

Do Medical Inpatients Who Report Poor Service Quality Experience More Adverse Events and Medical Errors?

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Purpose: Service quality deficiencies are common in health care. However, little is known about the relationship between service quality and the occurrence of adverse events and medical errors. We hypothesized that patients who reported poor service quality were at increased risk of experiencing adverse events and medical errors.

Subjects and Methods: Patients were interviewed during and after their admissions regarding problems experienced during the hospitalizations. We used this information to identify service quality deficiencies. We then performed a blinded, retrospective chart review to independently identify adverse events and errors. We used multivariable methods to analyze whether patients who reported service quality deficiencies (obtained by patient report) experienced any adverse event, close call, or low risk error (ascertained by chart review).

Results: The 228 participants (mean age 63 years, 37% male) reported 183 service quality deficiencies. Of the 52 incidents identified on chart review, patients experienced 34 adverse events, 11 close calls, and 7 low risk errors. The presence of any service quality deficiency more than doubled the odds of any adverse event, close call, or low risk error (adjusted odds ratio = 2.5; 95% confidence interval = 1.2–5.4). Service quality deficiencies involving poor coordination of care (adjusted odds ratio = 4.4; 95% confidence interval = 1.4–14.0) were associated with the occurrence of adverse events and medical errors.

Conclusions: Patient-reported service quality deficiencies were associated with adverse events and medical errors. Patients who report service quality incidents may help to identify patient safety hazards.

Key Words: adverse events, medical errors, service quality, patient-doctor communication

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Service quality deficiencies, defined as shortcomings in care in dimensions other than technical aspects of health care delivery, are common in health care.^{1,2} We recently reported that nearly 40% of patients on a medicine unit identified at least 1 service quality deficiency during their inpatient admission.³ Surveys of patients in 5 countries identified service quality deficiencies at rates of 20–45%.⁴ However, little is known about the association of service quality deficiencies and outcomes related to the technical quality of care rendered, such as the occurrence of adverse events.

Given the surprisingly high rate of service quality deficiencies reported to date, we hypothesized that poor service quality experience might be associated with deficiencies in other aspects of care. We reasoned that poor service quality could signal the presence of other problems that may directly or indirectly increase the risk of iatrogenic injury. However, the literature is inconclusive about the relationship between consumer reports of service quality and independent measures of technical quality. Favorable patient-reported satisfaction was associated with higher quality of care for depression in 1 study, whereas patients' overall ratings of care were not associated with technical quality indicators in another.^{5,6}

To examine the hypothesis that patients with service quality deficiencies are at increased risk for adverse events, we studied patients on a general medicine unit at a Boston teaching hospital. We interviewed patients during and after their admissions regarding problems experienced during the hospitalizations, and used this information to identify service quality deficiencies.³ We then performed blinded, retrospective chart reviews to independently identify adverse events affecting the cohort. Our hypothesis was that patients with self-reported service quality deficiencies would be more likely to have experienced adverse events and medical errors.

Materials and Methods

We conducted a prospective cohort study of 228 adult inpatients admitted to a medical ward of a Boston teaching hospital from January to April of 2003.

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Patient Interviews

Patients who consented to participate in the study were interviewed throughout their hospitalizations and 10 days after discharge about any perceived problems, mistakes, or injuries that occurred during their care. This project was described in detail previously.^{3,7} Briefly, patient responses were recorded verbatim and independently coded by 2 physician investigators who were trained using practice cases. Service quality was defined as the patients' self-reported experience of care, and service quality deficiencies were considered shortcomings in care in dimensions other than technical aspects of health care delivery. If a service quality deficiency was identified, reviewers then classified the type of deficiency using 6 categories: (1) waits and delays, (2) poor communication, (3) environmental issues and amenities, (4) poor coordination of care, (5) poor interpersonal skill and unprofessional behavior, and (6) lack of respect for patient needs and preferences. Inter-rater reliability, assessed with the kappa statistic, was excellent (0.99) for type of service quality problem.³

Medical Record Reviews

Patients who report service quality deficiencies may be more likely to report all kinds of events, including adverse events and errors. To address this potential bias, we used a method other than patient report for ascertaining the presence of adverse events and medical errors. A nurse investigator, blinded to patient reports, reviewed the medical record of all patients in the cohort. She reviewed the entire record for the admission, guided by trigger events such as "stat" discontinuation orders or use of antidote medications.^{8,9} The results of this explicit review were presented to a physician panel for independent review and classification.

