WORKING
PAPER

Adverse Event Reporting Practices by U.S. Hospitals

Survey Results from 2005 and 2009

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HEALTH

Preface

In 2000, the U.S. Congress mandated the Agency for Healthcare Research and Quality (AHRQ) to take a leadership role in helping health care providers reduce medical errors and improve patient safety. In September 2002, AHRQ contracted with RAND to serve as the patient safety evaluation center for this initiative. The evaluation center was responsible for performing a four-year formative evaluation of AHRQ's patient safety activities, and providing regular feedback to support the continuing improvement of the initiative over the evaluation period. As part of this contract, RAND administered the Adverse Event Reporting System Survey (AERS) that was developed by AHRQ in 2003 through a contract with Westat.

This report presents the results of the administrations of the AERS survey in 2005 and 2009. These two sets of survey data provide measurable information that documents need and highlights priorities for improvements in the internal adverse event reporting systems and practices of U.S. hospitals. These survey results also establish baseline data for use in future monitoring of improvement progress, as AHRQ implements the Patient Safety Organization program established by the *Patient Safety and Quality Improvement Act of 2005* (S. 544) enacted by the U.S. Congress.

The contents of this report will be of primary interest to AHRQ, but should also be of interest to national and state policy makers, health care organizations, health researchers, and others with responsibilities for ensuring that patients are not harmed by the health care they receive.

This work was sponsored by the Agency for Healthcare Research and Quality, Department of Health and Human Services, for which James B. Battles, Ph.D. serves as project officer.

This work was conducted in RAND Health, a division of the RAND Corporation. A profile of RAND Health, abstracts of its publications, and ordering information can be found at www.rand.org/health.

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Summary

Little has been known about hospitals' adverse event reporting systems, or how they use reported data to improve safety performance. This information is needed to assess effects of national patient safety initiatives, including implementation of the Patient Safety and Quality Improvement Act of 2005 (PSQIA). The survey results presented in this report provide baseline information on the characteristics of hospital adverse event reporting systems and processes. The goal of the survey was to establish estimates of the percentage of hospitals that have such systems, the status of reporting practices, and how information on reported occurrences is disseminated and used for process improvements. These baseline survey results would be used for two purposes – to track trends in improvements for adverse event reporting practices across the country, and to assess effects of the implementation of the national actions under PSQIA, intended to support hospitals in improving their internal reporting processes.

Two rounds of the Adverse Event Reporting System (AERS) Survey were administered, the first in 2005 and the second in 2009, using a mixed mode (mail/telephone) survey design with stratified random samples non-federal U.S. hospitals. The surveys were completed with the risk manager at each hospital in the sample. We used the same data collection methods for both the 2005 and 2009 surveys, which were chosen because the methods were known to yield fairly high response rates. The survey mode was a mail survey with two waves of mail follow-ups, which was followed by a Computer-Assisted Telephone Interviewing (CATI) telephone survey for the remaining non-responders. The CATI survey was tested to ensure that the questionnaire items appeared as designed, that the logical flow was correct, that there were appropriate range checks and that the data were being recorded correctly. The survey questions for both years took approximately 25 minutes to complete.

In September 2005 through January 2006, we administered the first AERS survey to risk managers at a stratified randomized sample of 2,050 non-federal hospitals, excluding those in southern portions of Louisiana and Mississippi. Hospitals in those areas had been affected by Hurricane Katrina at the time we went into the field for survey data collection, so we were not able to contact them for the survey. The sample was thus representative of non-federal hospitals nationally excluding these areas. The sample was stratified by Joint Commission accreditation status, hospital ownership, and staffed bed size, which also yielded good representation on teaching, urban/rural, and multi-hospital system status. An 81 percent response rate was obtained, for a sample of 1,652 completed surveys.

In April through September 2009, we administered the second AERS survey to risk managers at a subset of the hospitals that responded to the 2005 survey. A stratified random sample of 1,200 hospitals was drawn from the 1,652 hospital Risk Managers who completed the 2005 survey, using random selection within the strata established for the 2005 survey. To achieve a representative sample in this survey across strata, different proportions of responders to the 2005 survey were selected. A 79 percent response rate was obtained, for a sample of 952 completed surveys.

The samples for the 2005 and 2009 surveys have similar profiles of characteristics. For both surveys, the characteristics of the hospitals that completed surveys reflected those of the larger hospital population, as reflected in small differences between the un-weighted and weighted distributions of hospitals in each sample. The mixes of hospital service types also were

similar in the samples for the 2005 and 2009 surveys. Greater than 60 percent of the hospitals in both samples were general medical/surgical hospitals that were not critical access hospitals (CAHs), and another 20 percent were CAHs. The remaining hospitals were a mix of other specialty care hospitals.

INDEXES OF REPORTING PERFORMANCE

We established four indexes as summary measures of hospitals' reporting performance. Each index addressed one of four components identified for an effective adverse event reporting system: supportive environment, reporting by a range of staff, timely distribution of summary reports, and review of reports by key departments and committees. Each index was measured based on data from relevant survey questions (see Table S.1):

- A supportive environment – one point if a hospital provides for anonymous reporting for all reporters and one point if it always keeps identity private for reporters who identify themselves (on 3-point scales of all, some, none).
- Reporting by a range of staff – one point if a hospital reported that at least some of its reports came from physicians, and one point if it reported that at least some reports were submitted by technicians, therapists, pharmacy staff, or other staff (on 5-point scales of all to none).
- Timely distribution of summary reports – one point if a hospital distributes summary reports within the hospital (yes/no response), one point if it produces summary reports on a monthly basis or more frequently (from a 4-point scale of weekly, monthly, quarterly, annually), and one point if reports are distributed within two weeks after the end of reporting period (from a 5-point scale of less than one week to two months or more).

Table S.1 Composition of Hospital Reporting Performance Indexes

Index	Index Values*	Survey Items in the Index
Supportive environment	0, 1, 2	Provides for anonymous reporting for all reporters. Always keeps identity private for reporters who identify themselves.
Reporting by a range of staff	0, 1, 2	At least some of its reports came from physicians. At least some reports were submitted by technicians, therapists, pharmacy staff, or other staff.
Timely distribution of reports	0, 1, 2, 3	Distributes summary reports within the hospital. Produces summary reports on a monthly basis or more frequently. Distributes reports within two weeks after the end of reporting period.
Review of reports by key departments and committees	0, 1, 2	Always provides reports to all of hospital administration, nursing department, and medical administration. Discusses adverse events at both the hospital board or board committee and the medical executive committee.

* Default value = 0 for all indexes.

- Review of reports by key departments and committees – One point if a hospital always provides reports to all of three key departments: hospital administration, nursing department, and medical administration (5-point scale of always to never, conditional on having the department); and one point if adverse events are discussed at both the hospital board or board committee and the medical executive committee (yes/no response, conditional on having the committee).

CROSS-SECTIONAL COMPARISONS OF 2005 AND 2009 SURVEY RESULTS

Virtually all hospitals reported in both 2005 and 2009 that they had centralized adverse event reporting systems. The hospitals varied in the system types they were using, however, across paper-only systems, paper-and-computer systems, and computer-only systems.

Comparison of Performance Index Results, 2005 and 2009

We used the four performance indexes, described above, to characterize hospitals' performance on each of four key aspects of the process of reporting and acting on information on adverse events. Ideally, all hospitals should achieve a maximum score for each of these indexes, which would reflect their having a proactive system, not only to report events but also to take actions to prevent such events from occurring again in the future.

In 2005, only 32 percent of hospitals had established environments that supported reporting, only 13 percent had broad staff involvement in reporting adverse events, and 20-21 percent fully distributed and considered summary reports on identified events (Figure S.1 through Figure S.4). For the supportive environment and timely reporting indexes, hospitals were somewhat evenly distributed across the scores. For the index on type of staff reporting, 69 percent of hospitals had index scores of one point, suggesting that occurrences in their hospitals were likely to be reported by either physicians or other staff, but not both. A similar pattern was found for reporting to key departments and committees, indicating that their reports were being considered by either internal departments or committees, but not both. Because survey responses were self-reported by risk managers, these may be optimistic assessments of hospital performance.

The distributions of index scores improved somewhat in 2009 for the first two indexes. For the supportive environment index, only 21 percent of hospitals had a score of 0 in 2009, compared to 24 percent in 2005, and those with a score of 2 increased from 32 percent to 36 percent (Figure S.1). The increase in hospitals with a score of 2 was significant ($p=0.041$), but the decrease of hospitals with a score of 0 was not significant ($p=0.13$).

For the index on types of staff reporting (Figure S.2), the overall distribution of scores changed between 2005 and 2009 ($p=0.002$). Within the distributions of scores, the decrease in percentage of hospitals with a 0 score from 18 percent in 2005 to 12 percent in 2009 was significant ($p<0.001$), but the increase in the percentage of hospitals with a score of 2 was not significant ($p=0.299$).

By contrast, no significant difference was found between 2005 and 2009 in the score distributions for the index on timely distribution of adverse event reports ($p=0.09$) (Figure S.3).

For the index on discussion of event reports with key departments and committees (Figure S.4), we also found a decrease in the percentage of hospitals with a score of 0, and also in the percentage with a score of 2. As a result, hospitals with a score of 1 increased from 56 percent in 2005 to 64 percent in 2009. The decrease in the percentage of hospitals with a

score of 0 was statistically significant (p=0.007), but the decrease in the percentage of hospitals with a score of 2 was not significant (p=0.15).

