Association for Surgical Education

A real-time mobile web-based module promotes bidirectional feedback and improves evaluations of the surgery clerkship


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Surgical education; Mobile; Evaluations; Medical students; Mistreatment; Reporting

Abstract

BACKGROUND: We implemented a real-time mobile web-based reporting module for students in our surgery clerkship and evaluated its effect on student satisfaction and perceived abuse.

METHODS: Third-year medical students in the surgery clerkship received surveys regarding intimidation, perceived abuse, satisfaction with clerkship resources, and interest in a surgical career. Survey data were analyzed to assess differences after implementing the mobile reporting system and to identify independent predictors of perceived abuse.

RESULTS: With the reporting module, students perceived less intimidation by residents ($P < .001$) and by faculty ($P = .008$), greater satisfaction reporting feedback ($P < .001$), and greater interest in surgical careers ($P = .003$). Perceived abuse decreased without reaching statistical significance ($P = .331$). High ratings of intimidation by faculty independently predicted perceived abuse (odds ratio $= 1.3$), and satisfaction with anonymous reporting was a negative predictor (odds ratio $= .2$).

CONCLUSIONS: A mobile web-based system for real-time reporting fosters open communication and bidirectional feedback and promotes greater satisfaction with the surgery clerkship and interest in a surgical career.

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In the early 1990s, as many as 81% of US medical students reported mistreatment at some point in medical school, an experience associated with later cynicism and career regret.1-3 Despite major efforts to improve student experiences,4-6 recent surveys suggest that perceived mistreatment rates remain unabated.7-9 The surgery clerkship is often considered the most common source of student mistreatment.10-13

Conduct policies and complaint management practices targeting medical student mistreatment commonly rely on end-of-clerkship student reports, which are often reviewed months following clerkship completion. In the absence of timely discourse, mistreatment concerns are not addressed in a manner considered meaningful and effective by students.14 Also, reports provided by students at the end of an experience is subject to recall error, while timelier reports are more likely to produce a formative effect.14

Usage of mobile devices in the educational setting has increased rapidly in recent years.15-17 Reports suggest that mobile software resources engineered for medical students have

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improved clinical performance and learning. Recognizing the potential advantages of mobile technology, we created a real-time, anonymous, mobile reporting mechanism for students on the surgery clerkship. We hypothesized that the mobile system would stimulate bidirectional feedback, improve student satisfaction, and decrease perception of mistreatment.

**Methods**

This study was performed in a large academic medical center during four 12-week surgery clerkship blocks from January to December 2013. All third-year medical students rotating on the surgery clerkship during the study period \( n = 187 \) were candidates for the reporting module (RM) study group, while 88 students who had completed the third-year surgery clerkship during the two 12-week blocks before the study period (July to December 2012) were candidates for the control group (CG). The learning environments of the 2 groups were identical in clinical rotation structure. Didactic lectures encouraging teaching practices among residents and faculty members were delivered during the autumn quarter of each academic year. All clinical and educational resources were available to both groups; however, only the study group received access to these resources and an anonymous RM via a dedicated mobile Web site. The study was approved by the University of California, Los Angeles Institutional Review Board.

**Mobile Web site development**

We created an educational mobile Web site designated for medical students rotating on the surgery clerkship with an embedded web-based RM using cloud computing. The RM form invited anonymous unrestricted text reports from students (Fig. 1). Form responses, including time and date, were compiled instantly within a secure cloud-based spreadsheet. We tracked RM usage via web-based site analytics. The Web site also incorporated links to educational resources, including video lectures and web-based clinical reference material.

**Surveys**

Using the same cloud-computing platform, we generated web-based surveys about the clerkship experience and embedded them within a separate section of the medical student mobile Web site. The 12-question surveys included 2 demographic questions; 2 questions assessing perceived intimidation, 1 by residents and 1 by faculty (formatted to 10-point scales); 2 questions assessing perceived quality of teaching, 1 by residents and 1 by faculty (formatted to 10-point scales); 1 question evaluating whether students felt they were ever abused; 1 question assessing student expectations about mistreatment in future clerkships; 3 questions assessing satisfaction with student-reported feedback resources (formatted to 5-point Likert scales); and 1 question assessing interest in a surgical career.

**Study design**

The timeline of the study period is shown in Fig. 2. In January 2013, we sent the end-of-clerkship survey (ES) described above via e-mail link to the 88 students who
completed the surgery clerkship in the prior 6 months with a request and instructions to rate the clerkship; respondents comprised the CG. At the beginning of each block in the subsequent study period, students received an initial survey containing the same questions as the ES, with instructions to rate previously completed clerkships. In a mandatory review session at the end of each block, students received the ES with instructions to rate the surgery clerkship. Respondents during the study period comprised the reporting group (RG).

