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Title:

Patient Safety Event Reporting Expectation: Does it Influence Residents' Attitudes and Reporting Behaviors?

Short Title:

Resident Event Reporting Expectation: Is It Effective?

ABSTRACT

Background:

Internal Medicine resident (IMR) physician reporting of patient safety events (PSE) is sub-optimal and may be related to poor attitudes towards reporting.

Purpose:

The objective was to evaluate the impact of a PSE reporting expectation on the rates of reporting among IMRs.

Methods:

In this prospective cohort study, IMRs were informed of an expectation to submit ≥ 1 PSE report/month based on the ACGME core-competencies. PSE reports were collected over nine-months and compared to a four-month baseline prior to the expectation. Report quality and IMRs' attitudes were also evaluated.

Results:

There was a significant and initial increase in the total number of reports. The number of IMRs however meeting the expectation of ≥ 1 report/month initially rose but was not sustained over the nine-month observational period. Report quality and IMRs attitudes towards reporting were positive but unchanged over time.

Conclusions:

While a reporting expectation increased the total number of reports, the majority of IMRs did not maintain a ≥ 1 PSE report/month despite positive attitudes.

BACKGROUND

Reporting patient safety events (PSE) including adverse events, near misses and unsafe conditions is a vital component in advancing patient safety and serves as a foundation in the continuous process improvement of healthcare delivery systems. Physician involvement in systems based practices such as reporting of PSEs in quality improvement programs, benefits institutions by identifying flaws, preventing future repeat errors and thereby reducing the quantity of lawsuits.¹ The benefit of PSE reporting has been recognized nationally by the Institute of Medicine as well as The Joint Commission and the Accreditation Council for Graduate Medical Education (ACGME).^{2,3} As a result of the passage of the Patient Safety and Quality Improvement Act of 2005, healthcare institutions are expected to establish and maintain a system for reporting adverse events.⁴ ⁵ Furthermore in 2008 the ACGME required resident training programs to incorporate PSE reporting as part of the System-Based Practice portion of the six general Core Competencies.³

Despite these expectations most physicians fail to understand the benefits, lack the skills to report or simply do not participate.⁶⁻⁷ Failure to participate is further exemplified by Madigosky et al who demonstrated an unsustained improvement in reporting PSEs by medical students despite incorporating patient safety and medical fallibility into the medical school curriculum.⁸ In contrast, Jericho et al reported that an educational intervention limited to anesthesiology trainees coupled with individualized feedback improved attitudes towards reporting as well as overall reporting rates of PSEs.⁹ While this focused intervention in a relatively small group of residents with a high level of

faculty engagement was successful, the generalizability of these findings to larger training programs with greater variability in faculty-resident interaction remains unclear.

PURPOSE

The objective of this study was to evaluate if a focused educational intervention coupled with a minimum monthly PSE reporting expectation would increase reporting rates in the Internal Medicine (IM) training program at the same institution. Additionally we evaluated the quality of the PSE reports and the impact of education on the perceptions, attitudes and biases that influence reporting.

METHODS

Study Design and Subjects

This was a prospective cohort study with a baseline run-in period serving as the control. Subjects were defined as all IM resident physicians, post-graduate years (PGY) one through five, rotating at the University of Illinois Hospital and Health Science System: IM categorical (PGY1-3), IM-Pediatric (PGY1-4), IM-Emergency Medicine (PGY1-5). Our post-graduate Internal Medicine categorical training program is an ACGME accredited residency of three years in duration. Our IM-Pediatric and IM-Emergency Medicine residency programs are each four and five in duration respectively and are also ACGME accredited. These training programs provide education and clinical ambulatory and inpatient experiences in general internal medicine and all sub-specialties. Germaine to this study, all trainees are required to develop competency in quality assurance and risk management: specifically all residents are evaluated in Systems-Based Practice which is

one of the six general Core Competencies as proposed by the ACGME. This study was approved by the University of Illinois at Chicago Institutional Review Board.

PSE Reporting System (time, t= -4 Months)

A web-based PSE reporting system maintained by the Department of Safety and Risk Management at UIH was utilized in this study. In brief, this system allowed for reporting from any computer with Internet access with or without reporter identification. Subjects were also able to submit reports via telephone. An honest broker (Author: CLT) de-identified all submitted PSE reports for purposes of this study. All IM residents were provided instruction on use of the online reporting system as part of their annual medical center training (t= -4 months). As part of that educational effort all residents were provided three mock cases demonstrating significant PSEs and were asked without consequence to create corresponding reports through the live system.

