

Liability Claims and Costs Before and After Implementation of a Medical Error Disclosure Program

Allen Kachalia, MD, JD; Samuel R. Kaufman, MA; Richard Boothman, JD; Susan Anderson, MBA, MSN; Kathleen Welch, MS, MPH; Sanjay Saint, MD, MPH; and Mary A.M. Rogers, PhD

Background: Since 2001, the University of Michigan Health System (UMHS) has fully disclosed and offered compensation to patients for medical errors.

Objective: To compare liability claims and costs before and after implementation of the UMHS disclosure-with-offer program.

Design: Retrospective before–after analysis from 1995 to 2007.

Setting: Public academic medical center and health system.

Patients: Inpatients and outpatients involved in claims made to UMHS.

Measurements: Number of new claims for compensation, number of claims compensated, time to claim resolution, and claims-related costs.

Results: After full implementation of a disclosure-with-offer program, the average monthly rate of new claims decreased from 7.03 to 4.52 per 100 000 patient encounters (rate ratio [RR], 0.64 [95% CI, 0.44 to 0.95]). The average monthly rate of lawsuits decreased from 2.13 to 0.75 per 100 000 patient encounters

(RR, 0.35 [CI, 0.22 to 0.58]). Median time from claim reporting to resolution decreased from 1.36 to 0.95 years. Average monthly cost rates decreased for total liability (RR, 0.41 [CI, 0.26 to 0.66]), patient compensation (RR, 0.41 [CI, 0.26 to 0.67]), and non–compensation-related legal costs (RR, 0.39 [CI, 0.22 to 0.67]).

Limitations: The study design cannot establish causality. Malpractice claims generally declined in Michigan during the latter part of the study period. The findings might not apply to other health systems, given that UMHS has a closed staff model covered by a captive insurance company and often assumes legal responsibility.

Conclusion: The UMHS implemented a program of full disclosure of medical errors with offers of compensation without increasing its total claims and liability costs.

Primary Funding Source: Blue Cross Blue Shield of Michigan Foundation.

Ann Intern Med. 2010;153:213-221.

For author affiliations, see end of text.

www.annals.org

Ethical obligations and patient safety principles support prompt disclosure of harmful medical errors (1–4). Disclosure can strengthen trust in the patient–physician relationship and is widely acknowledged as the “right thing” for hospitals and physicians to do (5–8). However, fears that disclosure will invite new claims or complicate subsequent litigation can inhibit the impulse to disclose (9–11). In practice, disclosure may not occur as frequently as we might hope (10–15).

Whether more disclosure will increase or decrease liability remains unclear. Some physicians and risk managers worry that admitting a medical error may amount to handing over a “blank check” and invite lawsuits and disputes about compensation amounts (16). Others counter that prompt disclosure may actually reduce liability because patients primarily seek the facts, a sincere apology, a commitment to prevent the error from recurring, and fair compensation (17, 18). The debate continues amid a lack of widely generalizable data on disclosure’s effect on liability (19, 20).

In 2001, the University of Michigan Health System (UMHS) launched a comprehensive claims management model with disclosure as its centerpiece (17). Emphasizing transparent communication, the UMHS program has received national attention for its process of disclosure with offer of compensation for harmful medical errors (1, 8). To better understand the relationship between disclosure and malpractice liability, we evaluated the effect of the UMHS

program on liability-related performance (**Appendix**, available at www.annals.org).

METHODS

The Claims Model

The current UMHS claims management program has been described in detail (17). In brief, before 2001, UMHS pursued a traditional approach to risk and claims management. Once received, claims for compensation were typically assigned to a defense counsel. A claims management committee would ultimately review all claims and advise on settling or going to trial.

In July 2001, UMHS began responding to all open and new malpractice claims by admitting fault and offering

See also:

Print

Editors’ Notes	214
Editorial comment	266
Summary for Patients	I-28

Web-Only

Appendix	
Appendix Figure	
Conversion of graphics into slides	

Context

The University of Michigan Health System performs active surveillance for medical errors, fully discloses found errors to patients, and offers compensation when it is at fault.

Contribution

This analysis found a decrease in new legal claims, number of lawsuits per month, time to claim resolution, and costs after implementation of the program of disclosure with offer of compensation.

Caution

Similar findings were reported in Michigan generally through the latter part of the study period.

Implication

A disclosure-with-offer approach to medical errors did not increase legal claims and costs at a large U.S. health system during the past 10 years.

—The Editors

compensation when an internal investigation reveals medical error. If an investigation reveals no error, UMHS provides the reasons for its conclusion and vigorously defends a claim, if necessary. In April 2002, UMHS began linking the investigation process with peer review and quality improvement efforts.

By February 2003, the disclosure program was fully integrated with patient safety efforts. The program now identifies patient injuries through various means, including reporting by employees, patients or family members, or patients' attorneys. It uses experienced risk managers with clinical backgrounds to lead investigations and mediate patient concerns as facts are collected, care quality is evaluated, and conclusions are disclosed. The UMHS emphasizes honesty and transparency with patients and staff, regardless of whether events resulted from error, and encourages staff to enlist risk management in the disclosure process.

Settlements, if made, generally occur in the institution's name, in line with common practice at many institutions with closed medical staffs (Appendix). Consequently, reporting of individual caregivers in medical malpractice claims in the National Practitioner Data Bank is rare. However, full claims histories are maintained and reported for each involved caregiver, as required.

Design

We used a before–after approach to evaluate the UMHS program. The study period included claims reported to risk management from 1 July 1995 to 30 September 2007, with 1 July 2001 as the date of initial implementation of the disclosure program and 1 February 2003 as the date of full implementation. We categorized claims on the basis of their date of reporting. The institu-

tional review board from the University of Michigan approved the study protocol.

Data Sources and Measures

We linked 2 data sets, the UMHS risk management database (which contains claims-related performance data, such as injury and disposition dates, disposition status, and liability costs) and the Clinical Information & Decision Support Services database, to assess 4 primary study measures: number of new claims, number of claims receiving compensation, time to claim resolution, and claims-related costs.