Mobile reporting module

At the beginning of the clerkship block, we distributed the RM web address to all students and instructed them to bookmark the form on their mobile devices. Students were invited to submit comments about their experiences in real time throughout their surgery rotations. The clerkship director reviewed the RM content weekly and promptly addressed any concerns with students, residents, or faculty members as necessary. These actions were documented within the RM spreadsheet. The students received biweekly e-mail digests including anonymous RM summaries submitted by their clerkship block and the clerkship director’s responses.

Data analysis

ES data from respondents in the RG and CG were compared to analyze differences in the surgery clerkship with and without the RM. Within the RG, initial survey and ES responses were compared to analyze differences between the surgery clerkship and previously completed clerkships. Statistical analysis included Fisher’s exact tests for proportions and 2-tailed unpaired $t$ tests for scale scores. A multivariable logistic regression analysis was performed to determine independent predictors of perceived abuse in the RG during the surgery clerkship.

Results

Study subjects in the CG included 36 of 88 eligible students (41%) who completed the ES via e-mail. Study subjects in the RG included 103 of 122 students with prior clerkship experience (84%) who completed the real-time IS, and 157 of 187 students (84%) who completed the real-time ES.

Mobile reporting and intervention

Web site analytics showed 31 mobile RM page views with a mean duration of 93 seconds. Of 20 comments registered on the RM, 18 (90%) reported incidents classified by the clerkship director as perceived abuse. The remaining 2 RM submissions included 1 praising a senior resident and 1 complimenting the RM. Selected student reports are shown in Table 1. In direct response to RM comments, the clerkship director held 7 group discussions with the clerkship students about professionalism in surgery, held independent discussions with 9 involved residents and 6 faculty members, and eliminated 2 medical student rotations.

Surgery clerkship surveys

Median survey response intervals were 19.6 days for students in the CG and 6.7 minutes for the RG. Comparing ES results (Table 2), RG candidates were more likely to participate in the survey, and respondents included a significantly greater proportion of female students. Students in
the RG reported higher ratings of teaching quality and lower ratings of intimidation by both residents and faculty. Greater proportions of students in the RG were satisfied with the clerkship feedback system. Perceived abuse was less frequent in the RG, but the difference did not reach statistical significance. There was no significant difference in the proportions anticipating mistreatment in future clerkships between the RG and CG. Students in the RG were significantly more likely to express interest in a surgical career. Proportions of female and male students in the RG expressing interest in a surgical career were not significantly different (34% vs 41%; \( P = .411 \)).

### Comparison of clerkships

Students’ experiences in surgery compared with prior clerkships are shown in Fig. 3. Significantly more RG students were satisfied with the value of student-reported feedback (61% vs 43%; \( P < .001 \)) and with the timeliness of response to student reports (53% vs 34%; \( P < .001 \)). Perceived abuse remained more common in surgery than in prior clerkships (31% vs 20%; \( P = .041 \)). When stratified by clerkship block, differences in the rates of perceived abuse between surgery and other clerkships showed a diminishing trend (Fig. 4).

### Predictors of perceived abuse

Within the RG, logistic regression analysis identified perceived intimidation by faculty as a positive independent predictor of perceived abuse (odds ratio [OR] 1.3; \( P = .036 \)), while satisfaction with the anonymity of student reports was a negative predictor (OR .2; \( P < .001 \)). Although female students were more likely to report perceived abuse than were male students (38% vs 22%; \( P = .037 \)), neither age (\( P = .277 \)) nor sex (\( P = .084 \)) was independent predictors of perceived abuse. Students with interest in a surgical career tended to perceive abuse less frequently than students without such interest, but this difference was not statistically significant (22% vs 38%; \( P = .079 \)) and did not independently predict perceived abuse (OR .8; \( P = .604 \)).

### Comments

We introduced a new real-time web-based reporting system for medical students that generated timely discussions regarding perceived mistreatment and engaged students in clerkship improvement. For third-year students who had access to our mobile web-based RM system, satisfaction with the surgery clerkship was improved, perceived quality of teaching by residents and faculty was