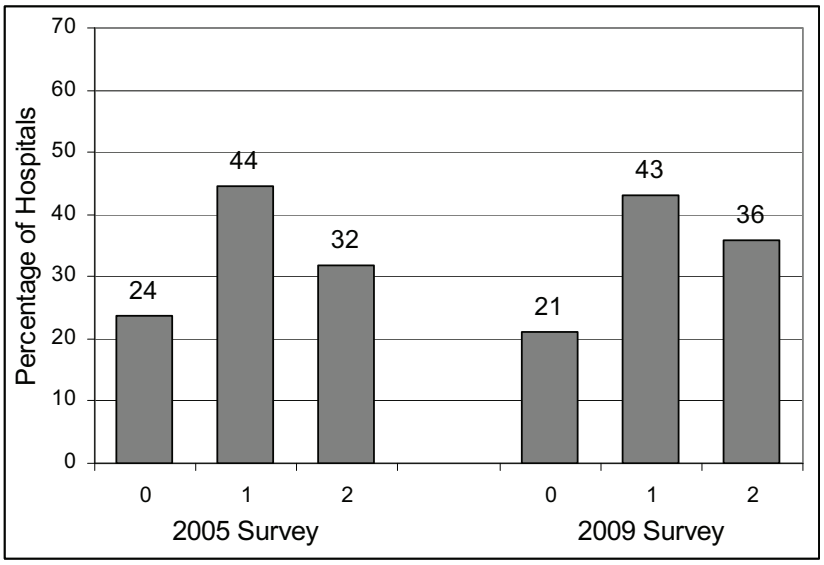

Figure S.1 Supportive Environment for Reporting, 2005 and 2009

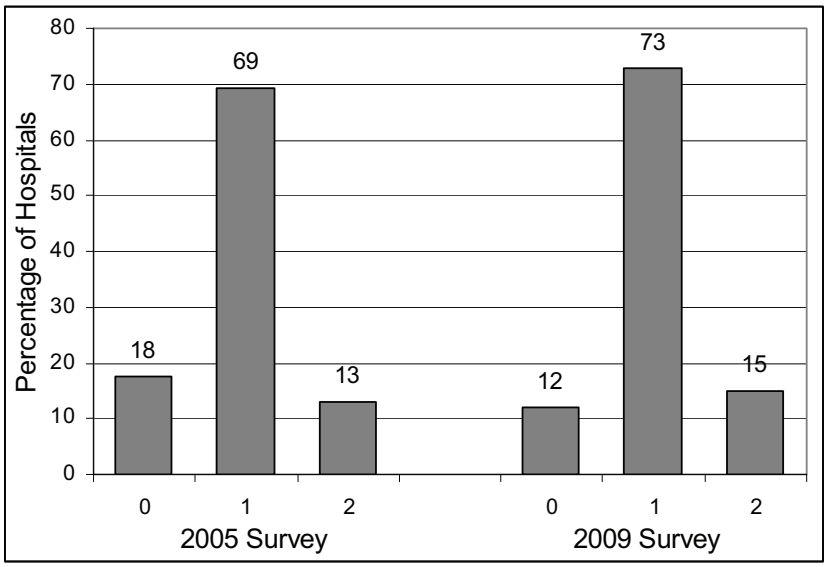

Figure S.2 Types of Staff Reporting, 2005 and 2009

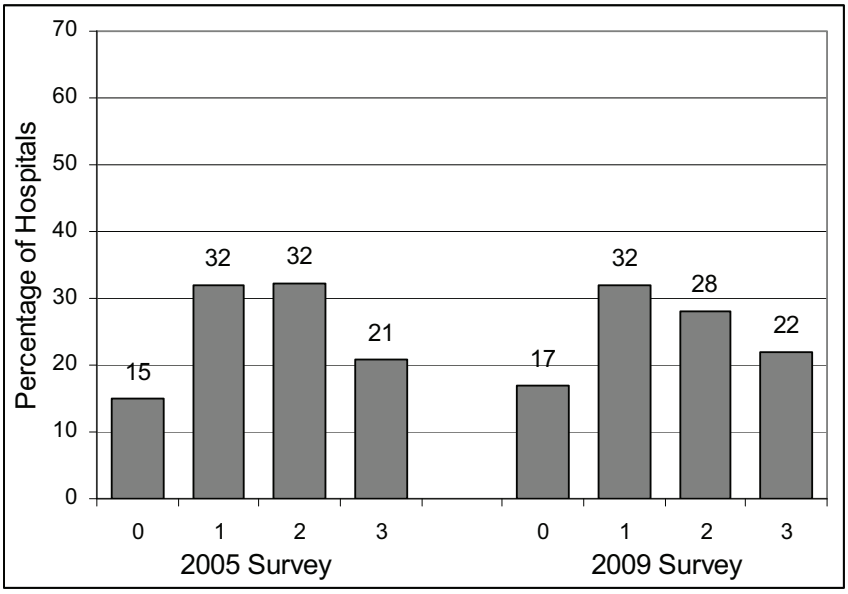

Figure S.3 Timely Distribution of Adverse Event Reports, 2005 and 2009

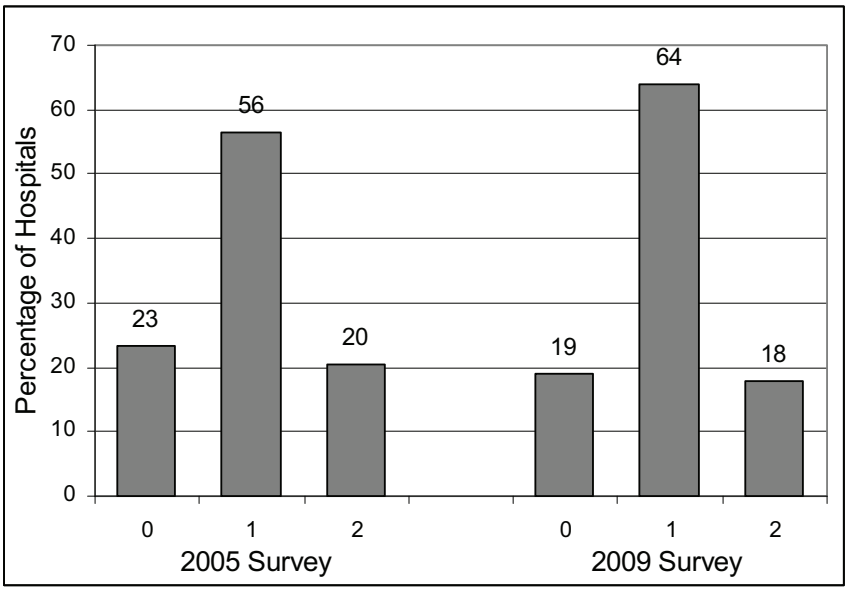

Figure S.4 Discussion with Key Departments and Committees, 2005 and 2009

Summary of Cross-Sectional Findings

These survey results for two points in time (2005 and 2009) document needs and highlight priorities for reporting improvements in U.S. hospitals. In particular, the relatively poor performance of hospitals in both years on each of the four performance indexes for event reporting systems suggests that hospitals have not pursued a clear trajectory of action during the past four years to strengthen their event reporting processes. This is a troubling finding that

points to a need for additional intervention by AHRQ and other organizations to stimulate hospital actions through incentives and provision of technical support.

As AHRQ's PSO Program moves forward and growing numbers of hospitals report their adverse event data to the PSOs with which they are working, it has the potential to provide some of the needed technical support and structure for improvement. The results from the 2005 and 2009 surveys establish baseline data that can be used in future monitoring of improvement progress by hospitals through that work.

Although results from the 2005 and 2009 AERS surveys tended to be similar, a few indications of improved practices were found in comparing specific results from the two surveys. We interpret these results with caution, however, because of within-hospital inconsistencies that we found in responses to 2005 and 2009 surveys, which we discuss below. We identified the following possible trends that the combined survey results suggest may be occurring in the internal adverse event reporting systems and practices of U.S. hospitals:

- The percentage of hospitals that have computer-only event reporting systems may have increased from 2005 to 2009, which appears to have occurred across all types of hospitals, with or without a patient safety program.
- Hospitals may have been obtaining increased information on adverse events from two sources: hotlines and hospital rounds or walk-arounds.
- Hospitals may have improved on three of the four indexes we created to summarize hospital performance on four key aspects of event reporting processes:
  - Supportive environment for reporting – improvement in both measures from which the index is constructed.
  - Types of staff reporting – improvement related to increased reporting by technicians, therapists, pharmacy staff, or other staff; no increase in reporting by physicians.
  - Timely distribution of adverse event reports – no improvement in this index
  - Discussion with key departments and committees – improvement related to increased rates of discussion with committees; no increase in discussion with departments.
- Compared with 2005, hospital characteristics appear to be less important in 2009, as factors related to the various measures of hospital reporting performance.
- Critical access hospitals and hospitals with patient safety programs, both of which performed better than other hospitals in 2005, continued to show better performance in 2009, but they did not differ from other hospitals in improvements made from 2005.

LONGITUDINAL CHANGES FOR THE 2005–2009 HOSPITAL COHORT

The sample of hospitals for the 2009 AERS survey was designed to allow us to analyze within-hospital changes in adverse event systems and practices over time. Both the 2005 and 2009 surveys generated data on baseline reporting practices by hospitals before national initiatives were undertaken to support hospitals in improving their reporting processes. Therefore, we did not expect large changes in the measures included in the survey. For the longitudinal analysis, we hypothesized that some of the hospitals would show improvements in their reporting practices and others would not. Conversely, we did not expect the performance levels of many hospitals to decrease between 2005 and 2009. To test these hypotheses, we analyzed data for the cohort of 952 hospitals that had responded to both the 2005 and 2009

surveys, which allowed us to compare responses given by each hospital regarding their adverse event reporting systems and practices.

Although our goal was to analyze within-hospital changes in adverse event systems and practices over time, we quickly found inconsistencies in the information provided by the risk managers at the cohort of hospitals in the 2005 and 2009 surveys. Our results suggested that some of the hospitals had changed their reporting systems in the four-year period, some in the direction of improvements and others in the opposite direction.

For example, of the hospitals that reported they had paper-only reporting systems in 2005, 43.9 percent reported in 2009 that they had paper-and-computer systems and another 5.0 percent reported they had computer-only systems. These changes represent upgrades, which one might expect to take place. However, responses that indicated changes in the opposite direction raised concern regarding the accuracy of the risk managers' responses. For hospitals with paper-and-computer systems in 2005, 10.4 percent said in 2009 that they had paper-only systems. Further, for hospitals with computer-only systems in 2005, 36.1 percent said in 2009 that they had paper-and-computer systems and another 0.9 percent said they had paper-only systems.

We also examined patterns across 2005 and 2009 for hospitals' production of summary reports of adverse events reported into their systems. For this measure, 95.7 percent of the hospitals reported that they produced reports in 2005. Of these, 3.4 percent reported they did not produce reports in 2009. This change is plausible because production of reports is an operating process that would be easy to change, so it would be more likely to occur than the apparent reduction in types of system. Conversely, a small number of hospitals said they did not produce reports in 2005, and 90.1 percent of them said they did in 2009, which also is reasonable.

We found quite mixed results in the cross-tabulations of the four index scores for 2005 and 2009, with substantial percentages of hospitals that had higher scores on the indexes in 2005 having lower scores in 2009. For example, as shown in Table S.2, only 47.8 percent of hospitals that had the highest score on the Supportive Environment index in 2005 also had the highest score in 2009; another 42.2 percent had a score of 1 and 10.0 percent had a score of 0.

Table S.2
Hospital Scores on Performance Index for Supporting Environment, 2005 and 2009

Supportive Environment Index in 2005	Number of Responses	Supportive Environment Index in 2009		
		0	1	2
0	195	37.4	43.1	19.5
1	418	***19.6***	44.3	36.1
2	289	***10.0***	***42.2***	47.8

We note that the responses from the risk managers suggested that many hospitals' performance on reporting process measures had improved, even as we found declines for other hospitals. If the apparent declines were not real, however, they also cast doubt on the accuracy of the apparent improvements reported by other hospitals.

We estimated multivariate logistic regression models to explore potential contributing factors for these reporting inconsistencies, including a set of hospital characteristics and a measure of risk manager turnover between 2005 and 2009. We could not find any factors that

were clearly affecting apparent declines in hospital performance. We found no effect of any of the hospitals structural characteristics on performance declines, and effects of turnover in risk manager staff were limited to two of the performance measures.

The risk manager turnover variable was a dichotomous variable that was given the value=1 if the risk manager reported he/she had a nursing degree in only one of the two years, otherwise it had a value=0. We chose this measure because it represented one professional degree, and there was a substantial turnover in risk managers between 2005 and 2009, based on nursing degree.

Our analysis of the effects of risk manager turnover was limited by the absence of a measure that captured all of the turnover that occurred from 2005 to 2009. Because we did not include a question on the 2009 survey that specifically asked whether a risk manager also had completed the 2005 survey, we did not have a definitive measure of the extent of turnover that occurred. However, we have anecdotal information from our survey data collection staff that as many as half of the risk managers that responded to the 2009 survey may have been new since we conducted the 2005 survey.

We know from previous work that hospitals are in the relatively early stages of implementing patient safety practices in general, including adverse event reporting practices, which are likely to involve both successes and failures (Farley et al., 2009). For example, the decommissioning of poorly performing health information systems could result in a shift of a hospital's reporting system from a computerized to paper-based system. Changes in hospital leadership or risk management staff also may have brought with them a change in priorities away from some patient safety activities. In addition, concerns about lack of protection from legal discovery, and related liability exposure, could lead a new manager to move away from reporting activities. Given this context, some of the apparent declines in performance on the measures used in these surveys may be real.

We believe, however, that some of the observed declines in performance may be related to differences in perspectives by new risk managers regarding the reporting practices at their hospitals, or differences in interpretation of the survey questions. Either factor could lead to differences in how they completed the survey, compared to their predecessors. It was found in the field testing of the original survey that the risk managers were the best positioned personnel in the hospital to provide valid information (Ginsberg et al., 2003), but we also knew that they would be using some judgment in responding to the survey questions.

Given that AHRQ is using this survey to track effects of the PSO program on hospitals' event reporting practices over time, it will be important to ensure that the survey responses are as accurate and consistent over time as possible. Therefore, there is a need to examine this issue further before proceeding with another survey. We suggest that a study be performed using case study methods, to explore the reasons for the apparent declines in performance on the reporting process measures. This information can only be obtained by talking with the risk managers and other management staff at some of the hospitals in the sample whose risk managers changed between 2005 and 2009. This study should assess how much of the apparent declines in reporting process performance was real, as opposed to being differences in staff definitions or perceptions of those processes. The study results would guide revisions to the questionnaire for future surveys, to increase the accuracy and consistency of the survey data collected.

USE OF THE AHRQ PATIENT SAFETY TOOLS BY U.S. HOSPITALS, 2009

Since the inception of AHRQ's patient safety initiative, the agency has developed an array of tools that hospitals (and other providers) can use to support their patient safety activities. AHRQ has been actively disseminating these tools over the past few years.

The survey contained a set of questions that asked if a hospital had used each of a list of patient safety tools developed by AHRQ (with yes/no responses). A total of 10 tools were addressed, which were organized into three groups, as well as the toolkits developed by the Partnerships in Improving Patient Safety projects funded by AHRQ. The groups of tools were general patient safety products, publications and materials, and AHRQ patient safety Web sites.

The results of the AERS survey indicate that the AHRQ patient safety tools are being used actively in the U.S. hospital community. Although rates of use vary across the specific tools, we estimate that more than half of all hospitals in the U.S. are using at least one tool in each of the three tool categories (patient safety products, publications and materials, and Web sites). Lower use was found, however, for the toolkits developed by the PIPS projects. In addition, we estimated use rates of less than 20 percent for several specific tools: the AHRQ fact sheets for patients (19.4 percent), TeamSTEPPS (19.2 percent), the WebM&M Web site (15.7 percent), and the Patient Safety Improvement Corps DVD (3.1 percent).

This information on hospital use of the AHRQ tools can guide future steps by AHRQ to modify or update tools and to focus tool dissemination strategies. The first step would be for AHRQ to assess estimated levels of use for each of the specific tools, relative to the patient safety priorities it has established, in order to identify which tools should be the focus of additional development or dissemination efforts. Hospitals may not be using some tools because they are not aware that the tools are available, or because the tools are not useful to them. If lack of awareness of a tool is a problem, then AHRQ's strategy would be to pursue more active dissemination of the tool. If lack of usefulness is a problem, then AHRQ may have to invest further development resources for tool modification, including seeking input and guidance from hospitals regarding improvements needed to make it more useful to them.

Another, more indirect, strategy to encourage greater use of the AHRQ patient safety tools by hospitals might be to work actively with hospitals to help them establish organized and comprehensive patient safety programs. The survey results show a strong relationship between having such a safety program and use of AHRQ tools. It is not clear, however, what the nature or direction of causality might be in this relationship. Hospitals may have made a broad commitment to patient safety, through which they both established strong patient safety programs and used the tools available to them, including the AHRQ patient safety tools. On the other hand, hospitals might first have made active use of the AHRQ tools and then developed a strong safety program, or they might have done the reverse, starting with the safety program and then seeking tools. Regardless of the underlying dynamics, encouraging hospitals to take a comprehensive approach to patient safety could enhance their likelihood of making improvements as well as their use of AHRQ tools that are available to help them in these efforts.