Baseline Run-In (t= -4 Months to t= 0 Months)

After initial requisite training, baseline data was collected from July 2009 (t= - 4 months) through October 2009 (t= 0 months) regarding the frequency and quality of PSE reports.

Interventional Reporting Education and Reporting Expectation (t= 0 Months)

Upon the completion of a four-month baseline (t= 0 months), all subjects were required to attend a one-hour training conference conducted by the authors DM and TM. This evidence-based conference educated subjects on the type of events that qualify for PSE reporting. They further identified the role of event reporting in facilitating process

improvements within the healthcare system. The education emphasized the importance of reporting adverse events to improve patient safety and ultimately minimize litigation. It also demonstrated how PSE reporting related to the ACGME six Core Competencies and hence a component of their training.

At the conclusion of the conference subjects were informed of a new program expectation to perform a minimum of one non-anonymous online occurrence report per one-month block while rotating on a UIH medical service. There was no discussion regarding incentives or disincentives for meeting or not meeting this expectation.

Report Collection and Aggregate Feedback (t= 0 Months – t= 9 Months)

Over a nine month period, a portion of time from previously arranged monthly lectures pertaining to the baseline IM program curriculum was allotted to provide aggregate reporting feedback. One of the investigators (JR) discussed the nature of at least one report submitted at each session. The purpose of this discussion was to remind subjects of the reporting expectation and to provide positive reinforcement of PSE reporting benefits. For each case the root-cause analysis was discussed and the resultant benefit of the system change emphasized.

Evaluation of Attitudinal Beliefs Towards Reporting

During the educational conference (t= 0 months) subjects were issued a questionnaire to assess attitudes, and experience regarding PSE reporting (Appendix 1). At t=9 months subjects were asked again to complete an identical questionnaire to re-evaluate their

attitudes and experience regarding PSE reporting. Completion of the questionnaire was however not a requirement for the training program.

The questionnaire was a unique tool that was constructed based on nine core domains previously defined as variables that either facilitate or impede PSE reporting.⁶ The domains assessed with respective number of questions were: *experience reporting* (3), *responsibility to patient* (7), *responsibility to self* (4), *responsibility to community* (7), *responsibility to profession* (6), *attitudinal barriers of reporting* (5), *feelings of uncertainty* (8), *feelings of helplessness* (4) and *fears of reporting* (7).

The questionnaire was assessed for reliability by administering it to graduating IM residents prior to the study period. It was again administered 30 days later to the same IM residents to assess for question stability. The Spearman correlation coefficient was >0.60 for all but one question indicating good test-retest reliability. The ambiguous question was subsequently removed.

PSE Report Quality Assessments

Beyond tabulating the total number of reports, a unique assessment was calculated regarding the quality of the reports submitted. A panel consisting of a medical student (JRB), an IM resident (JSB), an IM faculty (JR) and a Risk Management Specialist (CT) developed a standardized quality assessment form for evaluating and scoring the quality of each report (Appendix 2). A report quality score was calculated based on five criteria: (1) description of the event, (2) overall objectivity of the description, i.e. devoid of any

subjective comments, (3) timeliness of reporting (≤ 24 hours of event), (4) professionalism, i.e. no finger pointing, (5) overall clarity of the event description. Each category received a score of one if it fulfilled the panel's criteria and a score of zero if it did not. The summations of these scores were used to compare report quality, ranging from zero (low quality) to five (high quality).

Statistical Analysis

Statistical analysis was performed using the Statistical Analysis Software (SAS), version 9.1.3. One-sided t-test was used to test the differences between matched pre- and post-expectation questionnaire data and to compare rates of reporting. One-way Analysis of Variance (ANOVA) was used to test the differences between pooled pre- and post-expectation questionnaire data. Results were considered significant at $p < 0.05$.

RESULTS

Respondent Characteristics

Table 1 demonstrates the characteristics of our resident population. The prior training in PSE reporting during medical school was ascertained from those subjects that responded to the survey question on either the pre- (42) or post- (56) interventional questionnaire. The remaining 50 subjects did not complete either questionnaire or failed to respond to the question and as such, their prior training is unknown.

