.51 | $p < 0.001$ |
| After each operative case, my attendings told me what could be improved. | 1.29 ± 0.59 | 2.41 ± 0.51 | $p < 0.001$ |
| I received immediate feedback from faculty after each operative case. | 1.18 ± 0.64 | 2.53 ± 0.51 | $p < 0.001$ |
| I received a sufficient amount of feedback to direct my learning in the OR. | 1.65 ± 0.70 | 2.71 ± 0.59 | $p < 0.001$ |
| I received relevant feedback to direct my learning in the OR. | 1.94 ± 0.83 | 2.88 ± 0.60 | $p = 0.001$ |
| I was satisfied in my clinical training after each operative case. | 2.24 ± 0.83 | 2.94 ± 0.56 | $p = 0.006$ |
| Faculty | | | |
| After each operative case, I asked my resident(s) what went well during the case. | 1.72 ± 1.02 | 2.72 ± 0.57 | $p = 0.004$ |
| After each operative case, I told my resident(s) what went well during the case. | 2.17 ± 0.86 | 2.89 ± 0.47 | $p < 0.010$ |
| After each operative case, I asked my resident(s) what could be improved. | 2.00 ± 0.91 | 2.78 ± 0.55 | $p = 0.004$ |
| After each operative case, I told my resident(s) what could be improved. | 2.39 ± 0.70 | 2.83 ± 0.62 | $p = 0.005$ |
| I gave immediate feedback after each operative case. | 2.06 ± 0.73 | 2.78 ± 0.65 | $p = 0.001$ |
| I gave a sufficient amount of feedback to direct resident learning in the OR. | 2.39 ± 0.78 | 2.83 ± 0.62 | $p = 0.033$ |
| I gave relevant feedback to direct resident learning in the OR. | 2.65 ± 0.61 | 3.00 ± 0.61 | $p = 0.034$ |
| I was satisfied in my clinical teaching after each operative case. | 2.50 ± 0.51 | 2.83 ± 0.62 | $p = 0.034$ |

## MATERIALS AND METHODS

Residents and faculty were recruited to complete an Institutional Review Board approved, anonymous survey on the postsurgery feedback process in June 2017. The 8 evaluation items, rated on a 5-point Likert scale (0 = never, 4 = every time), were based on the learning and behavioral objectives related to the educational innovation. Survey questions were drafted based on the Kirkpatrick's Evaluation Model[10] in which reactions, knowledge, and skill transfer are evaluated based on relevant learning and behavioral objectives. Respondents were asked to answer each question in a retrospective manner, allowing a more accurate comparison before and after the implementation of the feedback process. The survey questions, listed in Table 1, evaluated whether faculty engaged in the feedback session, whether feedback perceived was effective and overall satisfaction with the process. A researcher external to the department recruited resident participants

**TABLE 2.** Perceptions Between Faculty and Residents on Post-Op Feedback Process Before and After the Intervention

| Survey Item | Before Intervention | | After Intervention | |
|---|---|---|---|---|
| | Mann-Whitney *U* | p Value | Mann-Whitney *U* | p Value |
| Asked resident(s) what went well during the case? | 109.50 | 0.13 | 119.00 | 0.20 |
| Told resident(s) what went well during the case? | 71.50 | 0.00 | 93.50 | 0.02 |
| Asked resident(s) what could be improved? | 71.00 | 0.00 | 102.00 | 0.05 |
| Told resident(s) what could be improved? | 41.00 | 0.00 | 102.50 | 0.07 |
| Gave immediate feedback after each operative case. | 62.50 | 0.00 | 123.00 | 0.26 |
| Gave a sufficient amount of feedback to direct resident learning in the OR. | 78.50 | 0.01 | 137.00 | 0.54 |
| Gave relevant feedback to direct resident learning in the OR. | 77.50 | 0.01 | 138.00 | 0.56 |

at a resident-only conference and recruited participation from clinical faculty at a faculty-only meeting to complete our survey. Participants completed the paper survey and returned it to the researcher in a large yellow envelope to ensure confidentiality.

To assess whether individual faculty engaged in the postfeedback session, a new item was added to residents' year-end evaluations of clinical faculty, "The attending routinely performs the postsurgery feedback session." Each resident anonymously rated each of the 27 faculty members on the item using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). All 25 residents completed the faculty evaluation in June 2017 and the residency program coordinator provided the research team with deidentified scores for each faculty member.

Wilcoxon-Signed Ranks Test was used to analyze whether objectives were met postintervention, and the Mann-Whitney *U* Test was used to gauge whether differences in perception between faculty and residents narrowed postintervention. Percentage agreement was calculated to analyze the faculty evaluation item for the 27 attending physicians.

## RESULTS

There was significant improvement postimplementation of the postoperative feedback process for both residents and faculty across all 8 objectives (Table 1). In addition, retrospective ratings of improvement resulted in less variance between resident and faculty ratings on objectives after implementation.