We defined a claim as any request for compensation for an unanticipated medical outcome whether initiated by the patient (or a family member or attorney) or by disclosure. We were unable to categorize the source of the claim (patient- or family-initiated vs. UMHS-initiated) because UMHS opted not to distinguish between the sources upon initiation of its program. We attempted to determine the number of lawsuits that had resulted from disclosure but could not reliably do so. Claims counts are by occurrence regardless of the number of caregivers named. We excluded service recovery claims (those brought by patients without an attorney and compensated for less than \$5000) because payments for those claims primarily serve to restore patient relations rather than redress a harmful error. We also excluded off-site claims (those involving a UMHS physician at a non-UMHS facility) because off-site locations frequently lacked a formal disclosure program.

We calculated the monthly rate of new claims by using the number of claims in a month (based on report date) for the numerator and the number of patient encounters in that month as the denominator. Patient encounters were defined as the sum of hospital discharges and outpatient visits for that month.

We defined total liability costs as the sum of all patient compensation and legal costs incurred by UMHS. Patient compensation costs included amounts paid to the patients (or families) and lien holders. Total legal costs were primarily defense attorney and expert fees but also included lawsuit-associated items, such as filing fees. Because costs are presented here as a portion of clinical operating revenue, we adjusted them to 2007 U.S. dollars by using the cost of medical care from the U.S. Bureau of Labor Statistics. We calculated the monthly liability cost rate by using total costs (by claim report date) in a given month as the numerator and total operating revenue in that month as the denominator.

Statistical Analysis

To evaluate differences in the rate of claims in the periods before and after disclosure, we used negative binomial generalized linear models (GLMs) with a log link. Rate ratios (RRs) were calculated by comparing the rate of claims before implementation of the disclosure program with that after full implementation. For the main analyses, only those claims that were reported and closed before the

initial implementation of the policy (1 July 2001) were included in the period before the program (reference group). We included claims that were reported after the full implementation of the policy (1 February 2003) in the period after disclosure. We used a locally weighted, scatterplot smoother (lowess) to display trends over time. Piecewise regression with linear splines was used to assess the difference in trends before and after initial implementation of the disclosure program (1 July 2001).

We conducted survival analyses to assess the time to claim resolution. Kaplan–Meier estimators of the survivorship function were plotted for claims reported before the initial implementation of the disclosure program (1 July 2001) and those reported afterward. A Cox proportional hazards regression model was used to calculate hazard ratios for the difference in resolution rates after versus before (reference group) implementation of the program; visual inspection of the survival curves suggested no violation of the proportional hazards assumption. We adjusted for patient age, sex, inpatient status, and whether the claim went to trial.

To assess the differences in costs of the program before and after disclosure, we used GLM with a gamma distribution and log link. At the time of analysis, 36 claims that had been filed during the study period remained open (that is, cases that had not been closed as of 31 March 2008); we included the costs for these open claims in the statistical analyses, as incurred as of 31 March 2008.

Two sensitivity analyses were conducted for the cost data. The first excluded outliers in the GLM. Outliers were determined by calculating costs that exceeded the product of 1.5 and the limits of the interquartile range (IQR). The second sensitivity analysis used the date of the initial implementation of the disclosure program (1 July 2001) as the cut point for the before-versus-after comparison. In addition, we included all claims on the basis of the date of the reported claim, regardless of disposition status.

All analyses were 2-tailed, with an α level of 0.05. We performed analyses in Stata SE, version 10.0 (StataCorp, College Station, Texas).

Role of the Funding Source

Blue Cross Blue Shield of Michigan Foundation funded this study. The funding source had no role in the

design, conduct, analysis, or decision to submit this manuscript for publication.

RESULTS

Total Claims

The UMHS risk management claims database contained 1131 claims for the study period after excluding service recovery ($n = 33$) and off-site cases ($n = 145$). Mean patient age was 40.4 years (SD, 20.7) at the time of injury; 87% of patients were white, 52% were women, and 55% were inpatients.

Of the 1131 total claims, 633 were asserted before and 498 after implementation of the disclosure-with-offer program. Of the claims made before implementation, 632 were closed as of 31 March 2008 and 319 (50.5% [95% CI, 46.5% to 54.4%]) were compensated, compared with 463 closed and 198 (42.8% [CI, 38.2% to 47.4%]) compensated after program implementation ($P = 0.012$). This averaged 53.2 paid claims per year before and 31.7 after the program began.

Claims Rates

The monthly rate of new claims decreased from 7.03 (CI, 5.98 to 8.08) per 100 000 patient encounters before initial program implementation to 4.52 (CI, 3.96 to 5.08) after full implementation (RR, 0.64 [CI, 0.44 to 0.95]) (Table 1). The trend in monthly rate was stable before (-0.002 [CI, -0.050 to 0.046]; $P = 0.935$) but decreased after the program was initially implemented in July 2001 (-0.061 [CI, -0.082 to -0.040]; $P < 0.001$), which was a statistically significant before–after difference (-0.059 [CI, -0.110 to -0.008]; $P = 0.023$) (Figure 1).

Changes in rates of claims before and after program implementation were statistically significant only for claims that resulted in a lawsuit. The UMHS experienced 232 lawsuits (38.7 per year) before and 106 (17.0 per year) after program implementation. A decrease was still evident, assuming all cases that were open at the end of the observation period (1 before and 35 after implementation) resulted in lawsuits, with 233 lawsuits (38.8 per year) before and 141 lawsuits (22.6 per year) after program implementation. Monthly lawsuit rates decreased from 2.13 (CI, 1.58 to 2.67) per 100 000 patient encounters before initial