Acknowledgements

We thank the risk managers at the hospitals in our sample for both the 2005 and 2009 surveys for their willing participation in the survey. We also thank the staff at RAND Survey Research Group (SRG) and the University of Illinois Survey Research Laboratory (SRL) for administering the survey data collection efforts, under the leadership of Chau Pham at RAND SRG and Jill Ronco and Ron Hazen at SRL. We also express our appreciation to our AHRQ project officer, James Battles, who has continued to be an active guide and supporter of this work, in both the original evaluation and the conduct of the survey to gather information on current hospital practices with their adverse event reporting systems.

Chapter 1
Introduction and Background

In its report, To Err Is Human: Building a Safer Health System, the Institute of Medicine highlighted the importance of adverse event reporting as a foundation for patient safety improvement and identified the fragmented nature of reporting as a significant barrier to achieving improvements (Institute of Medicine, 2000). Despite growing activity to improve patient safety reporting and practices, little has been documented systematically about the extent to which individual health care organizations have systems for reporting errors and adverse events, or how they use the reported data for actions to implement safer practices (Barach and Small, 2000).

Soon after the IOM report was released, the U.S. Congress funded the Agency for Healthcare Research and Quality (AHRQ), in the Department of Health and Human Services, to establish a national patient safety initiative. This initiative has been one of numerous, important patient safety efforts being undertaken by organizations across the country in which AHRQ has played a leadership role. It has done so by funding a portfolio of patient safety research and implementation projects to expand knowledge in this area, providing motivation and guidance for the activities of others, and integrating its work with that of other public and private organizations to achieve synergy through collaboration.

AHRQ contracted with RAND in September 2002 to serve as the Patient Safety Evaluation Center, with responsibility for performing a longitudinal evaluation of AHRQ's patient safety activities and for providing regular feedback to support the continuing improvement of this initiative. The evaluation of the patient safety initiative was completed in September 2006, culminating in a final report that presents evaluation findings over the full four-year evaluation period (Farley et al., 2008). In subsequent evaluation work, RAND examined the extent to which patient safety practices were being implemented by providers across the country. The conduct of the hospital adverse event reporting system (AERS) survey was part of this evaluation.

The AERS survey was developed by AHRQ in 2003 through a contract with Westat, to fill this gap in knowledge of current reporting practices of U.S. hospitals. In this report, we present results from the two administrations of the AERS survey, in which we used the survey data to characterize the extent to which U.S. hospitals have adverse event reporting systems and how they use them.

Hospital adverse event reporting systems record occurrences that have, or could have caused harm to a patient. No research to date has systematically examined or described the status of these reporting systems in hospitals. Anecdotal evidence suggests that while many hospitals report events, there appears to be little consistency in the manner of reporting and in the information reported. Since no overarching federal legislation mandates the collection of such information, many hospitals report information under a variety of mandatory and voluntary reporting structures. Several states require reporting of adverse events and others encourage voluntary reporting. Accreditation agencies—specifically, the Joint Commission—encourage voluntary reporting of specific "sentinel events," however, many hospitals do not report to this system.

The purpose of this research was to understand and characterize the adverse event reporting systems used in US hospitals, and to establish a national benchmark of adverse event reporting systems used in hospitals. The AERS survey was designed to generate data that can enhance understanding of the status of reporting systems, the type of information that is collected, and uses for the information.

The AERS survey asks about whether hospitals collect information on adverse events, store this information centrally, and use it to guide actions to reduce future event frequency. The survey inquires about who might report information and whether they can report to a system which is confidential or anonymous. The survey also asks about the uses of the data that are collected, for example, whether information is used for purposes such as analytic uses, personnel action, and intervention design. Finally the survey asks about the other sources of information that are useful for patient safety-related interventions.

BACKGROUND

Because standardized data on reported adverse events have been lacking, it has not been possible to detect and assess safety issues at the national level or to track trends over time (Institute of Medicine, 2000; Dixon et al, 2002). With enactment of the Patient Safety and Quality Improvement Act of 2005 (PSQIA), the U.S. Congress established a structure and process intended to reduce the fragmentation of information on reported patient safety events and issues (U.S. Congress, 2005). The PSQIA provides for national certification of patient safety organizations (PSO), to which health care providers can report data and other patient safety information, and it establishes confidentiality and protection from legal discovery for information reported by participating providers.

No formal models for hospital adverse event reporting systems have been published, but many sources identify the essential components of an effective system. A hospital's reporting system should be one element of a cohesive patient safety program that includes identification of errors and occurrences through reporting, and establishment of patient safety infrastructure, processes, and climate that support reduction in adverse events (Gandhi et al., 2005; Clarke, 2006; Anderson et al., 2006; Reason, 1995; Spigelman and Swan, 2005). A reporting system should be able to capture both adverse events and near misses, define adverse events precisely to prevent under-reporting or misperceptions, and link errors to patient and team characteristics (Clarke, 2006; Tamuz et al., 2004; Martin et al., 2005). The system also should be linked to organizational leaders who can act on reports (Clarke, 2006; Schuerer et al., 2006). A broad range of staff throughout the hospital should participate in reporting, with confidentiality or anonymity provided for those who report occurrences – preferably confidentiality to allow discussion of occurrences with the reporting persons (Clarke, 2006; Reason, 1995; Suresh et al., 2004; Stow, 2006).

These principles also apply to external adverse event reporting systems. The World Health Organization established guidelines that identify the characteristics of successful adverse event reporting systems (World Alliance for Patient Safety, 2005). Such systems should be non-punitive, confidential, independent, analytically capable, systems-oriented, and responsive in developing solutions. Several countries have national reporting systems with many of these features. England and Wales NHS, The Netherlands, Slovenia, and Australia have voluntary systems, and the Czech Republic, Denmark, Ireland, and Sweden have mandatory systems

(Spigelman and Swan, 2005; World Alliance for Patient Safety, 2005; Runciman, 2002; Williams and Osborn, 2006).

STUDY OBJECTIVES AND FRAMEWORK

In administering the AERS survey, the goal was to establish estimates of the percentage of hospitals that have such systems, the status of reporting practices, and how information on reported occurrences is disseminated and used for practice improvement. The survey results would establish baseline information for two policy-related purposes – to enable tracking of trends in improvements for adverse event reporting practices across the country and to assess effects of implementation of the PSQIA on hospitals' internal reporting processes.

To reduce adverse events for hospital patients, hospitals need to have both effective reporting systems that identify risks and hazards in their systems and effective performance improvement processes that act on reported information. The survey results presented here address the first of these steps—estimation of the extent to which hospitals currently collect and disseminate the occurrence data needed to inform effective performance improvement.

Drawing from the published information described above about the features of effective reporting systems, we identified four system components that should be in place for effective operation of hospital adverse event reporting, which were used to frame our analysis:

- A supportive environment that protects the privacy of staff who report occurrences;
- Broad reporting to the system by a range of types of staff;
- Timely distribution of summary reports that document reported occurrences for use in action strategies to prevent future adverse events from occurring; and
- Senior-level review and discussion of summary reports by key hospital departments and committees for policy decisions and development of action strategies.

WHAT THIS REPORT CONTAINS

As stated above, the AERS survey was administered twice to a national sample of hospitals. The first fielding of the survey was in 2005, and the second fielding was in 2009. The results of both surveys are presented in this report, with analyses that compare the information reported by hospitals at the two separate times, four years apart. Both sets of data are considered to be measuring baseline conditions in the hospital system, which precede national efforts to encourage strengthening of hospital reporting processes and making them more consistent.

The 2005 survey was administered jointly by RAND and the Joint Commission, which allowed the collection of data from a larger sample of hospitals than would have been possible by either organization alone. RAND administered the 2009 survey alone, using the same data collection methods that had been used previously. Chapter 2 of this report describes the data collection and analysis methods. Chapters 3 through 5 present survey results—the cross-sectional comparisons of 2005 and 2009 data in Chapter 3, longitudinal analysis for a cohort of hospitals in both surveys in Chapter 4, and findings on use of AHRQ tools in Chapter 5.

Chapter 2
Data Collection and Analysis Methods

THE ADVERSE EVENT REPORTING SYSTEM SURVEY

The AERS questionnaire was developed and pilot-tested by Westat in 2003, for the U.S. DHHS Quality Interagency Coordination Task Force. This work included an assessment of the need to collect data from one or more types of personnel to obtain valid and reliable results (Ginsberg et al, 2003). Questions covered in the survey included whether hospitals collect information on adverse events, what information is collected, who reports occurrences, how their privacy is protected, and uses of the data collected.

In developing the survey, Westat performed cognitive interviews with risk managers and department heads, which guided terminology, response options, and several aspects of survey design. A draft instrument was reviewed by American Hospital Association staff, resulting in substantive revisions. Test results suggested that respondents understood the questions being asked and the questions obtained the desired information.

Based on field test data collected from hospital risk managers and up to six department heads (e.g., nursing, medicine, laboratory), Westat found that most of the adverse event reports are sent to the risk manager, although many are not (Ginsberg et al, 2003). Westat concluded that a survey of the risk managers could

> "provide a relatively complete picture of adverse event reporting systems in hospitals,…focusing on the main reporting vehicle for the hospital, describing reporting for the majority of adverse events,…[and] would also give a picture of the types of events that are not reported to their systems."

Where more detailed information on reporting patterns and practices might be needed, these results can be supplemented with departmental manager surveys.

The 2005 Questionnaire. Our goal was to understand the status of hospitals' main vehicles for reporting adverse events. Therefore, based on Westat's pilot test results, the AERS questionnaire for risk managers was used in the 2005 survey with minor modifications to improve clarity and data completeness. Changes made to a small number of questions on the Westat survey included editing changes to clarify terminology or wording, adding response options to obtain more complete data, reordering response options to improve logic flow and adding open-ended response options for two items. In addition, one question was deleted that collected duplicative information, and two new questions were added about whether the hospital had a patient safety program.

The 2009 Questionnaire. For the 2009 survey, we made three sets of revisions to the AERS questionnaire, while retaining all the questions that we used in the analysis of the 2005 survey data. The first revisions were the addition of several new questions at the end of the 2009 survey that were used to gather data on the extent to which hospitals were using the various products and tools that AHRQ provides to support patient safety improvements by providers and others. Second, we added new questions to gather more detailed data regarding the nature of the hospitals' patient safety programs, which expanded upon the single question that was used in the 2005 survey, and we added a question about the importance of having consistent reporting formats. Finally, we deleted questions that had been in the 2005 questionnaire to retain the same

survey length as the 2005 survey (compensating for the new questions added). The questions we chose to delete included those that did not perform well in the first survey, were difficult to interpret, or were open-ended questions.

THE SAMPLE OF U.S. HOSPITALS

The data source we used to establish the sample of hospitals for both the 2005 and 2009 AERS surveys was the 2003 Annual Survey of the American Hospital Association (AHA), provided by Health Forum, LLC, a subsidiary of the AHA. We obtained from the Health Forum the following data elements for all U.S. hospitals:

AHA ID	chief administrator	medical school affiliation
Medicare ID	control	COTH membership
hospital name	Joint Commission accreditation	MSA code
street address	system membership	status as critical access hospital
City and state	system cluster code	rural referral center
zip code	total hospital beds	sole community provider
telephone number	number of medical/dental interns and residents	

Our sampling frame included all non-federal hospitals (including not-for-profit hospitals, for-profit hospitals, and hospitals operated by cities, counties, or states). This frame was modified at the onset of the 2005 survey to exclude hospitals located in the southern portions of Louisiana and Mississippi. Hurricane Katrina occurred at the time we went into the field for the 2005 survey data collection, which affected hospitals in those areas. Details on the sample strategy are provided below.

Power Calculations for the 2005 and 2009 Surveys

The 2005 and 2009 survey samples were designed to have the statistical power to:

- Estimate differences in the use and comprehensiveness of adverse event reporting systems by hospitals of differing characteristics and locations, and
- Estimate changes over time in the comprehensiveness of adverse event reporting systems by hospitals of differing characteristics and locations.

We estimated that we needed a total of about 1,200 hospitals in the sample to have sufficient power to perform these estimates, with the goal of achieving 1,020 completed surveys (85 percent response rate). We expected a response rate of 80 percent for the 2005 survey and of 85 percent for the 2009 survey. The higher response rates expected for 2009 was based on an 81 percent response rate actually obtained for the 2005 survey, as well as an expectation that a high percentage of those who already completed the 2005 survey would respond to the 2009 survey.

The 2005 Survey. For 2005, we estimated that this sample size would allow us sufficient power to detect the following differences between subgroups that were 20 percent of our overall sample:

- A difference of 50 percent versus 65 percent (or 50 percent versus 35 percent) in a dichotomous outcome (e.g., whether or not a hospital has a comprehensive adverse event reporting system). For a dichotomous outcome, the most difficult differences to detect are in the vicinity of 50 percent; therefore this 15 percent difference is a worst-case scenario.