Physician Classification of Adverse Events and Medical Errors

Two physician investigators independently coded each chart review abstract for adverse events and errors. Adverse events were defined as injuries because of medical care rather than the natural history of the illness.⁷ Close calls were defined as errors with the potential for injury; some were intercepted before reaching the patient. Lapses in care with minimal risk of injury were defined as low risk errors. Physician reviewers classified the preventability and severity of the events (adverse event, close call, or low risk error).¹⁰ Differences were resolved by discussion. Inter-reviewer reliability, assessed with the kappa statistic, was excellent for type of event (0.97) and good for preventability (0.75) and severity (0.79).

Analyses

Our main predictor of interest was the presence of at least 1 service quality deficiency during the patient's admission (obtained by patient report). The main outcome variable was the presence of any adverse event, close call, or low risk error (ascertained by chart review). We calculated the number and percent of patients with at least 1 service quality deficiency, stratified by those with and without any adverse

event, close call, or low risk error on chart review. We performed bivariable analyses to examine the association of potential confounders with the presence of the composite outcome of any adverse event, close call, or low risk error.

We also created multivariable logistic regression models with forward selection ($P < 0.2$) to examine this relationship. We examined the literature and previous analyses of this cohort to inform our list of potential covariates.^{3,6,7,11,12} After identifying independent predictors of our outcome of interest, we separately added each covariate back to the model to evaluate for possible confounders. Covariates that changed the effect estimate by greater than 10% were considered to be confounders and retained in the final model.

This study was approved in advance by the hospital Institutional Review Board.

Results

Study Cohort

Characteristics of the study cohort are summarized in Table 1.^{3,7} The cohort included 228 patients with a mean age of 63 years. Thirty-seven percent were male, 21% were non-white, and 5% were non-English speaking. The mean number of comorbidities, medications, and drug allergies was 2.4, 7.1, and 1.2, respectively.

Patient-Reported Service Quality Deficiencies

The total number and types of patient-reported service quality deficiencies are shown in Table 2.³ They occurred at a rate of nearly 80 events per 100 patients. The most common types of service deficiencies were waits and delays, poor communication, and environmental issues.

Adverse Events, Close Calls, and Low Risk Errors

The rates and types of adverse events, close calls, and low risk errors are shown in Table 3. Forty-seven patients (21%) had a total of 52 events, and 5 patients experienced more than 1 event during the hospitalization.

Of the 52 total events identified on chart review, 34 (65%) were adverse events. One event was life threatening. The remaining adverse events were serious or had significant risk of harm. Thirteen (38%) adverse events were definitely or probably preventable. Eleven (21%) events were close

TABLE 1. Characteristics of Study Sample (N = 228)

	N or Mean	%, or (Range) SD
Male	85	37
Non-white race	47	21
Hispanic/Latino	8	4
Non-English speakers	11	5
Age (yr)	63	(19–102) 18.3
Length of stay (d)	4.4	(0–36) 4.9
No. comorbid illnesses	2.4	(0–8) 1.7
No. medications	7.1	(0–25) 4.7
No. drug allergies	1.2	(0–13) 1.9