Residents and faculty had significantly different perceptions on the feedback process in the operating room setting before the intervention took place, however their ratings on the feedback process after the intervention were not significantly different (Table 2). Even in a retrospective survey, there was disagreement between residents and faculty on how the feedback process existed prior to the intervention, however both groups had similar perceptions on the effectiveness of the feedback process after the intervention suggesting the gap between faculty and resident on whether feedback was given and received was potentially reduced after our intervention.

Based on the faculty evaluation data, at least half of the residents agreed or strongly agreed that 23 out of 27 (85%) clinical orthopedic surgery faculty members routinely performed the postsurgery feedback session (Table 3).

**TABLE 3.** Individual Faculty Evaluation Rating by Residents: "The Attending Routinely Performs the Postsurgery Feedback Session"

| Coded Faculty | % of Residents Who Agreed or Strongly Agreed | Mean ± SD |
|---|---|---|
| Attending A | 100% | 5.00 ± 0.00 |
| Attending B | 100% | 4.89 ± 0.32 |
| Attending C | 100% | 4.89 ± 0.32 |
| Attending D | 100% | 4.79 ± 0.42 |
| Attending E | 100% | 4.79 ± 0.42 |
| Attending F | 95% | 4.84 ± 0.50 |
| Attending G | 95% | 4.75 ± 0.55 |
| Attending H | 93% | 4.50 ± 0.85 |
| Attending I | 92% | 4.54 ± 0.66 |
| Attending J | 92% | 4.46 ± 0.66 |
| Attending K | 92% | 4.38 ± 0.65 |
| Attending L | 86% | 4.29 ± 0.73 |
| Attending M | 81% | 4.25 ± 0.77 |
| Attending N | 79% | 4.29 ± 0.83 |
| Attending O | 79% | 3.95 ± 0.62 |
| Attending P | 77% | 4.36 ± 1.05 |
| Attending Q | 77% | 3.85 ± 0.55 |
| Attending R | 75% | 3.94 ± 0.85 |
| Attending S | 69% | 4.15 ± 1.07 |
| Attending T | 67% | 3.87 ± 0.74 |
| Attending U | 64% | 3.93 ± 1.00 |
| Attending V | 63% | 3.75 ± 0.71 |
| Attending W | 54% | 3.58 ± 0.97 |
| Attending X | 43% | 3.43 ± 1.20 |
| Attending Y | 38% | 3.08 ± 1.32 |
| Attending Z | 22% | 3.33 ± 0.71 |
| Attending AA | 6% | 2.33 ± 0.84 |

Note: Item was rated on 5-point Likert scale, 1 = Strongly Disagree, 5 = Strongly Agree.

## CONCLUSIONS

Based on our results, we believe the integration of Pendleton's Rules as a framework for faculty to provide feedback to residents after each operative case is an effective intervention that can be utilized by surgical training programs to improve resident teaching and learning. Feedback has been identified as a critical component in adult learning theory and within the context of educating trainees in medical education.[11] Research has found that attainment of goals requires feedback loops and core guidelines for giving feedback in medical education include: (1) a collaborative effort between teacher and trainee, (2) well-timed and expected feedback, (3) first-hand data that is limited in quantity and to behaviors that are remediable, (4) use of language that is nonevaluative, (5) description of specific situations rather than generalizations, (6) use of subjective feedback is framed as such, and (7) focus on decisions and actions that are void of assumptions.[12]

Despite the theoretical foundation of the benefits and features of feedback, the study of interventions to implement specific feedback models for residents and attendings in the operating room are limited.[8] A recent study in general surgery identified barriers to effective feedback as perceived by residents and attendings included time, competing end of case responsibilities, inappropriate environment, and lack of interest in engaging in feedback.[13] To combat such barriers, our adoption of Pendleton's Rules required multiple strategies to ensure adoption including efforts to structure a feedback process into current workflow, evaluate faculty participation, support process champions, and establish accountability through the chairman. Faculty feedback to residents increased in frequency and quality within several months, and it will hopefully continue to improve in the future as the faculty becomes more skilled and comfortable in providing feedback.

The intervention was low-cost, and support of the chairman and champions helped sustain improvement efforts and drive behavior change. The initial investment to implement the process change required training time for the champions and then additional time to train the remaining faculty and residents. While our department did not have expertise in Pendleton's Rules, we were able to enlist an educational expert to assist with training faculty and residents at minimal cost.

Our multifaceted approach in having "champions" to spearhead the intervention helped with buy-in, and we felt that training the residents in addition to the faculty would allow trainees to help initiate the feedback in addition to improving their own teaching skills. Hopefully, with continued training of new faculty and residents, this technique can become a permanent fixture in our department's culture of resident education.

The systematic use of Pendleton's rules to provide feedback after surgical cases is a low-cost and highly effective method of improving the resident educational experience in surgical training.

We believe this method of feedback will result in both improved quality of training and resident satisfaction.

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## SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.jsurg.2019.03.007.