<table>
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<tr>
<th>Table 1 Selected reports of mistreatment from the reporting module</th>
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<tbody>
<tr>
<td>Student report</td>
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<tr>
<td>Resident intimidated the student</td>
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<tr>
<td>Intern asked student to do nonmedical chores</td>
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<tr>
<td>Duty hour violation</td>
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<tr>
<td>Resident spoke harshly about team members</td>
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<tr>
<td>Student felt service duties (writing progress notes) to be excessive</td>
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<th>Table 2 End-of-clerkship survey response summaries</th>
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<tr>
<td>Survey item</td>
</tr>
<tr>
<td>Students surveyed (( n ))</td>
</tr>
<tr>
<td>Respondents, ( n ) (%)</td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>Female (%)</td>
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<tr>
<td>Teaching quality score (1–10): residents</td>
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<tr>
<td>Teaching quality score (1–10): faculty</td>
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<tr>
<td>Intimidation score (1–10): residents</td>
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<td>Intimidation score (1–10): faculty</td>
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<tr>
<td>Reporting mistreatment (%)</td>
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<tr>
<td>Anticipating mistreatment in future clerkships (%)</td>
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<tr>
<td>Satisfied with anonymity of reports (%)</td>
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<td>Satisfied with value of reports (%)</td>
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<tr>
<td>Satisfied with timeliness of response (%)</td>
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<td>Interested in surgical career (%)</td>
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Bold denotes statistical significance (\( P < .05 \)).
increased, and ratings of intimidation by residents and faculty were decreased. Rates of student satisfaction with resources to report feedback doubled, perceived mistreatment decreased, and interest in a surgical career tripled over the study period.

Perceived mistreatment among medical students has remained consistently high since 1999, and students are reluctant to report specific instances.7–9 A longitudinal study at our institution showed that roughly half of students experienced some form of mistreatment by the end of the third year, and most did not report the events when they occurred.1 To explain this persistent phenomenon, some authors have suggested that current students may be more sensitive than students of prior generations in identifying episodes of mistreatment.7,22,23 A recent study determined that third-year medical students who perceived mistreatment in their own experiences were no more likely than other students to identify mistreatment in a series of hypothetical scenarios,8 suggesting that sensitivity alone does not account for the continued frequency of perceived mistreatment, and that institutions have failed to address student concerns.

Our mobile RM provides a formal but anonymous way for students to voice their concerns. Tulgan24 suggested that the ideal evaluation conditions provide frequent, accurate, specific, and timely bidirectional feedback between trainee and evaluator. On implementation of our system, rates of satisfaction with anonymity and value of student-supplied feedback improved drastically, despite relatively few mistreatment reports. Fried et al.7 discovered that University of California, Los Angeles medical students most often do not report instances they perceive as mistreatment unless queried in an anonymous survey at the end of the third year. In light of these findings, we expect that most of the 20 instances reported via the mobile RM would not have been reported otherwise. Moreover, students who were satisfied with the anonymity of feedback resources were 5 times less likely to perceive abuse in our study. The clerkship director’s improvements informed by student responses attest to the value of our reporting system, and our survey results indicate that students are significantly less likely to perceive mistreatment when they trust the anonymity of the reporting process. While formal discussions inspired by student reports have increased in quantity, we are unable to draw conclusions about how the reporting system affected the quality of communication among students, residents, and faculty. We anticipate that this will be the subject of a future study.

Significantly more students indicated interest in pursuing surgical training after we implemented the mobile reporting system. Student interest in a surgical career might signify an improvement in the clerkship experience. In a prior study, students who perceived mistreatment were less likely to pursue a career in academic medicine,25 while students who reported positive surgery clerkship experiences were more likely to view general surgery careers favorably.26 We infer from our results that the mobile RM is associated with an improvement in the experience of students in the surgery clerkship.

Usage of mobile technology in medical education and practice is increasing rapidly.15 Recent survey studies showed greater use of mobile devices among third-year medical students.
students and residents than among faculty and graduate students, and usage of mobile tablets for clinical work has increased among medical students by 31% since 2012.16,17 In a 2013 survey of 1,026 medical students, 53% of respondents referred to their mobile devices as the first resource to answer clinical questions.17 Current literature suggests that smartphones and tablets are useful for the process of medical learning and technical assessments.18–21 In our study, the mobile interface was associated with high rates of study participation and was effective in stimulating communication between students and the clerkship director. We conclude that mobile technology offers significant potential to address the issue of medical student mistreatment.

A principal limitation of this study is the survey comparison between study and CG students. The latter students participated in the surgery clerkship survey via e-mail, with relatively low response rates and recall biases typical of end-of-clerkship evaluations. Surveys were only administered to the CG after the surgery clerkship; therefore, observed proportions of students expressing interest in a surgical career may reflect independent characteristics of each group. Additionally, our results may not be attributable solely to the institution of the RM. Other changes also instituted during the study period included educational sessions to promote teaching practices among residents and faculty and the launch of multimedia and clinical resources for students on the mobile Web site. Students’ general level of satisfaction may have influenced their perceptions of abuse and career interest independently; however, the unique change in the mistreatment reporting process was the implementation of the RM system.

In conclusion, our mobile RM solicits real-time reports from students in the surgery clerkship. This system fosters a culture of positive reinforcement and bidirectional feedback among students and educators. With the RM system, students are more satisfied with the reporting process, prompting decreased likelihood to perceive abuse and greater interest in a surgical career.

References