TABLE 2. Types of Service Quality Deficiencies, N = 183 Events, 228 Patients

	Events		Events per 100 Patients
	n	Percent	
Waits and delays (eg, delays in nurse call button response, delays in transfer from emergency room to floor)	44	24.0	19.2
Poor communication (eg, patient confusion about aspects of their care including medicines started, stopped, and rationale)	36	19.7	15.7
Environmental issues and amenities (eg, food complaints, unsanitary conditions)	35	19.1	15.3
Poor coordination of care (eg, miscommunication between staff regarding patient's care)	21	11.5	9.2
Poor interpersonal skill and unprofessional behavior (eg, staff perceived to be joking about patients, rude, abrupt interactions without explanations)	20	11.0	8.7
Lack of respect for patient needs and preferences (eg, failure to recognize patient disability)	18	9.8	7.8
Other problems	9	4.9	3.9
Total	183	100	79.8

TABLE 3. Types of Adverse Events, Close Calls, and Low Risk Errors (N = 52 Events, 228 Patients)

	n	Percent	Events per 100 Patients
Adverse events	34	65	14.9
1 life threatening			
33 serious or significant*			
13 (40%) definitely or probably preventable			
Close calls	11	21	4.8
10 serious or significant*			
3 intercepted			
Low risk errors	7	13	3.0
Total	52	99 [†]	22.8

*Serious events cause organ systems dysfunction; significant events cause symptoms and laboratory abnormalities.

[†]Total less than 100% because of rounding.

calls, including 10 serious or significant events. The remaining 7 (13%) events were low risk errors. Examples of adverse events included delay in antibiotic administration for 21 hours while a patient with pyelonephritis awaited a bed assignment; 4 episodes of oversedation resulting in "stat" discontinuation or reversal orders; and 3 falls sustained by patients attempting to toilet without assistance.

Relationship of Adverse Events, Close Calls, or Low Risk Errors and Service Quality

The odds ratios (ORs) for the occurrence of any adverse event, close call, or low risk error on chart review are shown in Table 4. In bivariable analyses, the presence of any patient-reported service quality deficiency was significantly associated with the occurrence of any adverse event, close call, or low risk error on chart review (OR = 2.4; 95% confidence interval, 95% CI = 1.2–4.6). Patients with greater lengths of stay also had increased odds of having an adverse event (OR = 1.2; 95% CI = 1.1–1.3 per day). The association between service quality deficiency and the occurrence of

any adverse event, close call, or low risk error remained significant on multivariable analysis (OR = 2.5; 95% CI = 1.2–5.4).

We performed a sensitivity analysis to examine whether low risk errors affected the relationship between adverse events and close calls with service quality. Excluding low risk errors, the presence of any patient-reported service quality deficiency increased the odds of any adverse event or close call in both the unadjusted (OR = 2.3; 95% CI = 1.1–4.4) and multivariable analysis (OR = 2.4; 95% CI = 1.1–5.4).

In an exploratory analysis, we examined the relationship between type of service quality deficiency and the occurrence of any adverse event, close call, or low risk error (Table 5). In the multivariable analysis, poor coordination of care was associated with the occurrence of any adverse event, close call, or low risk error (OR = 4.4; 95% CI = 1.4–14.0). Poor interpersonal skill and unprofessional behavior increased the unadjusted OR for the composite outcome (OR = 3.3; 95% CI = 1.2–9.5) but did not achieve statistical significance on multivariable analysis (OR = 3.1; 95% CI = 0.99–9.3).

Discussion

In this prospective cohort of adult inpatients, patient-reported service quality deficiencies were associated with the presence of adverse events and medical errors. The presence of a patient-reported service quality deficiency more than doubled the odds of identifying an adverse event, close call, or low risk error on chart review. Exploratory analyses suggested that poor coordination of care among staff and poor interpersonal skill and unprofessional behavior were types of service deficiencies that may be associated with the occurrence of adverse events, close calls, or low risk errors.