Reporting Rates and Report Quality

As seen in Figure 2, the month-by-month reporting rate, defined as the percent of eligible subjects submitting at least one report per month, significantly increased from an average of 3.7% (95% CI 2.0-5.4) for the four months prior to the intervention to 33.1% (95% CI 22.0-46.1) immediately after the reporting expectation (t=0 Months). While the initial response significantly increased from baseline, there was a tendency for the reporting rate to decline over subsequent months. Taking the perspective of the total number of reports for the residency group as whole there was a significantly increased aggregate rate of reports during the nine-month observational period. Specifically a total of 10 reports were submitted during the four-month baseline with a mean of 2.5 (SD±1.7) reports per month. This significantly increased to a total of 173 reports over the nine-month period averaging 19.2 (SD±7.5) reports per month.

Of the 128 subjects, only eight (6.25%) met the expectation of at least one report per eligible rotation block over the nine-month period. While our expectation was a minimum of reporting once per month, 17 subjects (14%) within our population exceeded their block expectation at least one report during the entire period of observation.

Conversely, only 75 (59%) subjects submitted at least one report in any eligible rotation block. On the 5-point scale ranging from zero to five, with five representing an ideal report, the average report quality in the pre-intervention baseline was 3.70 (SD±1.16).

This numerically increased to 3.85 (SD±1.17) however this was not statistically significant. Additionally there were no statistically significant differences in the sub-scores of the individual five criteria.

Predictors of Reporting

Over the nine months of observation, 24 subjects submitted a report at a rate of 50% of our expectation or greater. As such, 104 submitted reports less than 50% of the time. In a post-hoc analysis comparing these two populations female subjects (OR 2.53, 95% CI 1.01-6.25) and PGY2 residents (OR 3.08, 95% CI 1.26-7.53) were more likely to report than their peers (Table 2). Other factors including participation in the practice cases, prior PSE reporting education in medical school, prior PSE reporting or prior involvement in any type of PSE were not predictive of increased reporting.

Perception and Attitude Assessments

Forty-two (33%) and 56 (44%) respondents completed the pre- and post-intervention questionnaire, respectively. Of those, 24 (19%) completed both. Data was analyzed based on both matched and pooled results for each domain as seen in Table 3. Subject matched data demonstrated only a significant change between pre- and post-intervention in the *experience reporting* domain; other domains did not significantly change. The pooled data included respondents that answered either the pre- or post-intervention questionnaire or both. Results for the pooled data (not shown) similarly described a significant change only in the *experience reporting* domain. After controlling for gender, post-graduate year, frequency of reporting, quality of reports or prior medical school PSE reporting training the statistically significant difference in the *experience reporting* domain persisted in both matched and pooled data.

DISCUSSION

Based on national guidelines and ACGME requirements, post-graduate education programs are expected to provide training in quality improvement and risk management which are included in the Systems-Based Practice category of the six General Core Competencies.²⁻⁵ Previous studies have demonstrated a relative lack of participation by residents for various reasons not limited to attitudinal biases, poor/incomplete educational training, competing priorities and perceived lack of value.⁶⁻⁸ This study was designed to assess whether focused PSE education coupled with a training program reporting expectation and aggregate process improvement feedback would lead to a sustained increase in reporting rates and improved attitudes of IM residents towards reporting. Prior to our interventions and reporting expectation, the baseline PSE reporting rate was 2.5 reports per month for the aggregate of our IM residents. Immediately after our intervention, we were able to demonstrate a significant approximate six-fold increase in the total number of PSE reports. This rate however trended towards baseline over the nine-month observational period. This finding, measuring aggregate reporting, differs from the results focused on our expectation that individual residents report at least one PSE per rotation block. While we had a significant increase in the number of residents who reported at least one or more reports per block after our educational intervention, the response rate more rapidly diminished over the subsequent nine months (Figure 2). The difference between the sustainability of the response over time is in part based on the fact that there was a cohort of individuals who consistently submitted multiple reports per block. These data of diminished reporting rates after the acute intervention demonstrates that attempts to change a culture most likely requires significant continuous reinforcement beyond our monthly reminders and case presentations. One might further

suggest that the culture within a residency program and the culture amongst the faculty and the institution need change simultaneously.

Additionally we were unable to demonstrate a correlation between attitudinal biases held by the residents and their individual reporting rates. Furthermore our baseline data suggested a relatively high quality level that did not significantly change or improve with our interventions. We view this as a positive finding suggesting again that it is not a lack of reporting skills, but rather simply the willingness to participate. We know however that our scale for quality was not fully validated and it is possible that quality of the reports may still be an area of concern. Additionally, as we did not measure the severity, clinical meaningfulness or impact of individual issues reported, we cannot draw conclusions on whether increasing volume and/or increasing quality of PSEs would necessarily influence healthcare outcomes within our organization.