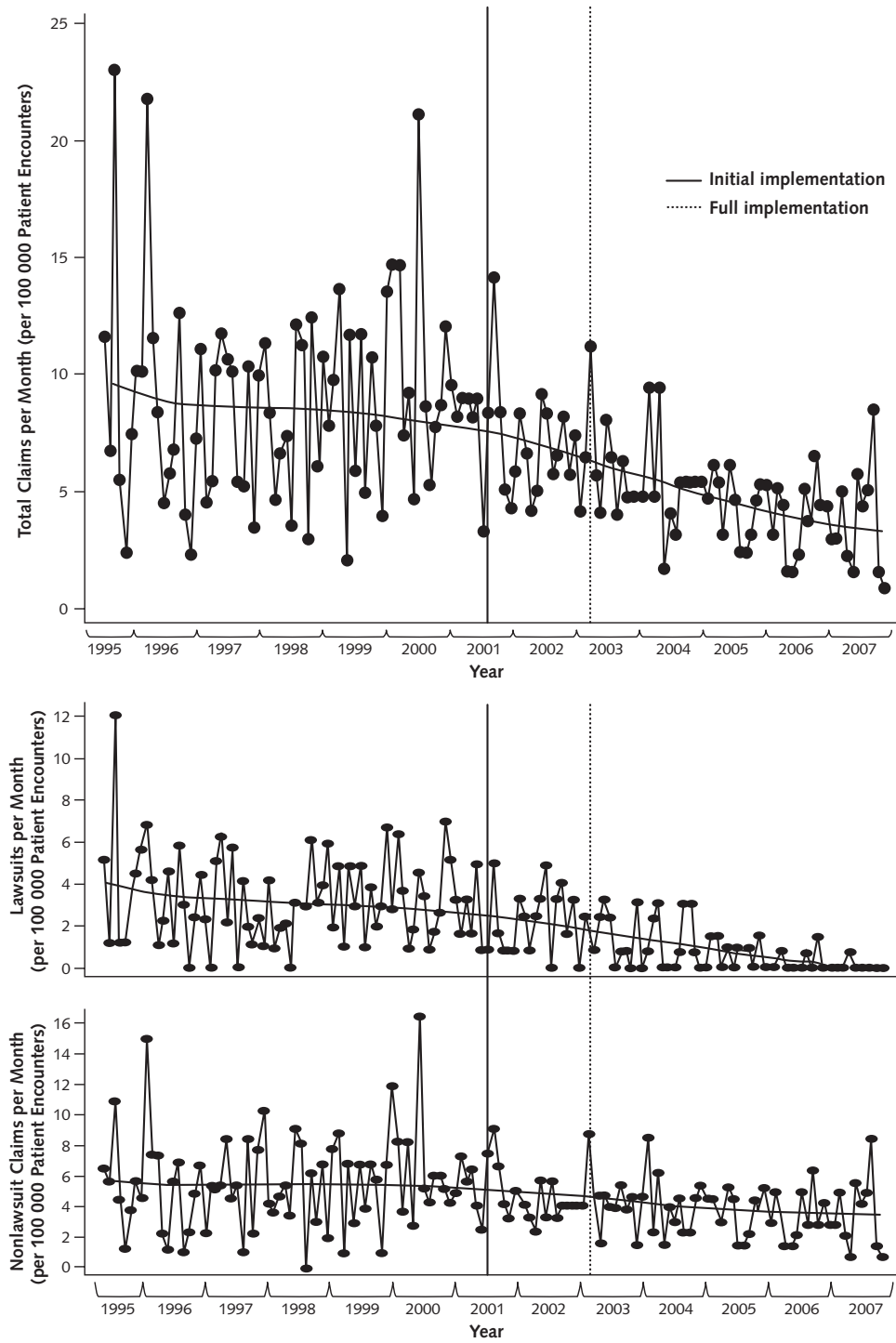
Table 1. Monthly Rates and Incidence Rate Ratios of New Claims Before and After Full Implementation of the University of Michigan Health System Disclosure-With-Offer Program

Variable	Mean Monthly Rate (95% CI)*		Rate Ratio (95% CI)†	P Value
	Before	After		
Total claims	7.03 (5.98–8.08)	4.52 (3.96–5.08)	0.64 (0.44–0.95)	0.025
Lawsuits	2.13 (1.58–2.67)	0.75 (0.47–1.03)	0.35 (0.22–0.58)	<0.001
All other claims	4.90 (4.17–5.63)	3.77 (3.27–4.26)	0.77 (0.52–1.14)	0.191

* Number of claims in 1 mo per 100 000 patient encounters.

† Rate after full implementation compared with rate before program began (reference group).

Figure 1. Monthly rates of new claims before and after implementation of the University of Michigan Health System disclosure-with-offer program.



implementation to 0.75 (CI, 0.47 to 1.03) per 100 000 patient encounters after full implementation (RR, 0.35 [CI, 0.22 to 0.58]) (Table 1). The trend in monthly rates of lawsuits before and after initial implementation of the program demonstrated a significant change (difference in trend, -0.028 [CI, -0.054 to -0.001]; $P = 0.04$) (Figure 1).

In contrast, there was no change in the rate of claims that did not result in a lawsuit after the program was fully implemented (RR, 0.77 [CI, 0.52 to 1.14]) (Table 1), with no significant change in trend after initial implementation (difference in trend, -0.031 [CI, -0.070 to 0.007]; $P = 0.108$).

Our primary analyses counted only claims reported and closed before initial program implementation as “before” claims, but findings were similar when we compared rates of all claims reported before and after initial program implementation, independent of time of disposition (RR for all claims, 0.59 [CI, 0.41 to 0.83]; RR for claims resulting in lawsuits, 0.34 [CI, 0.23 to 0.51]; and RR for claims not resulting in lawsuits, 0.73 [CI, 0.51 to 1.04]).