- If half of the hospitals in the 20-percent subgroup have adverse event reporting systems, we can distinguish characteristics that are in different systems 20 percent versus 40 percent of the time.
- We can also distinguish an effect size of 0.4 among this smaller group

The 2009 Survey. For 2009, we estimated that the targeted sample size would allow us sufficient power to detect the following differences between subgroups for cross-sectional analysis (within the second survey) and for before-after analysis (between the 2005 survey and this survey):

1. Power for cross-sectional analysis – within the 2009 survey only
   - Sufficient power (80 percent) to detect a difference of 50 percent versus 65 percent (or 50 percent versus 35 percent) in a dichotomous outcome (e.g., whether or not a hospital has a comprehensive adverse event reporting system) between two sub-samples that are each 20 percent of the full sample. For a dichotomous outcome, the most difficult differences to detect are in the vicinity of 50 percent; therefore this 15 percent difference is a worst-case scenario.
   - Margin of Error (1/2 confidence interval) for a single full sample proportion = 0.03 with $\alpha = 0.05$
   - Margin of Error (1/2 confidence interval) for a single full sample mean of a continuous measure = 0.056 standard errors with $\alpha = 0.05$
   - Ability to distinguish an effect size of 0.28 (a difference in means of 0.28 standard deviations) between two 20-percent sub-samples for a continuous outcome with $\alpha = 0.05$ and 80 percent power.
2. Power for before-after analysis – using linked 2005 and 2009 surveys
   - For the full sample, the average change over time (within hospital) in a continuous outcome that can be detected with $\alpha = 0.05$ and 80 percent power is an effect size of 0.09 (0.09 standard deviation change where this is the standard deviation of the changes, not of the original factor – if the pre-post correlation = 0.30 this is an effect size of 0.11, corr = .5 → ES= 0.09, corr = 0.70 → ES= 0.07 where the effect sizes are in terms of number of standard deviations of the outcome instead of change in the outcome).
   - For a 30 percent sub-sample, the average change over time (within hospital) in a continuous outcome that can be detected with $\alpha = 0.05$ and 80 percent power is an effect size of 0.16 (0.16 standard deviation change where this is the standard deviation of the changes, not of the original factor – if the pre-post correlation = 0.30 this is an effect size of 0.19, corr = 0.5 → ES= 0.16, cor r= 0.70 → ES= 0.12 where the effect sizes are in terms of number of standard deviations of the outcome instead of change in the outcome).

Note: These power calculations are conservative if:

- the analysis accounts for the stratified design and the variation is lower within strata than between strata, or
- other covariates that are correlated with the outcomes are controlled for in testing for differences over time or between groups.

Sampling Strategy for the 2005 Survey

In September 2005 through January 2006, we administered the AERS survey to risk managers at a stratified randomized sample of 2,050 non-federal hospitals in the U.S. The sample was stratified by Joint Commission accreditation status, hospital ownership, and staffed bed size, which also yielded good representation on teaching, urban/rural, and multi-hospital system status.

The sampling frame consisted of 5,517 non-federal hospitals in the 2003 database of the American Hospital Association, excluding those in southern portions of Louisiana and Mississippi, which had been affected by Hurricane Katrina at the time we went into the field for survey data collection. We dropped 67 hospitals in southern Louisiana and Mississippi from our original sample and replaced them with additional randomly sampled hospitals in the same strata. (Hospitals dropped were those in zip codes beginning with 700–708 and 390–397.) The sample was thus representative of non-federal hospitals nationally excluding these regions.

This starting sample of 2,050 hospitals was larger than we originally had anticipated because RAND collaborated with a research team at the Joint Commission to conduct the 2005 survey. With our combined survey budgets, we were able to include a larger number of hospitals in the sample than either of our organizations could have done alone.

Sampling Strategy for the 2009 Survey

In April through September 2009, we administered the AERS survey to risk managers at a subset of the hospitals that responded to the 2005 survey. A stratified random sample of 1,200 hospitals was drawn from the 1,652 hospital Risk Managers who completed the 2005 survey, using random selection within the strata established for the 2005 survey: Joint Commission accreditation status, hospital ownership, and staffed bed size. To achieve a representative sample in this survey across strata, different proportions of responders to the 2005 survey were selected. Specifically, we selected higher proportions of respondents in strata with low response rates for the 2005 survey (e.g. 50 percent rate) and smaller proportions from strata with high response rates in 2005 (e.g., 100 percent rate).

We also were prepared to take two additional sampling steps if the 2009 survey non-response rates varied considerably by stratum, to obtain proportionate samples within each stratum. First, in low-response rate strata, we would randomly select additional hospitals that responded to the 2005 survey. Second, if this was insufficient to obtain enough responses in a low responding stratum, we would randomly select additional hospitals from that stratum that either had not been selected to be in the 2005 survey or who were selected and did not respond to the 2005 survey. Neither of these steps was necessary, however, because we were able to achieve sufficient sample in each stratum working with the original sample of 1,200 hospitals.

DATA COLLECTION METHODS

The surveys for both 2005 and 2009 were completed with the Risk Manager at each hospital in the sample (one per hospital). The methods used for data collection were chosen because they were known to yield fairly high response rates. The survey mode was a mail survey with two waves of mail follow-ups, which was then followed by a Computer-Assisted Telephone Interviewing (CATI) telephone survey for the remaining non-responders. The CATI survey was tested to ensure that the questionnaire items appeared as designed, that the logical

flow was correct, that there were appropriate range checks and that the data were being recorded correctly. The survey questions for both years took approximately 25 minutes to complete.

To prepare for data collection for the 2005 survey, the hospital risk manager to be surveyed was identified by an initial phone contact to each hospital in the sample. Then the following data collection steps were undertaken:

1. A cover letter and copy of the follow-up survey was mailed to the Risk Manager.
2. A reminder post card was sent to the Risk Managers who had not returned the follow-up survey within 2 weeks of the initial mailing, and a re-mail of the follow-up survey was sent 2 weeks after the reminder post card was sent.
3. If a follow-up survey had not been returned 2 weeks after the second re-mail, a telephone interviewer attempted to complete the follow-up survey with the Risk Manager over the telephone. Respondents were called at different times of days and different days of the week, and messages were left on voice mail or with a gatekeeper. The telephone interview was conducted using CATI.

Both RAND and the Joint Commission carried out the data collection activities for the 2005 survey. The Joint Commission administered the mail survey and follow-ups and RAND conducted the telephone interviews with risk managers who had not responded to the mail survey. With this approach, we could ensure consistency in methods at each step of the data collection process.

The 2009 surveys were mailed to the risk managers who had been identified in the 2005 survey. When a survey mailing was returned because a risk manager no longer was at a hospital, we contacted the hospital to identify the current risk manager, and then re-mailed the survey to the new risk manager. The data collection steps used for the 2005 survey, as described above, also were used for the 2009 survey, to provide consistency across the two surveys. The RAND performed the 2009 survey alone, so our team carried out all the data collection steps, rather than splitting them with another organization.

NON-RESPONSE WEIGHTS

We constructed nonresponse weights that were utilized in all analyses of the survey data, to ensure that our results were generalizable to the target population of hospitals. The same method was used to establish these weights for both surveys. We were fortunate that we had information on both responding and nonresponding hospitals via the AHA database. Initially we assessed how different the responding and nonresponding hospitals were in terms of the characteristics in the AHA data. We then fit a multivariate logistic regression model using respond or did-not-respond as the outcome and AHA variables as covariates. Based on this model, we formed nonresponse classes that consisted of responding and nonresponding hospitals who are similar in terms of predicted nonresponse. Responding hospitals in a particular nonresponse class all received the same nonresponse weight, which was calculated based on the number of nonresponding hospitals that needed to be represented in that class.

MEASURES USED

Three key sets of measures were used in the analysis of results for the 2005 and 2009 AERS surveys, which are described below. The first set consists of hospital characteristics for which data were available from the AHA data. The second set is four indexes that measure

reporting performance, which we derived using data from sets of survey items. The third set was measures of the existence and characteristics of the patient safety programs established by the hospitals. In addition, we specified other measures of the survey data in several different ways, to test patterns of responses and comparisons, which are not described in this chapter; rather we introduce each of these measures as part of the results presented in Chapters 3, 4, and 5.

Hospital Characteristics

Measures of hospital characteristics that were used in the analysis were accreditation status, bed size, ownership, teaching status, rural location, and status as a critical access hospital (CAH). All of these measures were obtained from the AHA data, with the exception of teaching status. For teaching status, we used the information that was self-reported by the hospitals in response to the survey item "Are you a teaching hospital?". We chose this approach, rather than using the measures available in the AHA data, because the self-report measure is likely to best reflect the hospital's view of its role in medical education, and each of the measures provided by AHA offers incomplete information on teaching status.

Because CAHs differ from other hospitals by their smaller size and more limited services, they may differ in their adverse event reporting systems and practices. To qualify for designation as a CAH, a hospital has to (1) be in a state with a State Flex Program, (2) be in a rural area or be treated as rural under a special CAH provision, (3) provide 24-hour emergency care services using either on-site or on-call staff, (4) provide no more than 25 inpatient beds, (5) have an average length of stay of 96 h or less, and (6) be either more than 35 miles from a hospital or another CAH or more than 15 miles in areas with mountainous terrain or only secondary roads (other exceptions provided).

Existence of a Comprehensive Patient Safety Program

Risk managers were asked in the 2005 survey if the hospital had in place a comprehensive patient safety program, and they were asked when the patient safety program was established relative to their event reporting systems. We did not attempt to obtain additional detail on the characteristics of the patient safety programs, because they are complex to profile effectively, and the additional survey items required to do so would increase survey length.

By the time we fielded the 2009 survey, we had developed, as part of a separate research effort, a set of eight survey items that could be used to characterize a hospital's patient safety program. These items were based on the desired characteristics for a patient safety program specified by the National Quality Forum (NQF) in its document entitled *Safe Practices for Better Healthcare–2006 Update: A Consensus Report* (2007). The items had undergone a two-step testing process, consisting of cognitive testing with hospital users, to ensure that the items written to address each practice were clear and reasonable, followed by a validation analysis to assess how well the set of items "fit" with hospitals' actual practice (Farley et al., 2009).

We included these eight items in the 2009 survey, with the goal to perform a more detailed analysis of the characteristics of the hospitals' patient safety programs. We created three composite "safety program strength" variables for each hospital, using the hospital's responses to all of these questions. (See Chapter 3 for results of these analyses.)

Index Measures for Reporting Performance

We established indexes as summary measures of hospitals' performance on the four components identified for an effective adverse event reporting system. Each index was based on

data from relevant survey questions (Table 2.1). For the components on supportive environment and on reporting by a range of staff, we established indexes based on two survey questions each. For the supportive environment component, a hospital was given one point if it provides for anonymous reporting for all reporters and one point if it always keeps identity private for reporters who identify themselves (on 3-point scales of all, some, none). For the index on range of staff reporting, a hospital was given one point if it reported that at least some of its reports came from physicians, and one point if it reported that at least some reports were submitted by technicians, therapists, pharmacy staff, or other staff (on 5-point scales of all to none). Reporting by nurses was not included because survey results showed that nurses were the predominant reporters for a large share of the hospitals.

The other two indexes address the distribution and discussion of summary reports on reported occurrences within the hospital. The index for timely distribution of reports is based on responses to three survey questions. A hospital was given one point if it distributes summary reports within the hospital (yes/no response), one point if it produces summary reports on a monthly basis or more frequently (from a 4-point scale of weekly, monthly, quarterly, annually), and one point if reports are distributed within two weeks after the end of reporting period (from a 5-point scale of less than one week to two months or more).

Table 2.1 Composition of Hospital Reporting Performance Indexes

Index	Index Values*	Survey Items in the Index
Supportive environment	0, 1, 2	Provides for anonymous reporting for all reporters. Always keeps identity private for reporters who identify themselves.
Reporting by a range of staff	0, 1, 2	At least some of its reports came from physicians. At least some reports were submitted by technicians, therapists, pharmacy staff, or other staff.
Timely distribution of reports	0, 1, 2, 3	Distributes summary reports within the hospital. Produces summary reports on a monthly basis or more frequently. Distributes reports within two weeks after the end of reporting period.
Review of reports by key departments and committees	0, 1, 2	Always provides reports to all of hospital administration, nursing department, and medical administration. Discusses adverse events at both the hospital board or board committee and the medical executive committee.

* Default value = 0 for all indexes.

The index for senior-level review and discussion of reports by key hospital departments and committees is based on responses to two survey questions. A hospital was given one point if it always provides reports to all of three key departments: hospital administration, nursing department, and medical administration (5-point scale of always to never, conditional on having the department). It also was given one point if it reported that adverse events are discussed at both the hospital board or board committee and the medical executive committee (yes/no response, conditional on having the committee).

ANALYSES PERFORMED

Using the data for each survey year, we first calculated descriptive statistics of the sample characteristics and estimated distributions of hospitals on the performance indexes. Then we performed descriptive analyses for individual components of the indexes, and we estimated standard logistic regression models to assess how hospital characteristics were associated with specific aspects of reporting performance. These results for the 2005 and 2009 survey were then compared as two cross-sectional samples, to identify differences between 2005 and 2009 in what hospitals reported regarding their event reporting systems and activities.

We tested the statistical significance of differences observed between the two survey year. Because the 2009 survey sample is a subset of the respondents to the 2005 survey, and therefore error terms would be correlated, we estimated logistic regression models with clustered standard errors to test the significance of any differences in results for the two years. Three types of logistic regression models were used: (1) logistic regression for dichotomous measures being tested (0/1 responses), (2) ordered logistic regression for measures with ordered, multiple-response options (e.g., scales of 1 to 5), and (3) multinomial logistic regression for measures with unordered, multiple-response options (e.g., type of staff reporting).

Each observation was defined by hospital and survey year, such that there was one observation for each hospital that was only in the 2005 survey, and two observations for each hospital that was in both the 2005 and 2009 surveys. The nonresponse weights for each of the two survey years were standardized to their mean by dividing each hospital's weight by the mean weight for the survey year. Independent variables in the models were a dummy for the 2009 survey year and, in some cases, interaction terms for year and a specific hospital characteristic being considered in an analysis. A difference in the dependent variable between 2005 and 2009 was deemed to be statistically significant if the coefficient on the 2009 survey year variable was significant. The significance of differences in changes over time by hospital characteristics was determined by the significance of the interaction terms in the model for those variables.