In evaluating our data for factors influencing reporting, our data demonstrated that PGY2 residents (adjusted OR 3.08) and female gender (adjusted OR 2.53) were more likely to report than those in other years in training and males respectively. While we did not directly evaluate these risk factors, we speculate that PGY2s were more likely to report because our curriculum is designed with these residents more commonly serving as team leaders for inpatient medicine rotations; this increased sense of responsibility may contribute to an increased likelihood of reporting PSEs. In contrast, it is unclear why female residents differ from their male counterparts.

In designing this study, we hypothesized that there would be a sustained response for the reporting of PSEs by resident over the time frame of our observational period. We speculate that there are several factors that led to the findings as reported. First, in our study we did not provide individual feedback for the residents we were evaluating. As such individual or group incentives/disincentives were not included in our intervention. This lack of positive or negative feedback may have influenced the number and sustainability of reporting rates by resident. The positive impact of linking financial incentives to event reporting among resident physicians in a tertiary care setting was recently reported by Scott et al.¹⁰ However, our decision to avoid disincentives for not reporting was deliberate. We believe that punishment would specifically be associated with a culture of negativity and might theoretically lead to meaningless low quality reporting and detract from the purpose of creating a safer healthcare environment. Secondly we described the one report per month minimum as an expectation and not a specific requirement. In doing so we relied on our belief that compliance would be driven by the residents' understanding that this expectation was in accordance with the ACGME Core Competencies. Linking the lack of individualized feedback, the lack of incentives/disincentives and the lack of establishing reporting as an absolute requirement may have impart contributed to the observed unsustained response rate by resident.

Interestingly our study contrasts with the findings of the Jericho et al at the same institution. In the Jericho study, there was prompt feedback to individual residents. As immediate feedback was not incorporated in our study, we question the generalizability

of the Jericho et al findings in the absence of individualized resident tracking and feedback.

There are several limitations to our study. First only 69 of the 128 study participants had documentation of completing the three mock practice cases leaving an open-ended question of whether or not the remaining residents attained adequate training and proficiency of the online PSE reporting system. Unfortunately we could not approach the non-responders to assess their reason of non-compliance. Specifically we could not address whether this was due to lack of training or personal unwillingness. It is interesting to note that of the 69 who participated, their post-interventional reporting rate was no different from the remaining residents who did not complete the mock practice cases. As such the 33% reporting rate as seen in Figure 2 may under-represent the potential rate of response. Secondly with regards to our survey tool, it is noteworthy that despite the relatively positive scores at baseline, these measures were not predictive nor did they correlate with our pre-intervention reporting rates. While our survey tool was not validated, we did however identify a change in the *experience reporting* domain as would be expected. The lack of change in other domains could signal perception bias as a potential confounder in those completing the questionnaire.

As there is a burgeoning focus on improving quality in patient care and reducing risk, physicians will be increasingly called upon for their participation. Our study suggests that providing an expectation for participation is insufficient in developing a meaningful long-term commitment. We speculate that for larger training programs focused

individualized feedback with incentives or disincentives may be critical to facilitate a sustained response.