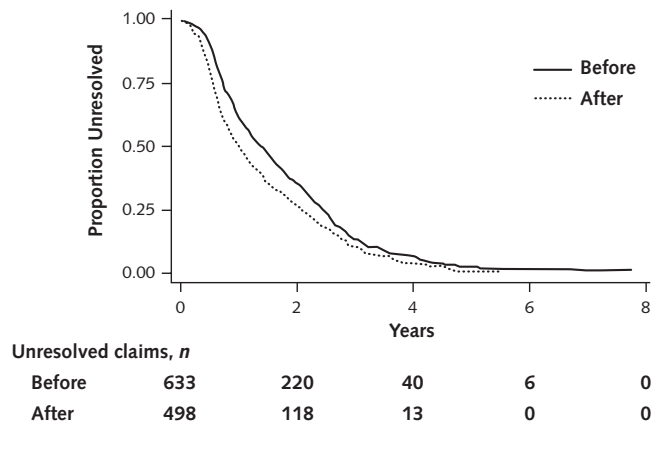
Time to Resolution

Median time to claim resolution was 1.36 years (IQR, 0.72 to 2.44 years) before initial implementation and 0.95 year (IQR, 0.55 to 1.96 years) after initial program implementation (Figure 2); the rate of resolution increased after program implementation with an adjusted hazard ratio of 1.27 (CI, 1.11 to 1.45; $P < 0.001$). No effect modification by site (inpatient vs. outpatient) occurred.

Liability Costs

Median and mean total liability costs decreased after full program implementation (RR for mean costs, 0.41 [CI, 0.26 to 0.66]; $P < 0.001$), attributable to decreases in both legal and patient compensation costs (Table 2). After initial program implementation, total cost rates significantly decreased (difference in trend, -0.449 [CI, -0.806 to -0.092]; $P = 0.014$) as did legal (difference in trend, -0.066 [CI, -0.111 to -0.022]; $P = 0.004$) and patient compensation (difference in trend, -0.383 [CI, -0.715 to

Figure 2. Time to claim resolution before and after implementation of the University of Michigan Health System disclosure-with-offer program.



-0.050]; $P = 0.024$) costs (Figure 3). Although the total costs associated with lawsuits decreased after full implementation (RR, 0.27 [CI, 0.13 to 0.54]), the total costs for nonlawsuit claims did not (RR, 0.81 [CI, 0.47 to 1.38]) (Table 2).

In a sensitivity analysis excluding outliers, results were qualitatively similar for claims overall (RR, 0.66 [CI, 0.44 to 0.98]), type of claim (RR for lawsuits, 0.35 [CI, 0.21 to 0.58]; RR for nonlawsuits, 0.77 [CI, 0.52 to 1.14]), and type of costs (RR for legal costs, 0.43 [CI, 0.26 to 0.70]; RR for patient compensation, 0.45 [CI, 0.31 to 0.67]). We also found similar results in a sensitivity analysis by using the date of initial rather than full program implementation as the before–after marker (data not shown).

The average cost per lawsuit significantly decreased from \$405 921 before to \$228 308 after initial program implementation (RR, 0.40 [CI, 0.24 to 0.68]; $P = 0.001$). Costs did not change for nonlawsuits (RR, 1.27 [CI, 0.73 to 2.23]; $P = 0.397$). This pattern was similar when time

Table 2. Monthly Rates of Liability Costs Before and After Full Implementation of the University of Michigan Health System Disclosure-With-Offer Program

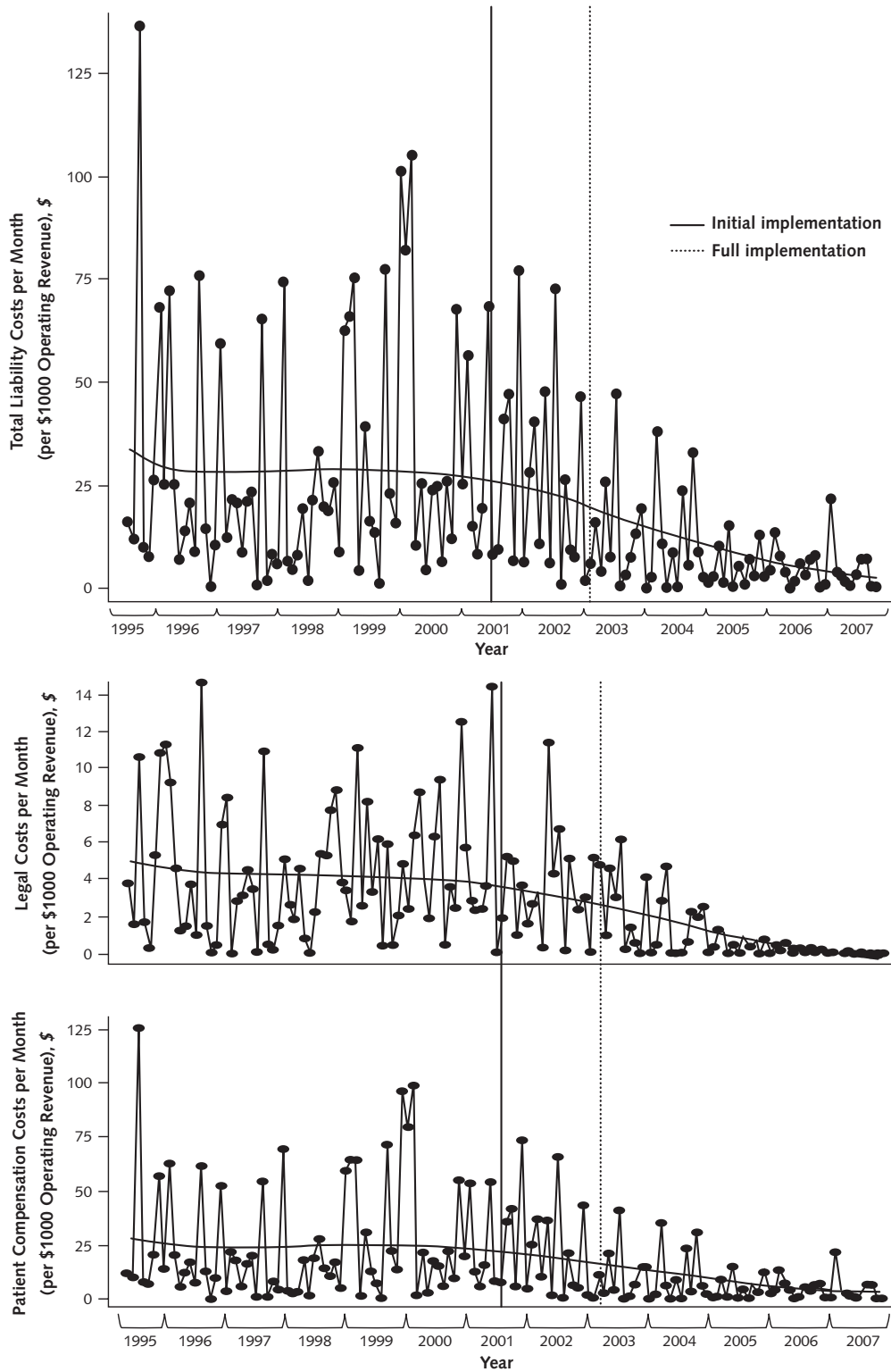
Category	Median Cost Rate (IQR)*		Mean Cost Rate (95% CI)*		Rate Ratio (95% CI)†
	Before	After	Before	After	
All liability costs	8.48 (3.24–21.48)	4.00 (1.16–9.31)	18.91 (12.61–25.21)	7.78 (5.14–10.42)	0.41 (0.26–0.66)
Type of claim					
Lawsuit	4.06 (0.02–13.95)	0 (0–3.65)	13.85 (8.26–19.43)	3.71 (1.46–5.95)	0.27 (0.13–0.54)
Nonlawsuit	1.02 (0.13–5.95)	2.45 (0.29–5.61)	5.06 (3.07–7.04)	4.07 (2.55–5.60)	0.81 (0.47–1.38)
Type of costs					
Patient compensation	7.88 (2.11–19.09)	3.56 (1.07–8.00)	16.64 (10.90–22.38)	6.90 (4.51–9.30)	0.41 (0.26–0.67)
Legal	0.95 (0.18–2.87)	0.19 (0.01–0.89)	2.26 (1.46–3.06)	0.88 (0.48–1.27)	0.39 (0.22–0.67)