The cross-sectional comparisons represent net differences between 2005 and 2009 on the measures being examined. They do not provide information on changes within hospitals that might have occurred during this period, which could have occurred in either direction for any individual hospital. To address this question, we performed a longitudinal analysis of survey results for the set of hospitals that had responded to both the 2005 and 2009 surveys, which allowed us to assess the extent of change in reporting activities within hospitals. First, we calculated cross-tabulations for the years 2005 and 2009 for each performance index, as well as key individual measures that comprise those indexes. We then estimated logistic regression models to assess how hospital characteristics were associated with the direction and sizes of changes in measures from 2005 to 2009.

In the last set of analyses, we examined how hospitals reported they used each of a list of products and tools made available by AHRQ to support patient safety activities. We performed descriptive analyses on the use of each tool, and each set of tools. Then we estimated regression models to assess how hospital characteristics were associated with the use of these tools.

Chapter 3
Cross-Sectional Comparisons for 2005 and 2009

In this chapter, we present comparisons of the two cross-sectional results from the 2005 and 2009 surveys. These results reflect any net effects of changes in hospital reporting systems or processes that may have occurred during the four years involved. However, they do not show the underlying patterns of changes within individual hospitals, which likely varied across hospitals and could have occurred in opposite directions. Results of this longitudinal analysis, which examines changes for the cohort of hospitals that were in both the 2005 and 2009 samples, are presented in Chapter 4.

CHARACTERISTICS OF THE SAMPLES

The samples for the 2005 and 2009 surveys were of different sizes, but they had similar profiles of characteristics. Of the 2,050 hospitals in the 2005 survey sample, 1,652 completed the survey, for an overall survey response rate of 81 percent. Of the 1,200 hospitals in the 2009 survey sample, 952 completed the survey for a response rate of 79 percent.

For both surveys, the characteristics of the hospitals that completed surveys reflected those of the larger hospital population, as shown by the small differences between the un-weighted and weighted distributions of hospitals in each sample. The distributions of hospitals by their characteristics are shown in Table 3.1 (2005 sample) and Table 3.2 (2009 sample), along with the un-weighted and weighted percentages in each category. Therefore, although these weights are used in the analyses presented here, they have a minor effect on the results.

The survey samples included the full range of hospital types. For both years, 63 percent of the hospitals in the responding sample were general medical-surgical hospitals, and 20 percent were CAHs. Hospitals of a variety of sizes are in the sample, as are hospitals of different ownership status. For both years, slightly less than one-quarter of the hospitals are teaching hospitals, and slightly more than 70 percent are Joint Commission accredited.

An analysis we performed for the 2005 data showed that, of the hospitals in that sample that were not accredited (466 hospitals), more than half (57 percent) were CAHs. The remaining 43 percent of the hospitals without accreditation tended to be some combination of rural (50 percent), small in size (70 percent have fewer than 75 beds), or specialty hospitals (32 percent).

The mixes of hospital service types also were similar in the samples for the 2005 and 2009 surveys, as shown in Table 3.3. Greater than 60 percent of the hospitals in both samples were general medical/surgical hospitals that were not CAHs, and another 20 percent were CAHs. The remaining hospitals were a mix of other specialty care hospitals.

Table 3.1
Characteristics of the Hospitals Surveyed, 2005

		Percentage Distribution	
	Number	Un-weighted	Weighted
Bed size			
0-74 beds	766	46%	45%
75-199 beds	484	29	30
200+ beds	402	24	25
Ownership			
Not-for-profit	959	58	57
For-profit	280	17	19
Government	413	25	24
Teaching hospital	385	23	24
JCAHO accredited	1,186	72	72
Hospital type			
General medical/ surgical	1,046	63	63
Critical access hospital *	320	20	19
Other **	286	17	18

* Note that of the 320 CAH hospitals, 317 are 'General medical/surgical' and 3 are 'Other specialty'.

** This group includes psychiatric, rehabilitation, children's care, other specialty care (non-CAH), acute long-term care, and other types of hospitals.

Table 3.2
Characteristics of the Hospitals Surveyed, 2009

		Percentage Distribution	
	Number	Un-weighted	Weighted
Bed size			
0-74 beds	438	46%	45%
75-199 beds	284	30	30
200+ beds	230	24	25
Ownership			
Not-for-profit	545	57	56
For-profit	166	17	19
Government	241	25	25
Teaching hospital	218	23	23
Joint Commission accredited	673	71	71
Hospital type			
General medical/ surgical	599	63	63
Critical access hospital *	195	20	20
Other **	158	17	17

* All of the 195 CAH hospitals in 2009 are 'General medical/surgical' hospitals.

** This group includes psychiatric, rehabilitation, children's care, other specialty care (non-CAH), acute long-term care, and other types of hospitals.

Table 3.3
Types of Services for Hospitals Surveyed, 2005 and 2009

Hospital Service Type	2005 Survey		2009 Survey	
	Number	Percentage	Number	Percentage
General medical/surgical–non-CAH	1,046	63.3%	599	62.9%
Critical access hospital (CAH)*	320	19.4	195	20.5
Psychiatric	128	7.7	68	7.1
Rehabilitation	59	3.6	35	3.7
Children's care	24	1.5	13	1.4
Other specialty – non-CAH	14	0.8	7	0.7
Acute long term care	30	1.8	14	1.5
Other types	31	1.9	21	2.2
Total	1,652	100.0%	952	100.0%

* Of the 320 CAH hospitals in 2005, 317 are 'General medical/surgical' and 3 are 'Other specialty'. All of the 195 CAH hospitals in 2009 are 'General medical/surgical' hospitals.

TYPES OF REPORTING SYSTEMS

All but a small percentage of the risk managers in both the 2005 and 2009 samples reported that their hospitals had a centralized adverse event reporting system, as shown in Table 3.4 (test of difference: p=0.78). The type of system they reported having, however, changed from 2005 to 2009. In 2005, only 12.4 percent of hospitals reported having systems that were only computerized systems, while 71.3 percent reported having systems based on both computer and paper. By 2009, the percentage of hospitals that had computer-only systems had increased to 23.1 percent (an 86.3 percent increase, p<0.001). Decreases in the percentage of hospitals that had either paper-only or computer-and-paper systems were not significant.

Table 3.4
Percentage of Hospitals That Had Reporting Systems, and Types of Systems, 2005 and 2009

Reporting System in Place	2005 Survey	2009 Survey	Percentage Change
Has a centralized adverse event reporting system	97.6% (n=1,649)	97.8% (n=952)	0.2%
For those with reporting systems, type of system	(n=1,588)	(n=907)	
Paper only	16.4%	15.8%	-3.7%
Paper and computer	71.3	61.1	-14.3
Computer only	12.4	23.1	86.3 ***
In a state that protects reporting system from legal discovery	86.4	86.2	-0.2
Hospital has an organized patient safety program	86.8	87.2	0.5

*** p<0.001

There was no detectable difference from 2005 to 2009 in the percentage of hospitals that were located in a state that protects the system from legal discovery (p=0.88) or the percentage that had an organized patient safety program (p=0.76).

The percentage differences from 2005 to 2009 in the types of reporting systems used by hospitals of different characteristics are presented in Table 3.5. We calculated these percentage differences using the percentage distributions by type of system for each characteristic group, in each year, which are presented in Table 3.6.

The sizes of the changes in types of reporting systems varied by hospital characteristics. For example, the percentage of not-for-profit hospitals reporting they had a computer-only system was 113.3 percent greater in 2009 than in 2005. There is some evidence that non-accredited hospitals shifted away from use of paper-only reporting systems more than accredited hospitals (p=0.035), which may be a net effect of a large decrease by the non-accredited hospitals and a slight increase by the accredited hospitals. Smaller percentages of hospitals used paper-only and paper-and-computer systems in 2009, compared to 2005, with the size of differences varying substantially across characteristic groups. The differences in distribution by types of reporting systems between the two waves were not statistically significant for bed size (p=0.32), ownership (p=0.11), or teaching status (p=0.87).

Table 3.5
Percentage Changes in Types of Reporting Systems, by Type of Hospital, 2005 to 2009

	Type of reporting system		
Hospital Characteristics	Paper only	Paper and computer	Computer Only ***
Bed size			
0-74 beds	-9.1%	-5.9%	91.2%
75-199 beds	11.6	-11.5	63.0
200+ beds	27.8	-31.3	99.6
Ownership			
Not-for-profit	-1.6	-20.4	113.3
For-profit	10.5	-10.5	35.4
Government	-12.3	-0.9	61.5
Teaching status			
Teaching hospital	-11.0	-19.3	77.6
Non-teaching	-3.2	-12.4	89.3
Accreditation status			
Joint Commission accredited	18.2 *	-18.8	84.7
Not accredited	-17.5 *	1.0	98.2

* p<0.05; *** p<0.001

Table 3.6
Types of Reporting Systems Used, by Type of Hospital, 2005 and 2009

Hospital Characteristics	Type of reporting system (for those with systems)		
	Paper Only	Paper and Computer	Computer Only
2005 Survey			
Bed size			
0-74 beds	28.7%	64.6%	6.8%
75-199 beds	8.6	78.8	12.7
200+ beds	3.6	74.1	22.3
Ownership			
Not-for-profit	12.4	74.1	13.5
For-profit	14.3	69.3	16.4
Government	27.6	66.0	6.5
Teaching status			
Teaching hospital	8.2	72.6	19.2
Non-teaching	19.0	70.9	10.3
Accreditation status			
Joint Commission accredited	8.8	76.2	15.0
Not accredited	35.9	58.6	5.6
2009 Survey			
Bed size			
0-74 beds	26.1	60.8	13.0
75-199 beds	9.6	69.7	20.7
200+ beds	4.6	50.9	44.5
Ownership			
Not-for-profit	12.2	59.0	28.8
For-profit	15.8	62.0	22.2
Government	24.2	65.4	10.5
Teaching status			
Teaching hospital	7.3	58.6	34.1
Non-teaching	18.4	62.1	19.5
Accreditation status			
Joint Commission accredited	10.4	61.9	27.7
Not accredited	29.6	59.2	11.1

As described above, hospitals that have been designated as critical access hospitals (CAHs) are quite different from other general hospitals, in both their small size and the limited services they provide. Given these differences, we wanted to understand how CAHs and non-CAH hospitals may differ in the nature of their event reporting systems and how they work with them. As shown in Table 3.7, there was little difference between CAHs and non-CAH hospitals in the percentages who reported they had a centralized reporting system, but they did differ significantly in the types of systems they were using. In 2005, the CAHs were more likely than the non-CAH hospitals to use paper-only reporting systems (39.5 percent versus 11.3 percent [$p<0.001$]), and less likely to use either computer-only or paper-and-computer systems.

Although these differences between CAHs and non-CAH hospitals still existed in 2009, the percentage of CAHs using paper-only systems decreased from 39.5 percent to 30.8 percent in 2009, while the percentage of non-CAH hospitals using paper-only systems did not change significantly (p=0.86). In addition, larger percentages of both CAHs and non-CAH hospitals reported in 2009 that they had computer-only systems, compared to 2005. The rate of increase was not significantly higher for the CAHs than the non-CAH hospitals (p=0.32).

Table 3.7
Percentage of Hospitals That Have Reporting Systems, by CAH or Not, 2005 and 2009

	2005 Survey		2009 Survey	
Reporting System in Place	Non-CAH	CAH	Non-CAH	CAH
Have a centralized adverse event reporting system	98.2 % (n=1329)	94.7% (n=320)	97.6% (n=744)	98.5% (n=194)
For those with reporting systems, type of system	(n=1287)	(n=301)	(n=721)	(n=186)
Paper only	11.3%	39.5%	12.1%	30.8%
Paper and computer	74.5	56.8	61.9	58.3
Computer only	14.2	3.7	26.0	10.9

Response rates by question and hospital type:
Non-CAH: 99.8% (1329/1332); 96.6% (1287/1332)
CAH: 100% (320/320); 94.1% (301/320)

We also anticipated that having a comprehensive patient safety program could influence whether a hospital had an event reporting system and the type of system they had. This question is addressed in Table 3.8, which shows that having a safety program or not, in 2005, was not associated with whether a hospital had a centralized event reporting system (p=0.26). However, hospitals that reported having a safety program were more likely to state that their reporting systems were either computer-only or paper-and-computer systems, compared to those without a safety program (p<0.001). This pattern also was found for 2009 responses. Larger percentages of hospitals in both groups (with or without a safety program) reported having computer-only or paper-and-computer reporting systems, compared to 2005, but changes between the two years in the distribution of hospitals by type of reporting system for the two groups were not significantly different (p=0.61).

The types of information sources for occurrences reported into hospitals' reporting systems remained similar in 2005 and 2009, as shown in Table 3.9. There were slight increases in the percentages of hospitals that reported receiving information from many of the sources, although only two of the increases were statistically significant. The largest increase, of 20.4 percent (p<0.001), was for reports through a hotline. The other significant increase was for rounds or walk arounds (p=0.003).