REFERENCES

1. Kachalia A, Kaufman SR, Boothman R, Anderson S, Welch K, Saint S, Rogers MA. Liability claims and costs before and after implementation of a medical error disclosure program. *Ann Intern Med.* 2010 Aug 17;153(4):213-21.
2. Kohn LT, Corrigan JM, Donaldson MS, eds. *To Err Is Human: Building a Safer Health System.* Washington, DC: National Academy Press; 1999.
3. Accreditation Council for Graduate Medical Education. The ACGME Common Program Requirements: General Competencies, <http://www.acgme.org/outcome/comp/GeneralCompetenciesStandards21307.pdf>, Accessed on September 12, 2011.
4. Public Law 109-41. Patient Safety and Quality Improvement Act of 2005, www.pso.ahrq.gov/statute/pl109-41.pdf. Accessed on September 12, 2011.
5. The Joint Commission. 2011 National Patient Safety Goals, http://www.jointcommission.org/standards_information/npsgs.aspx Accessed on September 12, 2011.
6. Kaldjian LC, Jones EW, Rosenthal GE, Tripp-Reimer T, Hillis SL. An empirically derived taxonomy of factors affecting physicians' willingness to disclose medical errors. *J Gen Intern Med.* 2006 Sep;21(9):942-8. Review.
7. Kaldjian LC, Jones EW, Wu BJ, Forman-Hoffman VL, Levi BH, Rosenthal GE. Reporting medical errors to improve patient safety: a survey of physicians in teaching hospitals. *Arch Intern Med.* 2008;168(1):40-60.
8. Madigosky WS, Headrick LA, Nelson K, Cox KR, Anderson T. Changing and sustaining medical students' knowledge, skills, and attitudes about patient safety and medical fallibility. *Acad Med.* 2006; 81:94-101.
9. Jericho BG, Tassone RF, Centomani NM, Clary J, Turner C, Sikora M, Mayer D, McDonald T. An Assessment of an Educational Intervention on Resident Physician Attitudes, Knowledge, and Skills Related to Adverse Event Reporting. *J Grad Med Educ.* 2010 June; 2(2): 188–194.
10. Scott DR, Weimer M, English C, Shaker L, Ward W, Choi D, Cedfeldt A, Girard D. A novel approach to increase residents' involvement in reporting adverse events. *Acad Med.* 2011 Jun;86(6):742-6.

List of Abbreviations:

ACGME - Accreditation Council for Graduate Medical Education

ANOVA – Analysis of Variance

IM – Internal Medicine

SAS - Statistical Analysis Software

Table 1. Respondent Characteristics

Characteristic:	No. (%)
Total Subjects	128
Women	62 (48)
Residency Program	
Internal Medicine	102 (80)
Internal Medicine / Emergency Medicine	10 (8)
Internal Medicine / Pediatrics	16 (13)
Post Graduate Year (PGY)	
PGY1	45 (35)
PGY2	37 (29)
PGY3	38 (30)
PGY4	6 (5)
PGY5	2 (2)
PSE Reporting Experience:	
Prior Training in PSE Reporting in Medical School	
Yes	26 (21)
No	52 (41)
Unknown	50 (39)
Involvement in Prior Medical Error at Baseline^a	
Near Miss	37
Minor Miss	34
Serious Error	10
None	3
No Response	77
^a Subjects could respond to multiple errors types	

Table 2. Odds of Reporting ≥50% of Eligible Rotation Blocks

Variable	OR (95% CI)
Gender	
Women	2.53 (1.01-6.25)
Post-Graduate Year	
PGY1	0.88 (0.34-2.27)
PGY2	3.08 (1.26-7.53)
PGY3	0.27 (0.08-0.92)
PGY4	0.84 (0.09-7.55)
PGY5	-
Prior Error Reporting Training in Medical School	1.55 (0.51-4.66)

Table 3. Matched Questionnaire Responses^d

		Baseline (t= 0 Months)	Intervention (t= 9 Months)	P Value

		N=24 (19%)	N=24 (19%)	
Domain	Range	Mean (Std)	Mean (Std)	
Responsibility to Patient	7-28	21.3 (3.4)	22.3 (3.6)	0.78
Responsibility to Self	4-16	13.5 (1.3)	13.5 (1.3)	0.36
Responsibility to Community	7-28	22.6 (2.7)	22.3 (2.5)	0.22
Responsibility to Profession	6-24	18.5 (2.1)	18.8 (2.4)	0.28
Attitudinal Barriers of Reporting	5-20	16.3 (1.6)	16.7 (1.8)	0.17
Uncertainty	7-28	20.1 (2.8)	20.6 (2.5)	0.18
Helplessness	4-16	11.2 (1.9)	10.7 (1.9)	0.09
Fears of Reporting	7-28	20.7 (2.8)	21.5 (3.2)	0.10
Experience Reporting	2-12	8.7 (1.7)	9.7 (1.2)	0.001

^dA subject's sense of responsibility is directly related to the numerical value. A subject's sense of attitudinal barrier, uncertainty, helplessness, and fears of reporting is inversely related to the numerical value.

Figure 1. Study timeline.

Figure Subtext

Each box represents one month from July 2009 to July 2010.

Figure 2. Percent of subjects submitting ≥ 1 report per rotation block. 95% confidence intervals are represented around each rate.

Figure Subtext

1. Ninety-five percent confidence intervals are represented for each rate by the error bars.
2. $[x/y]$ below each month designates the number of reports submitted (x) over the number of potential reports (y).

Appendix 1. Attitudinal Questionnaire

Appendix 2. Individual Event Report Assessment