IQR = interquartile range.

* Costs in 1 mo per \$1000 operating revenue.

† Generalized linear models comparing average monthly costs after full implementation with average monthly costs before implementation (values <1.0 represent a decrease in costs).

Figure 3. Monthly rates of legal and patient compensation costs before and after implementation of the University of Michigan Health System disclosure-with-offer program.



trends were considered, with a significant decrease for lawsuit costs (before–after change in slope, -7848.73 [CI, -14035.56 to -1661.90]; $P = 0.013$) but not nonlawsuits (before–after change in slope, -1119.33 [CI, -3831.10 to 1592.45]; $P = 0.416$) (Figure 4).

DISCUSSION

In this analysis of changes in liability claims and costs with the introduction of a comprehensive disclosure-with-offer program at the UMHS, we detected a reduced rate of claims, primarily driven by a decrease in the number of lawsuits; lower liability costs; and shorter time to resolution after the program was started. These findings demonstrate that it is possible to implement a disclosure-with-offer program without increasing liability claims and costs.

Other providers and insurers have undertaken disclosure initiatives or programs, but only 1 organization with a comprehensive disclosure-with-offer program, the Veterans Affairs Medical Center (VAMC) in Lexington, Kentucky, has reported its experience (21, 22). Assessment of total malpractice payments 9 years after initiation of the program demonstrated that the medical center had moved from the top to the bottom quartile in its peer group (21). Despite these results, widespread adoption of disclosure-with-offer programs has been limited, perhaps because the Lexington VAMC program is set in a medical center gov-

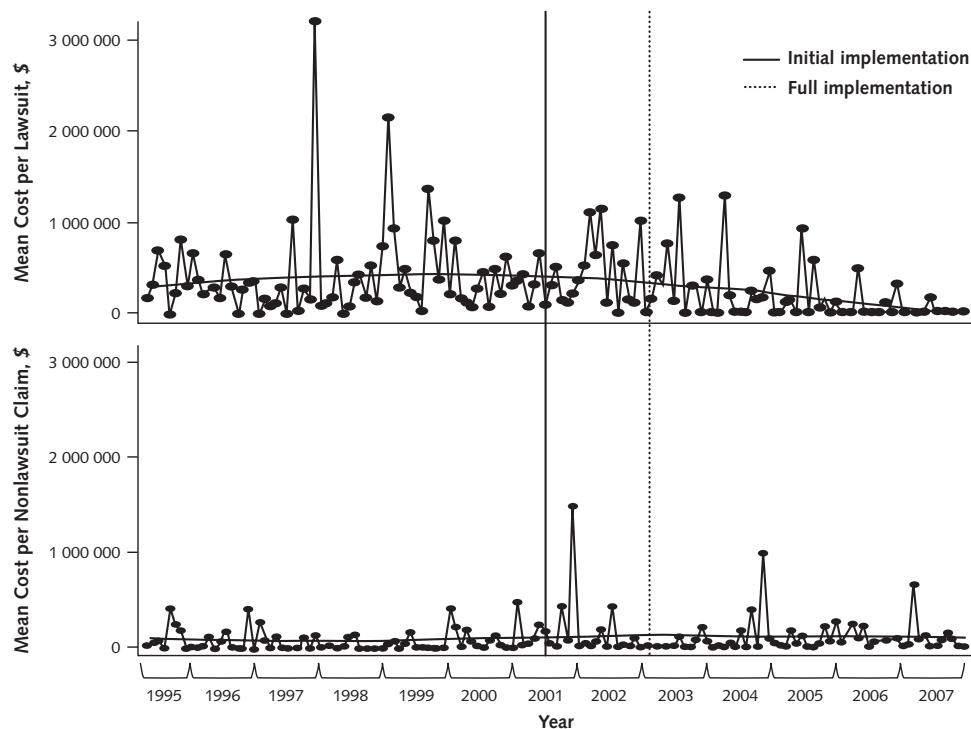
erned by the Federal Tort Claims Act and serves a population largely restricted to military veterans.

The near-absence of data on disclosure's direct effect on liability risk has led investigators to examine other indicators. For example, researchers have generated a predictive program and concluded that liability costs may actually increase with disclosure (20). Others argue that disclosure reduces lawsuits, citing surveys that suggest patients may be more likely to sue if they sense a lack of transparency (23–25). We provide empirical information on the direct liability-related consequences of a disclosure-with-offer program.