Table 3.8
Percentage of Hospitals That Have Reporting Systems, by Presence of a Patient Safety Program or Not, 2005 and 2009

Reporting System in Place	2005 Survey		2009 Survey	
	Has Patient Safety Program	No Patient Safety Program	Has Patient Safety Program	No Patient Safety Program
Have a centralized adverse event reporting system	97.7% (n=1,423)	96.5% (n=218)	98.2% (n=810)	94.9% (n=121)
For those with reporting systems, type of system	(n=1,378)	(n=210)	(n=783)	(n=118)
Paper only	14.4%	29.3%	14.7%	22.8%
Paper and computer	72.6	62.5	60.9	62.3
Computer only	13.1	8.2	24.3	14.9

Table 3.9
Sources of Information about Adverse Events, 2005 and 2009

Information Source	Percentage of Hospitals Responding "Yes"		Percentage Change
	2005 Survey	2009 Survey	
Hospital staff filling out a form	99.3%	99.4%	0.1%
Hospital staff calling you directly	96.8	97.0	0.2
Through a hotline	32.4	39.0	20.4 ***
By attending a committee meeting	77.9	80.4	3.2
By conducting rounds, walk-arounds	77.1	81.8	6.1 **
By a patient notifying the hospital	87.6	89.0	1.6
By a Federal or State agency contacting the hospital	55.0	56.0	1.8

** $p < 0.01$; *** $p<0.001$

We found strong consistency among hospitals regarding many of the collected data elements in the 2005 survey responses. Virtually all the hospitals' systems had the capability to record type, place, and time of occurrences, and all but a small percentage can document patient demographics, needed follow-up treatment, action taken, and personnel involved (Table 3.10). However, only 82 percent of the hospitals reported that their systems could collect data on the patient's condition before and after an occurrence, and only 79 percent collected data on severity of patient harm. This question was deleted from the 2009 survey to make space for the new questions added to the survey. It was a candidate for removal because such high percentages of hospitals reported collecting most of the items, which was not likely to change.

Table 3.10
Types of Data That Hospital Adverse Event Reporting Systems Are Designed to Collect, 2005 Only

Data Element	Percentage Having the Data Element In 2005
Type of occurrence	100%
Place of occurrence	100
Time of occurrence	99
Patient demographics	95
If any action was taken	94
Needed follow-up treatment	94
Personnel involved	91
Contributing factors	89
Needed administrative follow-up	85
Condition before/after event	82
Severity of harm to patient	79
Patient's medical history	58
Other information	47

Note: Number of non-responses ranged from a maximum of 15 to a minimum of 2.

The 2005 survey included several questions about whether the hospital was in a state with laws that gave hospital reporting systems protections from legal discovery and whether various aspects of their review processes were protected from discovery. These questions also were deleted from the 2009 survey, to allow space for new questions, because we learned that many risk managers did not have accurate information about this issue. In the 2005 survey, 89 percent of the hospitals reported that they were in states that protected their reporting systems from discovery. However, when we performed an analysis of the within-state consistency of responses to this question, we found substantial discrepancies in those responses.

The results of this analysis, presented in Table 3.11, show that only 17.7 percent of the hospitals, counted within each state, were completely in agreement that their states had (or did not have) discovery protection laws, and 24.9 percent of them were in less than 85 percent agreement about their states' laws. Given these inconsistent results, we could not use these data in any analyses of other responses.

Table 3.11
Hospitals' Consistency in Knowing Their State Laws Regarding Protection of Hospital Adverse Event Reporting Systems from Legal Discovery, 2005 Only

Degree of Agreement Among Respondents on State Laws	Number (Percent) of Hospitals	Number of States Involved
100% agreement	279 (17.7)	14
85-99% agreement	904 (57.4)	21
70-84% agreement	196 (12.5)	8
<70% agreement	195 (12.4)	8

FEATURES OF A WELL-PERFORMING HOSPITAL REPORTING SYSTEM

As described in Chapter 2, we created four indexes to profile hospitals' performance on each of four key aspects of the process of reporting and acting on information on adverse events. These indexes are: creating a supportive environment for reporting, types of staff reporting, timely distribution of adverse event summary reports, and discussions with key hospital departments and committees. Ideally, all hospitals should achieve a maximum score for each of these indexes, which would reflect their having a proactive system to not only report events but also to take actions to prevent such events from occurring again in the future.

In Figure 3.1 through Figure 3.4, we summarize the status of hospitals' reporting systems in 2005 and 2009 on each index. In 2005, only small percentages of hospitals had the maximum score for each of the four indexes (a supportive environment, types of staff reporting, timely reporting, and reporting to departments or committees). For the supportive environment and timely reporting indexes, hospitals were somewhat evenly distributed across the scores. For the index on type of staff reporting, 69 percent of hospitals had index scores of one point, suggesting that occurrences in their hospitals were likely to be reported by either physicians or other staff, but not both. A similar pattern is found for reporting to high-level departments and committees, indicating that their occurrence reports were being considered by either internal departments or committees, but not both.

The distributions of index scores improved somewhat in 2009 for the first two indexes. For the supportive environment index, only 21 percent of hospitals had a score of 0 in 2009, compared to 24 percent in 2005, and those with a score of 2 increased from 32 percent to 36 percent (Figure 3.1). An overall test of the change in distribution between the 2005 and 2009 surveys is not significant (p=0.78), but the increase in hospitals with a score of 2 was significant (p=0.041). The decrease of hospitals with a score of 0 was not significant (p=0.13).

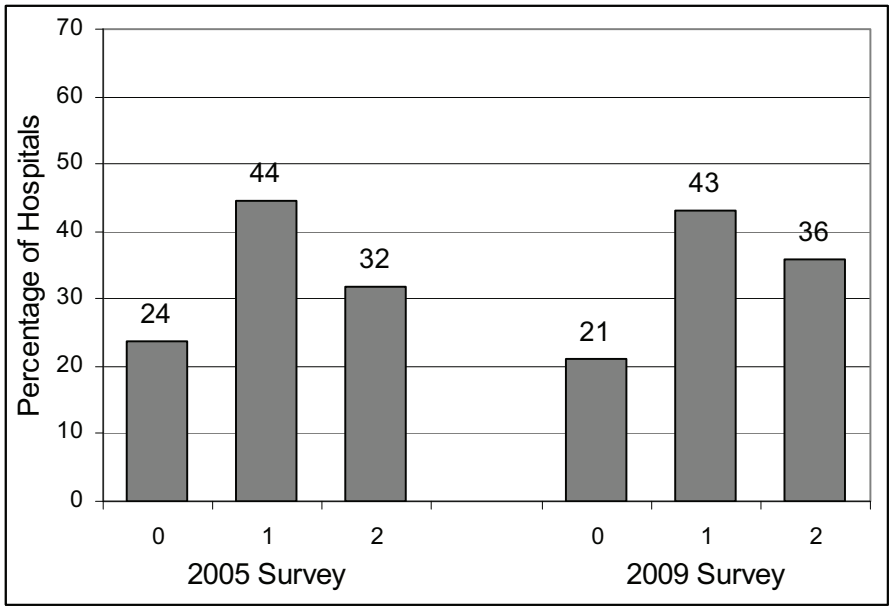

Figure 3.1 Supportive Environment for Reporting, 2005 and 2009

For the index on types of staff reporting, as shown in Figure 3.2, the overall distribution of scores changed between 2005 and 2009 (p=0.002). Within the distributions of scores, the decrease in percentage of hospitals with a 0 score from 18 percent in 2005 to 12 percent in 2009 was significant (p<0.001), but the increase in the percentage of hospitals with a score of 2 was not significant (p=0.299).

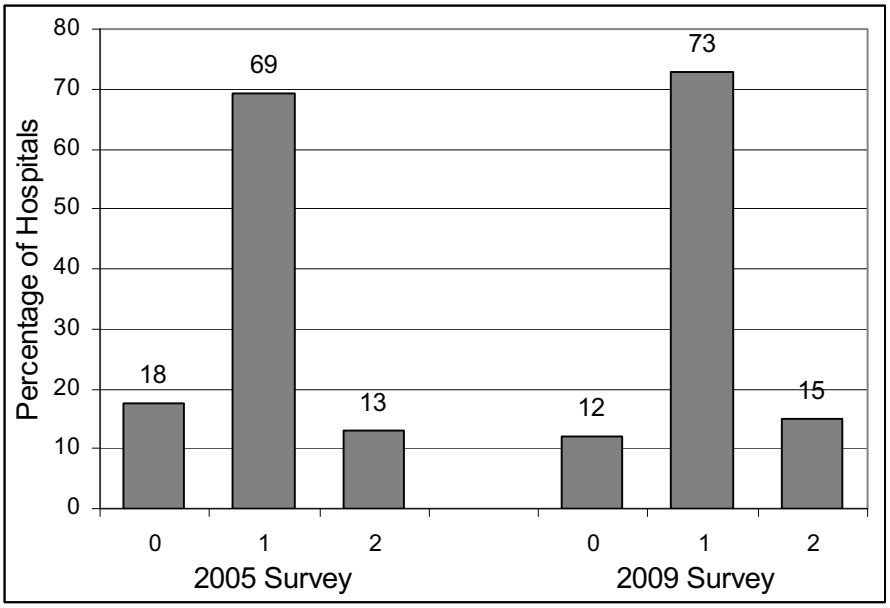

Figure 3.2 Types of Staff Reporting, 2005 and 2009

By contrast, as shown in Figure 3.3, no significant difference was found between the 2005 and 2009 in the score distributions for the index on timely distribution of adverse event reports (p=0.09).

For the index on discussion of event reports with key departments and committees, we found a decrease in the percentage of hospitals with a score of 0, and also in the percentage with a score of 2. As a result, hospitals with a score of 1 increased from 56 percent in 2005 to 64 percent in 2009. The decrease in the percentage of hospitals with a score of 0 was statistically significant (p=0.007), but the change in the percentage of hospitals with a score of 2 was not significant (p=0.15).

We also found 23 percent missing data for 2005 and 15 percent missing data for 2009 for items in this index, which may indicate that actual performance is less positive than is indicated by the index scores. This index is missing if a hospital reports for any one of 5 different questions that they do not have a committee or department, or if the question was not answered and it is not in a legitimate skip pattern.

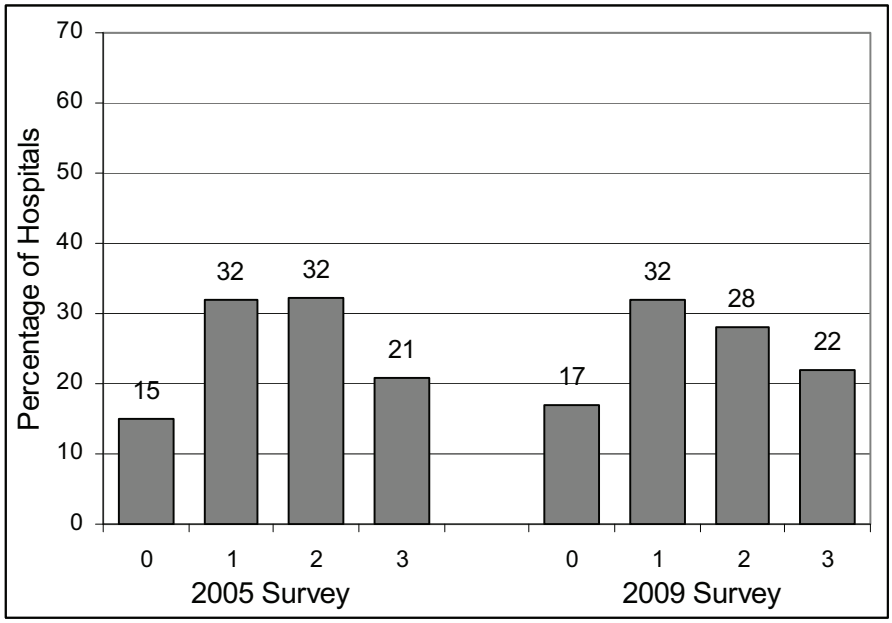

Figure 3.3 Timely Distribution of Adverse Event Reports, 2005 and 2009

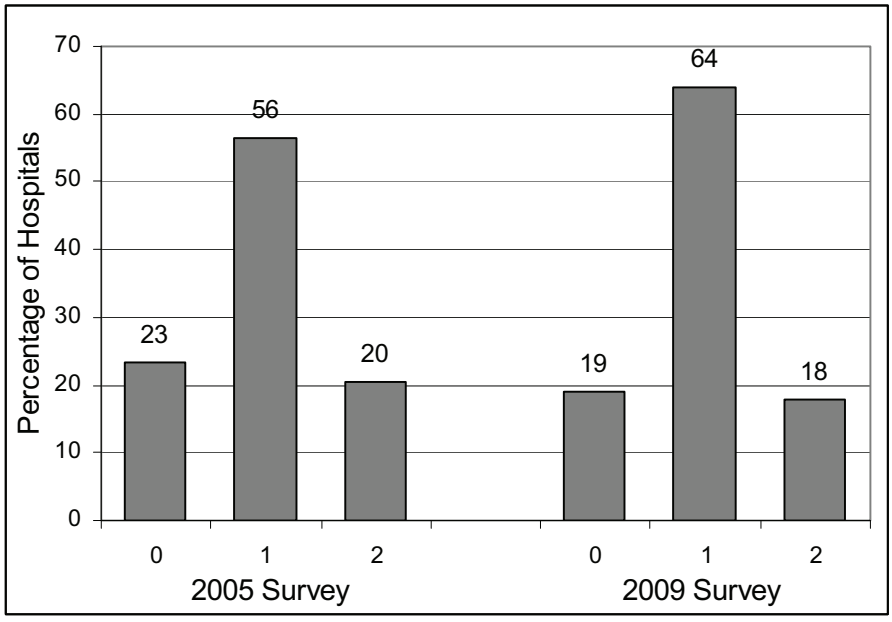

Figure 3.4 Discussion with Key Departments and Committees, 2005 and 2009

FACTORS CONTRIBUTING TO RESULTS FOR INDEXES

Given the varying performance of hospitals regarding their event reporting systems, we examined the individual variables that were used to construct each of the four indexes and that influence that variation. The results of these analyses are reported here.