Little is known about the relationship of service quality to technical quality, or the association between service quality and patient safety. There are conflicting results in the limited literature evaluating service quality and technical quality.^{5,6,13} However, patient complaints have been associated with higher rates of malpractice claims for physicians.^{14–16}

TABLE 4. Unadjusted and Adjusted Odds Ratios of any Adverse Event, Close Call, or Low Risk Error

	Any Adverse Event, Close Call, or Low Risk Error Unadjusted (N = 47)		Any Adverse Event, Close Call, or Low Risk Error Adjusted* (N = 47)	
	OR	95% CI	OR	95% CI
Male	1.5	0.77–2.8		
Non-white	0.72	0.30–1.7		
Hispanic/Latino	0.54	0.06–4.5		
Non-English speakers	0.38	0.05–3.0		
Age (yr)	1.0	0.98–1.0		
Length of stay (d)	1.2	1.1–1.3	1.2	1.1–1.3
No. comorbid illnesses	1.1	0.93–1.3		
No. medications	1.0	0.95–1.1		
No. medication allergies	1.1	0.92–1.3		
Any service quality deficiency	2.4	1.2–4.6	2.5	1.2–5.4

*Adjusted for length of stay, number of medications, and non-English speakers.

TABLE 5. Odds Ratios of any Adverse Event, Close Call, or Low Risk Error by Type of Service Quality Deficiency

	Any Adverse Event, Close Call, or Low Risk Error, Unadjusted (N = 47)		Any Adverse Event, Close Call, or Low Risk Error, Adjusted* (N = 47)	
	OR	95% CI	OR	95% CI
Lack of respect for patient needs and preferences (n = 16)	1.3	0.40–4.3		
Waits and delays (n = 35)	1.4	0.61–3.3		
Environmental issues and amenities (n = 32)	0.87	0.34–2.3		
Poor communication (with patients) (n = 27)	1.4	0.56–3.6		
Poor coordination of care (among staff) (n = 17)	5.1	1.9–14.1	4.4	1.4–14.0 [†]
Inadequate staffing (n = 5)	0.96	0.10–8.8		
Poor interpersonal skills and unprofessional behavior (n = 16)	3.3	1.2–9.5	3.1	0.99–9.3
Difficult, premature or unsafe discharge (n = 2)	3.9	0.24–64.0		

*Adjusted for length of stay.

[†]Adjusted for length of stay, non-English speakers, and non-White race.

How can we make sense of the observed association between service quality and measures of patient safety in this study? Patients' experience of harm may increase their vigilance and critical assessment of service quality. Consistent with this perspective, Murff and colleagues showed that the presence of a surgical complication increased the odds of an unsolicited patient complaint.¹⁷ Our study found a similar association between service and technical quality metrics. However, neither study tested the hypothesis that experienced harm resulted in critical assessments of service quality. A competing view is that general attributes of the organization, such as the quality of interprofessional and patient-clinician communication, may lead to service quality problems as well as adverse events and errors.

In favor of the latter perspective, we found no association between adverse events and errors with either waits and delays or complaints about amenities. In contrast, patient-reported deficiencies involving poor coordination of care among staff was associated with adverse events and errors on chart review. This

finding is consistent with previous work demonstrating that patients are more concerned about interpersonal dimensions of care than hotel service qualities.^{4,18} It is also consistent with studies showing that communication and professional behavior are significant determinants of patients' decisions to pursue malpractice litigation.^{9,14–16,19–22}

This study is limited by its small sample size and single site, potentially reducing its generalizability. Although our study used a prospective cohort design, our analysis was restricted to a cross-sectional examination, thus precluding determination of causality between variables such as length of stay, service quality, and adverse events. Understanding the temporal relationship between adverse events and service quality judgments would help to clarify whether perceptions of poor service result from medical injury, or whether these perceptions develop independently. Similarly, increasing lengths of stay may increase the risk of adverse events, errors, and service quality deficiencies. Alternatively, experiencing these problems may increase the length of stay.

Despite these limitations, the relationship that we have identified between patient-reported service quality and patient safety outcomes seems important. These findings suggest that poor service quality may be a marker for poor technical quality. It is possible that problems with clinical communication—a service quality deficiency—increase the risk of medical errors and injuries. Patients, as attentive observers of care, may be particularly well-positioned to observe these lapses, recognizing and identifying conditions that increase their risk of harm. Listening to and addressing patient-reported service quality problems may help to improve overall care.

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