The UMHS program was designed to expedite compensation and claim resolution. Two frequent criticisms levied on the tort liability system are that only a small proportion of patients are ever compensated for negligent injury and that the time to obtaining compensation is excessively long (26). Our finding that time to claim resolution was shorter with the disclosure program suggests that the program seems to address the latter criticism. Quicker resolution can be important, especially for patients sustaining disabling injuries.

Our finding that fewer patients were compensated during the disclosure period may raise concerns that disclosure is not practiced with every case of error. This analysis, however, did not identify the specific factors that

Figure 4. Mean costs per claim before and after implementation of the University of Michigan Health System disclosure-with-offer program.



might account for the finding. Plausible explanations include a general decrease in claims for compensation, fewer injuries as a result of patient safety efforts, or patient satisfaction with an apology and honesty. In light of the University's transparency, patients (and their lawyers) may also be less likely to seek compensation if they believe they are getting the "real story" when UMHS denies that an error occurred. The UMHS's stance not to settle nuisance claims may also decrease the number of paid claims.

A program of disclosure with offer of compensation may also address another criticism of the malpractice system, namely its high administrative expenses (26, 27). After implementation, mean legal expenses for UMHS decreased by about 61%. Part of these savings were probably offset by the increase in the UMHS risk management budget needed to more proactively address claims internally, but the risk management expenses were more reflective of greater resources dedicated to the improvement of patient safety rather than administration of the disclosure program. Moreover, decreases in transactional costs for patients are also apparent. Not only can the shorter time to resolution translate to lower legal expenses for patients, many plaintiff attorneys now take cases on an hourly basis (as opposed to the more expensive contingency basis) in claims in which the UHMS has admitted error.

In addition to addressing some of the problems with the malpractice system, the disclosure program is compatible with other patient safety needs. Experts have called for greater reporting of errors as an important part of delivering safe and high-quality care (28–30). Despite UMHS directly linking its patient safety reporting systems to an open-disclosure risk management program (which could theoretically discourage reporting), the number of reported incidents increased tremendously (**Appendix Figure**, available at www.annals.org).

Our analysis has several limitations. The state of Michigan's implementation of malpractice reform in 1994 (7 years before UMHS adopted its disclosure program) may have promoted a general decrease in liability claims and costs in the state. The legislation included caps on noneconomic damages, a 6-month compulsory presuit notice period, and new expert witness foundation requirements (31–34). However, Michigan was not considered immune to the most recent liability crisis (35).

Our study did not include a concurrent control to allow the disentanglement from secular trends. However, it is possible to glean some limited insight about what may have happened in the absence of a disclosure program. The UMHS outperformed its own actuarial models (based on external factors and UMHS claims experience before the disclosure program) by demonstrating a savings of approximately 39% from predicted total costs from 2003 to 2008. The UMHS actuarial modeling also demonstrated a relatively stable claims rate from 1995 to 2001 that was predicted to continue through 2008. Actual experience

demonstrated a claims rate that was more than 25% lower after the disclosure program.

State trends, through data submitted largely by commercial carriers insuring individual Michigan physicians, demonstrated declining numbers of reported claims from 2000 through 2007, with about 4.5 years from claim opening to closure (36). The UMHS experience compared favorably during this period: decreasing claims but with shorter resolution times. Aggregated national data from 20 physician insurer companies of claims closed from 2001 to 2008 revealed a relatively stable percentage of claims receiving payment (24% to 32%) and compensation costs, whereas legal expenses increased by about 28% (37). For claims opened during this period, UMHS compensated approximately 43% and had decreasing compensation and legal costs.

In addition, the UMHS approach of accepting systems-level responsibility with regard to the National Practitioner Data Bank reporting may affect applicability. For disclosure programs that do not adopt this approach, the willingness of physicians to settle may be limited. Finally, because the UMHS program is one of disclosure with offer (and not disclosure alone), this analysis does not necessarily inform on the liability results for providers that opt to disclose but not offer compensation.

Limitations notwithstanding, the study results have important implications. First, a medical center can implement a disclosure-with-offer program without increasing malpractice costs. Second, a disclosure program may address some of the main shortcomings of our current liability system, namely shortening long waits for compensation and decreasing administrative expenses. Third, disclosure may actually reduce another inefficiency of the malpractice system: preventing both meritorious and nonmeritorious claims from becoming expensive lawsuits. Fourth, the lower number of paid claims after implementation may suggest that disclosure with offer may not always ensure that injured patients receive compensation. This finding, however, may challenge past assumptions that everyone who had a harmful error expects compensation. The openness and accompanying patient safety efforts may satisfy patients for whom litigation was formerly their only alternative.

In an era of calls for greater transparency in health care, disclosure is often cited as a practice necessary to physician ethics and patient safety. The UMHS experience demonstrates that disclosure with offer can be conducted—in a setting similar to many other centers in the United States—without exacerbating liability costs. We hope that this study will encourage further disclosure efforts, as well as the detailed evaluation of their effects.

From Brigham and Women's Hospital, Boston, Massachusetts, and Ann Arbor Veterans Affairs Medical Center, University of Michigan Health System, University of Michigan, and Center for Statistical Consultation and Research, Ann Arbor, Michigan.

Disclaimer: The content is solely the responsibility of the authors and does not necessarily represent the official views of the Department of Veterans Affairs or the National Institutes of Health.

Acknowledgment: The authors thank Vinita Bahl, DMD, MPP; Ellen Bunting, MA; and Elaine Commiskey, MS, for their invaluable efforts in supplying data essential to this study.

Grant Support: By Blue Cross Blue Shield of Michigan Foundation (1217.II). In addition, Dr. Saint was supported by an Advanced Career Development Award from the Health Services Research & Development Service of the Department of Veterans Affairs during a portion of the time this study was conducted. Dr. Saint is currently supported by awards R21-DK078717 and R01-NR010700 from the National Institutes of Health.

Potential Conflicts of Interest: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M09-1494.

Reproducible Research Statement: *Study protocol, statistical code, and data set:* Not available.