Supportive Hospital Environment for Reporting

Risk managers were asked in both the 2005 and 2009 surveys if hospital policy provided for anonymous reporting or, if reported non-anonymously, for keeping reporter's identity private. Table 3.12 shows that, in 2005, an estimated 47 percent (±2.4 percent) of the hospitals reported that they always allowed for anonymous reporting, and 29 percent (±2.2 percent) never allowed for it. An estimated 8 percent (±0.8 percent) of hospitals overall never kept reporters' identities private once identities were known.

The percentages of hospitals that provided anonymous reporting increased in 2009, with 54 percent of hospitals (±1.6 percent) reporting that they always provided for anonymous reporting and 18 percent (±1.25 percent) reporting that they never allowed for it. The increase in percentage of hospitals that always allowed anonymous reporting ($p=0.026$) and the decrease in hospitals that never allowed it ($p<0.001$) were both significant. The percentage of hospitals that reported that the identity of reporters was never kept private decreased significantly from 8.4 percent (±0.71) in 2005 to 5.3 percent (± 0.73 percent) ($p=0.002$). On the other hand, no significant difference was found between 2005 and 2009 regarding hospitals policies on keeping reports in an employee's file ($p=0.19$).

Table 3.12
Hospital Policies for Protecting Identify of Individuals Reporting Events, 2005 and 2009

	Percentage of Hospitals by Policy Use		
Privacy Policy	Yes, Always	Yes, Some	No, Never
2005 Survey			
Anonymous reporting	47.2% **	23.6%	29.2%***
If reporter identified, keep private	60.3	31.3	8.4 **
Report in employee file	2.0	17.5	80.5
2009 Survey			
Anonymous reporting	54.0 **	27.9	18.1***
If reporter identified, keep private	60.5	34.2	5.3 **
Report in employee file	1.3	19.8	78.9

Change from 2005 to 2009: ** $p < 0.01$; *** $p<0.001$

In examining differences in hospital privacy policies for event reporters, by CAH status, we found no significant difference in 2005 between CAHs and non-CAH hospitals in their policies on anonymous reporting (Figure 3.5). However, we did find that CAHs are more likely to keep reporters' identities private (Figure 3.6) (chi-square, $p<0.001$). Similar relationships between CAHs and non-CAH hospitals also were found in the 2009 survey results.

In 2009, however, the percentage distributions of responses across "always", "some", and "never" differed from those in 2005. Specifically, as shown in Figure 3.5, the percentages of hospitals that stated they always provided for anonymous reporting were higher in 2009 for both the CAHs and the non-CAH hospitals than they were in 2005. This observed pattern was confirmed statistically in a negative result ($p=0.13$) for a test of differences between CAHs and non-CAH hospitals in how their response distributions changed between 2005 and 2009. However, this is some evidence that the percentage of CAH hospitals that "never" allowed anonymous reporting decreased more between 2005 and 2009 than did the percentage of non-CAH hospitals ($p=0.046$).

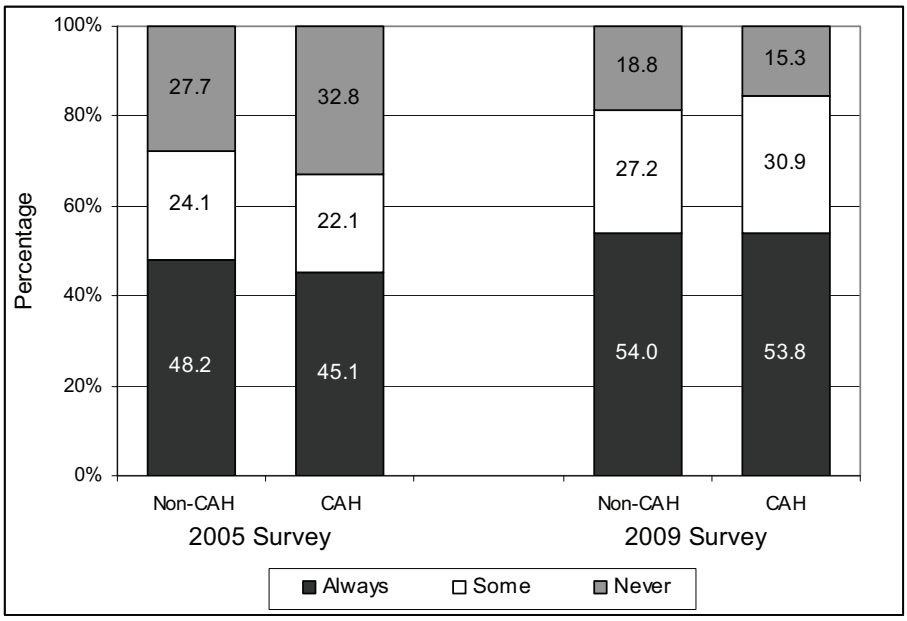

Figure 3.5 Distribution of Hospitals by Policy for Anonymous Reporting, by CAH Status, 2005 and 2009

On the other hand, as shown in Figure 3.6, the percentages of CAHs and non-CAH hospitals that always protected reporters' identity changed in different directions between 2005 and 2009. In 2009, 58.3 percent of non-CAH hospitals reported they always protected reporters' privacy, compared to 56.8 percent in 2005. Conversely, 69.6 percent of CAHs reported that they did so in 2009, a decline from the 74.4 percent reported in 2005. The overall change in distributions for CAHs between 2005 and 2009 was significant ($p=0.02$). In addition, the decrease from 2005 to 2009 in the percentage of CAHs who reported that they "always" protected reporters' identities in the 2009 survey was significant ($p<0.001$), as was the increase in CAHs that "never" protected their identities ($p=0.009$).

We also examined differences in privacy policies between hospitals that had comprehensive patient safety programs and those that did not. In 2005, hospitals that had safety programs were more likely to always provide for anonymous reporting ($p=0.015$), as shown in Figure 3.7. However, there was no significant difference between the two groups for their policies on protecting reporters' identities once their identities were known ($p=0.65$), as shown in Figure 3.8).

In 2009, there was a general increase in the percentage of hospitals that had policies that provided for anonymous reporting ($p<0.001$). However, comparing hospitals with or without a patient safety program, there was no significant difference in 2009 between the two groups in the percentages that provided for anonymous reporting policies ($p=0.62$). Similarly, the percentages of hospitals that protected reporters' identities increased significantly in 2009 ($p=0.007$), but there was no significant difference in 2009 between the two groups in the percentage that reported they protected reporters' identity ($p=0.18$).

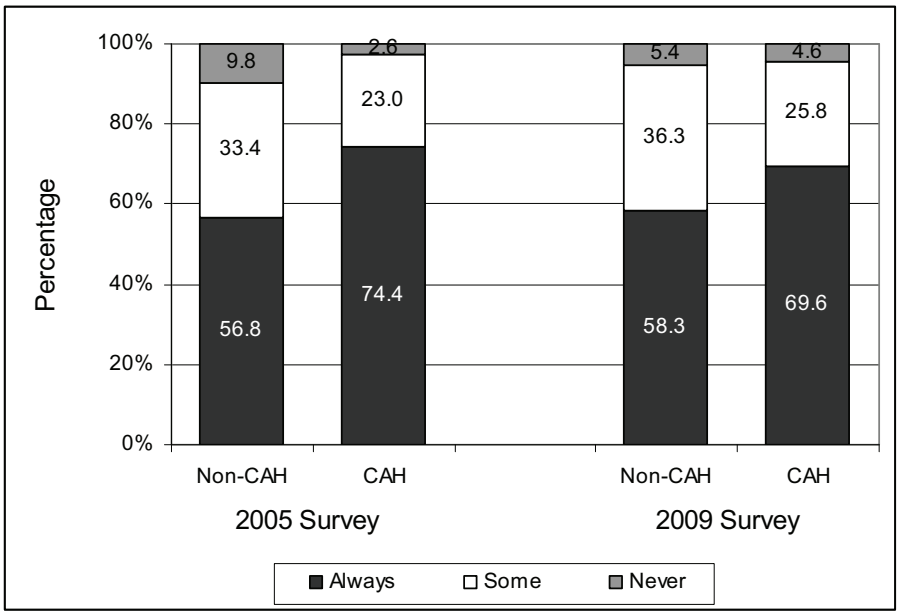

Figure 3.6 Distribution of Hospitals by Policy for Keeping Reporters' Identity Private, by CAH Status, 2005 and 2009

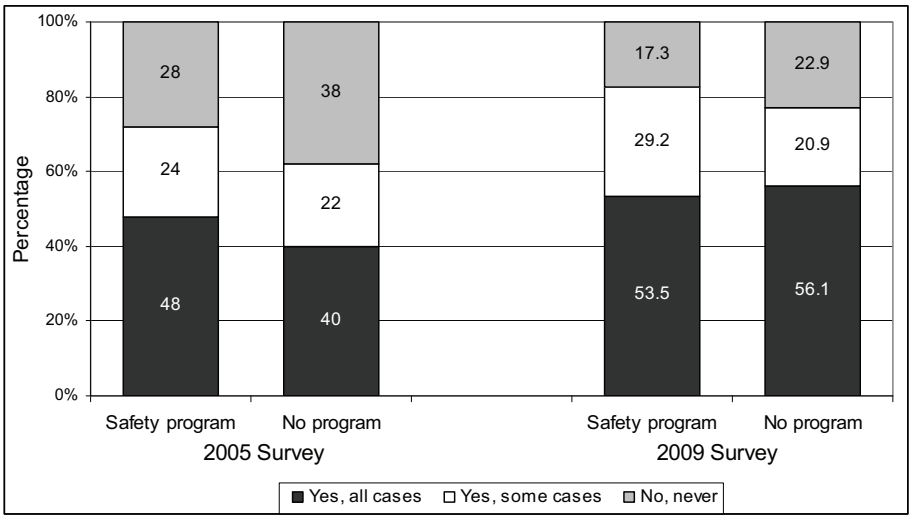

Figure 3.7 Distribution of Hospitals by Policy for Anonymous Reporting, by Patient Safety Program Status, 2005 and 2009

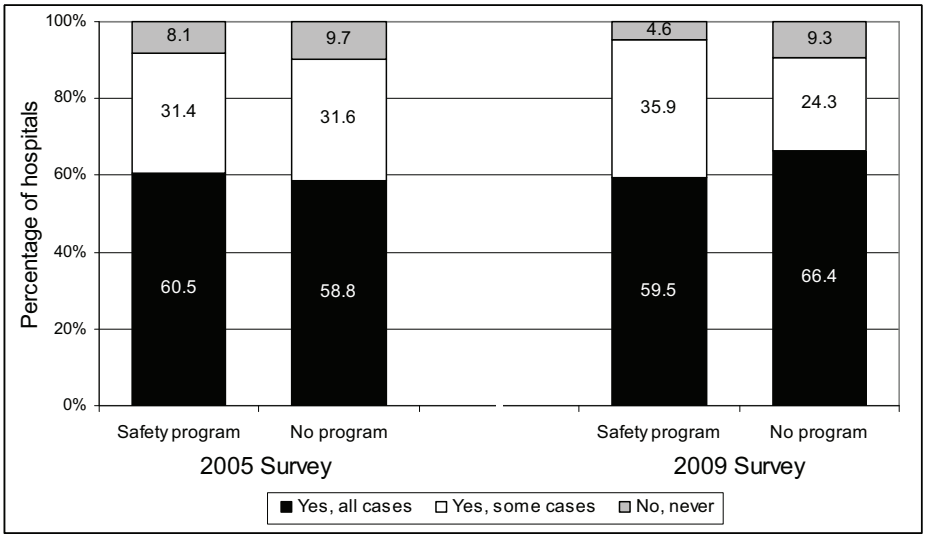

Figure 3.8 Distribution of Hospitals by Policy for Protecting Reporter Identity, by Patient Safety Program Status, 2005 and 2009

Logistic regression models were estimated to assess which hospital characteristics were associated with each of the two supportive environment components, the results of which are presented in Table 3.13 and Table 3.14. In 2005, a hospital was more likely to both allow anonymous reporting and keep reporters' identities private if it had a computer-only reporting system or had a patient safety program. In addition, small hospitals, for-profit hospitals, and government-owned hospitals were less likely to always allow anonymous reporting, but these characteristics did not affect reporters' privacy protection. CAHs were more likely to keep identity private, but this status did not affect hospital policies on anonymous reporting. Teaching hospitals were more likely to always allow anonymous reporting, but were less likely to keep reporters' identities private.

In 2009, similar but weaker results regarding hospital policies on anonymous reporting were found (Table 3.13), but no hospital characteristics were significantly related to protecting protectors' identity (Table 3.14). A hospital was more likely to always provide for anonymous reporting in 2009 if it had a computer-only reporting system, and it was less likely to do so if it was a for-profit or government-owned hospital. Hospital characteristics that had been significant in 2005, but were not in 2009, were bed size, teaching status, and having a patient safety program.

Types of Staff Reporting Adverse Events

The risk managers were asked to estimate the shares of staff who submitted reports to their systems, with responses of all, most, some, a few, or none for each staff type. In 2005, almost all risk managers reported that nursing staff submitted all or most occurrence reports, as shown in Table 3.15. Pharmacy staff, technicians, and therapists were identified by more than half the hospitals as submitting some of the occurrence reports. Greater than 80 percent of the hospitals estimated that attending MDs submit only a few of the reports.