Requests for Single Reprints: Allen Kachalia, MD, JD, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115; e-mail, kachalia@partners.org.

Current author addresses and author contributions are available at www.annals.org.

References

- Clinton HR, Obama B. Making patient safety the centerpiece of medical liability reform. *N Engl J Med*. 2006;354:2205-8. [PMID: 16723612]
- Levinson W, Gallagher TH. Disclosing medical errors to patients: a status report in 2007. *CMAJ*. 2007;177:265-7. [PMID: 17664451]
- Hospital Accreditation Standards. Oakbrook Terrace, IL: Joint Commission on Accreditation of Healthcare Organizations; 2008.
- National Quality Forum. Safe practices for better healthcare 2009 update: a consensus report. Washington, DC: National Quality Forum; 2009.
- Blendon RJ, DesRoches CM, Brodie M, Benson JM, Rosen AB, Schneider E, et al. Views of practicing physicians and the public on medical errors. *N Engl J Med*. 2002;347:1933-40. [PMID: 12477944]
- Snyder L, Leffler C; Ethics and Human Rights Committee, American College of Physicians. Ethics manual: fifth edition. *Ann Intern Med*. 2005;142:560-82. [PMID: 15809467]
- Mazor KM, Simon SR, Yood RA, Martinson BC, Gunter MJ, Reed GW, et al. Health plan members' views on forgiving medical errors. *Am J Manag Care*. 2005;11:49-52. [PMID: 15697100]
- Gallagher TH, Studdert D, Levinson W. Disclosing harmful medical errors to patients. *N Engl J Med*. 2007;356:2713-9. [PMID: 17596606]
- Kachalia A, Shojania KG, Hofer TP, Piotrowski M, Saint S. Does full disclosure of medical errors affect malpractice liability? The jury is still out. *Jt Comm J Qual Saf*. 2003;29:503-11. [PMID: 14567259]
- Lamb RM, Studdert DM, Bohmer RM, Berwick DM, Brennan TA. Hospital disclosure practices: results of a national survey. *Health Aff (Millwood)*. 2003;22:73-83. [PMID: 12674409]
- Gallagher TH, Waterman AD, Ebers AG, Fraser VJ, Levinson W. Patients' and physicians' attitudes regarding the disclosure of medical errors. *JAMA*. 2003;289:1001-7. [PMID: 12597752]
- Gallagher TH, Waterman AD, Garbutt JM, Kapp JM, Chan DK, Dunagan WC, et al. US and Canadian physicians' attitudes and experiences regarding disclosing errors to patients. *Arch Intern Med*. 2006;166:1605-11. [PMID: 16908793]
- Weissman JS, Annas CL, Epstein AM, Schneider EC, Clarridge B, Kirle L, et al. Error reporting and disclosure systems: views from hospital leaders. *JAMA*. 2005;293:1359-66. [PMID: 15769969]
- Loren DJ, Klein EJ, Garbutt J, Krauss MJ, Fraser V, Dunagan WC, et al. Medical error disclosure among pediatricians: choosing carefully what we might say to parents. *Arch Pediatr Adolesc Med*. 2008;162:922-7. [PMID: 18838644]
- Wu AW, Folkman S, McPhee SJ, Lo B. Do house officers learn from their mistakes? *JAMA*. 1991;265:2089-94. [PMID: 2013929]
- Butcher L. Lawyers say 'sorry' may sink you in court. *Physician Exec*. 2006;32:20-4. [PMID: 16615399]
- Boothman RC, Blackwell AC, Campbell DA Jr, Commiskey E, Anderson S. A better approach to medical malpractice claims? The University of Michigan experience. *J Health Life Sci Law*. 2009;2:125-59. [PMID: 19288891]
- Wojcieszak D, Banja J, Houk C. The Sorry Works! Coalition: making the case for full disclosure. *Jt Comm J Qual Patient Saf*. 2006;32:344-50. [PMID: 16776389]
- Kachalia A, Shojania KG, Hofer TP, Piotrowski M, Saint S. Does full disclosure of medical errors affect malpractice liability? The jury is still out. *Jt Comm J Qual Saf*. 2003;29:503-11. [PMID: 14567259]
- Studdert DM, Mello MM, Gawande AA, Brennan TA, Wang YC. Disclosure of medical injury to patients: an improbable risk management strategy. *Health Aff (Millwood)*. 2007;26:215-26. [PMID: 17211031]
- Kraman SS, Hamm G. Risk management: extreme honesty may be the best policy. *Ann Intern Med*. 1999;131:963-7. [PMID: 10610649]
- Peto RR, Tenerowicz LM, Benjamin EM, Morsi DS, Burger PK. One system's journey in creating a disclosure and apology program. *Jt Comm J Qual Patient Saf*. 2009;35:487-96. [PMID: 19886087]
- Mazor KM, Simon SR, Yood RA, Martinson BC, Gunter MJ, Reed GW, et al. Health plan members' views about disclosure of medical errors. *Ann Intern Med*. 2004;140:409-18. [PMID: 15023706]
- Vincent C, Young M, Phillips A. Why do people sue doctors? A study of patients and relatives taking legal action. *Lancet*. 1994;343:1609-13. [PMID: 7911925]
- Witman AB, Park DM, Hardin SB. How do patients want physicians to handle mistakes? A survey of internal medicine patients in an academic setting. *Arch Intern Med*. 1996;156:2565-9. [PMID: 8951299]
- Studdert DM, Mello MM, Brennan TA. Medical malpractice. *N Engl J Med*. 2004;350:283-92. [PMID: 14724310]
- Studdert DM, Mello MM, Gawande AA, Gandhi TK, Kachalia A, Yoon C, et al. Claims, errors, and compensation payments in medical malpractice litigation. *N Engl J Med*. 2006;354:2024-33. [PMID: 16687715]
- Kohn L, Corrigan J, Donaldson M. To Err is Human: Building a Safer Health System. Washington, DC: National Academies Press; 2000.
- Mello MM, Studdert DM, Kachalia AB, Brennan TA. "Health courts" and accountability for patient safety. *Milbank Q*. 2006;84:459-92. [PMID: 16953807]
- Leape LL. Reporting of adverse events. *N Engl J Med*. 2002;347:1633-8. [PMID: 12432059]
- Mich Comp Laws §600.2169.
- Mich Comp Laws §600.1483.
- Mich Comp Laws §600.5838a.
- Mich Comp Laws §600.5856.
- Xu X, Siefert KA, Jacobson PD, Lori JR, Ransom SB. The effects of medical liability on obstetric care supply in Michigan. *Am J Obstet Gynecol*. 2008;198:205.e1-9. [PMID: 17997388]
- Office of Financial and Insurance Regulation. Evaluation of the Michigan Medical Professional Liability Insurance Market. A Market Evaluation Study issued by Commissioner Ken Ross. Lansing, MI: State of Michigan Department of Energy, Labor and Economic Growth; October 2009. Accessed at www.michigan.gov/documents/dleg/Michigan_Medical_Liability_Ins_Rpt_297694_7.pdf on 1 July 2010.
- Physician Insurers Association of America. Claims Trend Analysis: A Comprehensive Analysis of Medical Liability Data Reported to the PIAA Data Sharing Project. Rockville, MD: Physician Insurers Association of America; 2009.

Current Author Addresses: Dr. Kachalia: Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115.

Mr. Kaufman: Department of Internal Medicine, Division of Cardiovascular Medicine, The Blue Cross Blue Shield of Michigan Cardiovascular Consortium, 2929 Plymouth Road, Suite 225, Ann Arbor, MI 48105-3206.

Mr. Boothman: University of Michigan Health System, Med Inn Building, C 201, SPC 5825, 1500 East Medical Center Drive, Ann Arbor, MI 48109.

Ms. Anderson: University of Michigan Health System, Risk Management Department, 300 North Ingalls Building, Room 8A06/SPC 5478, Ann Arbor, MI 48109-5478.

Ms. Welch: Center for Statistical Consultation and Research, 3554 Rackham Building, 915 East Washington Street, Ann Arbor, MI 48109-1070.

Dr. Saint: Ann Arbor Veterans Affairs Medical Center, Division of General Medicine, Department of Internal Medicine, University of Michigan, 300 North Ingalls Building, Room 7E08, Ann Arbor, MI 48109.

Dr. Rogers: Division of General Medicine, Department of Internal Medicine, University of Michigan, 300 North Ingalls Building, Room 7E07, Ann Arbor, MI 48109.

Author Contributions: Conception and design: A. Kachalia, S. Saint, S.R. Kaufman, M.A.M. Rogers, R. Boothman, S. Anderson.

Analysis and interpretation of the data: A. Kachalia, S. Saint, S.R. Kaufman, M.A.M. Rogers, R. Boothman, S. Anderson, K. Welch.

Drafting of the article: A. Kachalia, S.R. Kaufman, M.A.M. Rogers.

Critical revision of the article for important intellectual content: A. Kachalia, S. Saint, S.R. Kaufman, M.A.M. Rogers, R. Boothman.

Final approval of the article: A. Kachalia, S. Saint, S.R. Kaufman, M.A.M. Rogers, R. Boothman, S. Anderson.

Statistical expertise: S.R. Kaufman, M.A.M. Rogers, K. Welch.

Obtaining of funding: A. Kachalia, S.R. Kaufman, S. Saint, M.A.M. Rogers.

Administrative, technical, or logistic support: A. Kachalia, R. Boothman, S. Anderson.

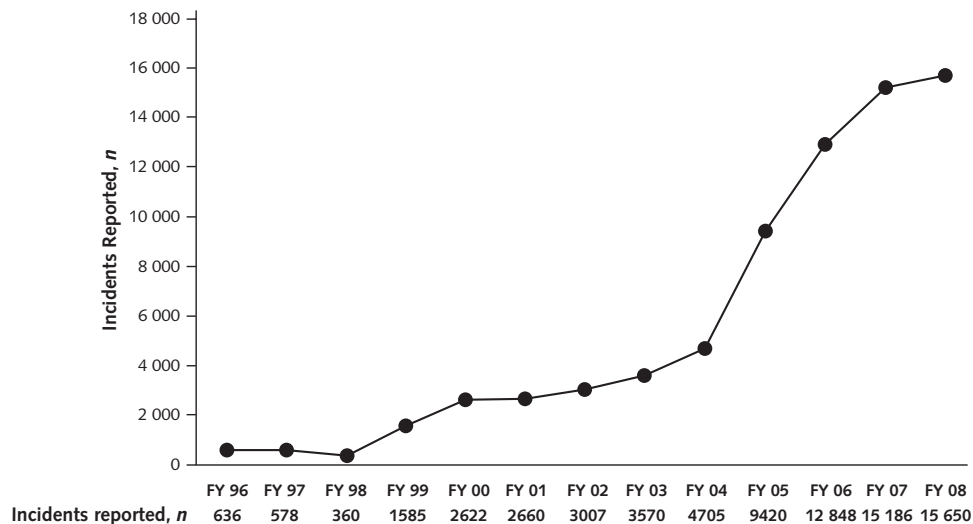
Collection and assembly of data: A. Kachalia, S.R. Kaufman, R. Boothman, S. Anderson.

APPENDIX

Background

The UMHS is a major public academic center located in Ann Arbor, Michigan. With few exceptions, the UMHS has a closed medical staff comprising faculty members employed by the University of Michigan Medical School, which is governed by the University's Board of Regents. The system and its employees have exclusive occurrence-based professional liability coverage provided by an established captive insurance company. Medical staff and other employees can be sued individually in the circuit courts with juries, but as an agency of the state of Michigan, the Regents may only be sued in the state's Court of Claims (which does not allow juries). For judicial economy, lawsuits are typically joined administratively but are not consolidated; separate judgments are obtained in each lawsuit that goes to verdict.

Appendix Figure. Number of incidents reported to University of Michigan Health System risk management, by fiscal year.



An incident is any event (whether involving injury, potential injury, or any concern) that was reported to risk management. FY = fiscal year.