Table 3.13
Factors Associated with Hospital Policy for Always Reporting Adverse Events Anonymously, 2005 and 2009

	2005 Survey		2009 Survey	
Hospital Characteristics	OR (95% CI)	p-value	OR (95% CI)	p-value
Bed size (0-74 beds reference)				
75-199 beds	1.38 (1.07, 1.77)**	0.013	1.19 (0.81, 1.75)	0.351
200+ beds	1.35 (1.00, 1.83)*	0.048	1.20 (0.75, 1.90)	0.439
CAH status	1.24 (0.90, 1.70)	0.190	1.24 (0.78, 1.98)	0.369
Rural location	1.06 (0.84, 1.34)	0.602	1.03 (0.74, 1.43)	0.878
Ownership (non-profit reference)				
For-profit	0.43 (0.33, 0.56)***	<0.001	0.34 (0.23, 0.51)***	<0.001
Government	0.74 (0.59, 0.93)**	0.010	0.70 (0.50, 0.97)*	0.034
Teaching hospital	1.28 (1.01, 1.62)*	0.042	1.12 (0.71, 1.46)	0.926
Joint Commission accredited	1.09 (0.83, 1.43)	0.538	1.11 (0.74, 1.66)	0.621
Computer-only reporting system	1.44 (1.09, 1.92)**	0.011	1.82 (1.29, 2.57)***	<0.001
Patient safety program	1.36 (1.03, 1.79)*	0.031	0.80 (0.52, 1.23)	0.307
Number with affirmative response	745 (n=1,560)		484 (n=894)	
Adjusted R-square	0.06		0.09	
c-statistic	0.62		0.64	
Hosmer-Lemeshow p-value	0.012		0.630	

* p<0.05; ** p < 0.01; *** p<0.001

Table 3.14
Factors Associated with Hospital Policy for Keeping Reporters' Identity Private, If Events Are Not Reported Anonymously, 2005 and 2009

	2005 Survey		2009 Survey	
Hospital Characteristics	OR (95% CI)	p-value	OR (95% CI)	p-value
Bed size (0-74 beds reference)				
75-199 beds	0.93 (0.72, 1.20)	0.560	0.95 (0.65, 1.39)	0.782
200+ beds	0.83 (0.61, 1.12)	0.219	0.69 (0.44, 1.08)	0.103
CAH status	1.60 (1.14, 2.25)**	0.006	1.19 (0.75, 1.91)	0.459
Rural location	1.25 (0.99, 1.59)	0.066	1.20 (0.85, 1.69)	0.299
Ownership (non-profit reference)				
For-profit	1.18 (0.91, 1.53)	0.224	1.32 (0.89, 1.98)	0.172
Government	1.11 (0.88, 1.41)	0.386	1.20 (0.85, 1.69)	0.306
Teaching hospital	0.77 (0.61, 0.98)*	0.033	1.12 (0.78, 1.62)	0.545
Joint Commission accredited	0.84 (0.63, 1.11)	0.220	0.85 (0.57, 1.27)	0.425
Computer-only reporting system	1.83 (1.35, 2.48)***	<0.001	1.08 (0.77, 1.53)	0.655
Patient safety program	1.33 (1.00, 1.78)*	0.049	0.80 (0.52, 1.22)	0.292
Number with affirmative response	897 (n=1,507)		536 (n=887)	
Adjusted R-square	0.06		0.04	
c-statistic	0.62		0.59	
Hosmer-Lemeshow p-value	0.133		0.663	

* p<0.05; ** p < 0.01; *** p<0.001

Comparing the 2009 and 2005 survey results, fewer hospitals reported in 2009 that all or most reports were submitted by nurses (p=0.001), fewer hospitals reported that a few or no reports came from other practitioners (p<0.001) or pharmacy staff (0.02), and more hospitals reported that all or most reports came from other staff.

Table 3.15
Types of Staff Most Likely to Submit Reports of Adverse Events, 2005 and 2009

	Percentage of Hospitals		
Type of Staff	All/most	Some	A few/none
2005 Survey			
Nursing staff	96% ***	4%	<1%
Other staff	38	17	45
Pharmacy staff	8 **	56	36
Techs/therapists	3	54	43
MDs in training	2	15	83
Attending MDs	1	13	86
Other practitioners	1	18	81
2009 Survey			
Nursing staff	93 ***	7	<1%
Other staff	44	11	45
Pharmacy staff	7 **	60	32
Techs/therapists	3	55	42
MDs in training	1	14	85
Attending MDs	1	15	84
Other practitioners	2	22	76

Note: Number of non-responses ranged from a maximum of 24 to a minimum of 5.
Change from 2005 to 2009: ** p < 0.01; *** p<0.001

We also asked the risk managers responding to the 2005 survey to provide their estimates regarding why some events were not reported. As shown in Table 3.16, the reason identified most frequently was that staff did not realize an error had occurred, which 89 percent of the hospitals identified for both errors that caused patient harm and did not cause harm. However, this reason was identified by only 73 percent of the risk managers for errors that were corrected. Other common reasons identified were "afraid to report," "did not know they should report," and "no time to report errors." This item was deleted from the 2009 survey to allow space for new items, because we expected that the responses would be fairly stable from year to year.

The low participation by physicians in reporting occurrences is consistent with previous research that found that physicians are least likely of all groups to use reporting systems. We estimated logistic regression models to assess which hospital characteristics were associated with the extent to which attending physicians submitted reports. The dichotomous dependent variable for the models was given a value=1 if a hospital risk manager responded "some," "most" or "all" to the survey question about the share of adverse event reports submitted by physicians. For the 2005 survey results, we found that attending physicians at larger hospitals, at hospitals with patient safety programs, and at hospitals in rural locations were more likely to submit occurrence reports to an adverse event reporting system (Table 3.17). For the 2009 results, however, the

only significant predictors of physician reporting were CAH hospitals and having a computer-only reporting system.

Table 3.16
Reasons Identified for Why Events Might Not Be Reported, 2005 only

Type of Staff	Percentage by Level of Patient Harm		
	Patient Harm	Error, No Harm	Error Corrected
Did not realize an error	88%	89%	73%
Afraid to report	61	48	38
Did not know should report	52	67	79
Other reason(s)	27	16	11
Did not know how to report	23	20	22
No access to reporting	5	5	4
No time to report error	53	56	53
No harm to patient	–	87	89

Note: Hospitals could list more than one reason for not reporting.

Table 3.17
Factors Associated with Reporting of Adverse Events by Physicians, 2005 and 2009

	At Least Some Physicians Report Adverse Events			
	2005 Survey		2009 Survey	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Bed size (0-74 beds reference)				
75-199 beds	1.57 (1.07, 2.31)*	0.021	1.14 (0.69, 1.88)	0.624
200+ beds	2.07 (1.32, 3.24)***	0.001	1.65 (0.92, 2.97)	0.094
CAH status	0.59 (0.33, 1.04)	0.070	0.45 (0.22, 0.90)*	0.025
Rural location (non-profit reference)	1.39 (0.99, 1.95)*	0.054	1.38 (0.88, 2.17)	0.163
Ownership				
For-profit	0.70 (0.47, 1.03)	0.072	1.15 (0.69, 1.92)	0.593
Government	0.77 (0.53, 1.11)	0.157	0.80 (0.49, 1.31)	0.372
Teaching hospital	1.14 (0.82, 1.59)	0.430	1.39 (0.89, 2.16)	0.149
Joint Commission accredited	1.07 (0.69, 1.65)	0.776	0.86 (0.50, 1.49)	0.596
Computer-only reporting system	0.90 (0.61, 1.34)	0.605	0.58 (0.35, 0.95)*	0.031
Patient safety program	1.77 (1.06, 2.93)*	0.028	0.69 (0.40, 1.20)	0.191
Number with affirmative response	202 (n=1,448)		133 (n=837)	
Adjusted R-square	0.05		0.05	
c-statistic	0.63		0.62	
Hosmer-Lemeshow p-value	0.322		0.731	

* p<0.05; ** p < 0.01; *** p<0.001

Distribution of Reports Regarding Adverse Events Reported into the System

Virtually all the hospitals said in both 2005 and 2009 that they produced summary reports of occurrence data, and more than half of them said these reports were produced at least monthly, as shown in Table 3.18. However, in both years, much fewer hospitals actually distributed the reports within the hospital. Only 71 percent (±2.3 percent) of the risk managers responding to the 2005 survey said they distributed these reports within the hospital, and 65 percent (±1.6 percent) of respondents to the 2009 survey said they distributed them. The hospitals varied in how long it took them to produce reports after the end of a reporting period, ranging from two weeks to longer than a month.

Table 3.18
Distribution of Hospitals by Dissemination of Adverse Event Report Information Within the Hospitals, 2005 and 2009

	Percentage of Responses	
	2005 Survey	2009 Survey
Produce reports of occurrence data	98.7%	96.3%
Frequency of reports		
At least monthly	50.5	59.1
Quarterly	37.4	36.5
Other frequencies +	12.1	4.4
Time to produce reports after end of reporting period		
Within 2 weeks	42.6	48.9
2 weeks to 1 month	29.7	28.8
longer than a month	27.7	22.3
Distribute reports within the hospital	71.3	64.9

Response rates for each item in the table:
produce reports of occurrence data – 2005 = 97%; 2009 = 99%
distribute reports within the hospital – 2005 = 95%; 2009 = 99%
frequency of reporting – 2005 = 94%; 2009 = 94%
time to produce reports – 2005 = 70%; 2009 = 68%

+ Some hospitals report at multiple frequencies; others at frequencies not listed above

As shown in Table 3.19, we found differences in both 2005 and 2009 for hospitals' distribution of reports, by those with and without organized patient safety programs. A larger percentage of hospitals with patient safety programs distributed event reports, compared to hospitals that did not have safety programs, and they produced the reports more frequently. Further, for hospitals with safety programs, the percentage that reported more frequently than quarterly increased from 2005 to 2009 ($p=0.02$), but there was not a significant increase between the two years for those without safety programs ($p=0.29$).

Table 3.19
Distribution of Hospitals by Dissemination of Adverse Event Report Information Within the Hospitals, by Patient Safety Program Status, 2005 and 2009

	Percentage of Responses			
	2005 Survey		2009 Survey	
	Safety Program	No Safety Program	Safety Program	No Safety Program
Frequency of occurrence data reports				
At least monthly	51.7 *	42.1	61.5 *	42.3
Quarterly	35.6	49.4	34.4	51.1
Other frequencies +	12.7	8.5	4.1	6.6
Distribute reports within the hospital	71.9	67.9	65.4	58.9

+ Some hospitals report at multiple frequencies; others at frequencies not listed above.

Change from 2005 to 2009: * $p<0.05$

Discussion of Adverse Event Reports with Key Hospital Committees and Departments

Risk managers were asked whether adverse events were discussed in specific committees and the frequency with which reports were provided to specific hospital departments. Their responses, which are presented in Table 3.20 (discussing reports with hospital committees) and Table 3.21 (reporting to hospital departments), are similar for the 2005 and 2009 surveys. Although large percentages of the hospitals reported to each of the committees and hospital departments listed, the percentages did not approach 100 percent, which would be the ideal. Only some of the changes were statistically significant, as shown in the tables.

Table 3.20
Percentage of Hospitals Reporting They Discussed Adverse Events Report Information with Each Hospital Committee, 2005 and 2009

	Percentage of Responses	
Hospital Committee	2005 Survey	2009 Survey
Quality Management Committee ***	71.4%	80.3%
Performance Improvement Committee **	68.0	70.6
Patient Safety Committee ***	83.3	88.5
Hospital Peer Review Committee	59.9	60.1
Morbidity and Mortality Conference	35.7	34.0
Medical Executive Committee	79.3	81.9
Senior Management Committee ***	52.6	68.2
Risk Management Committee ***	46.3	51.9
Governing Board or Committee ***	80.7	86.3
Other committee ***	36.9	26.1

Change from 2005 to 2009: ** $p < 0.01$; *** $p<0.001$

Table 3.21
Percentage of Hospitals Reporting They Always Disseminated Adverse Event Report Information to Each Hospital Departments, 2005 and 2009

	Percentage of Responses	
	2005 Survey	2009 Survey
Nursing	56.2%	57.4%
Pharmacy	49.5	50.2
Laboratory Medicine	33.4	34.7
Transfusion Medicine	32.5	32.5
Infection Control	41.5	45.1
Medical Leadership	48.6	45.8
Quality or Performance Improvement	67.1	65.6
Central Hospital Administration	52.9	54.0
Other ***	52.8	37.8

Change from 2005 to 2009: *** $p<0.001$

For our analysis of reporting, we focused on the three key hospital departments of senior administration, nursing, and medical administration, for which we derived a dichotomous variable that was given the value 1 if a hospital always reported to all three departments; otherwise it was coded=0. We also identified two committees as important ones to receive and discuss information about adverse events – the hospital board or board committee and the medical executive committee. Again, the derived variable was coded=1 if the hospital discussed adverse event reports with both committees; otherwise it was coded=0.

We found that only 25 percent (±2.2 percent) of all hospitals reported in 2005 that they distributed adverse event reports to all three of the key departments, and only 21 percent (±1.4 percent) of hospitals reported doing so in 2009. In logistic regression models, the results of which are shown in Table 3.22, hospital characteristics were found to explain little of the variance across hospitals in the likelihood of their distributing occurrence reports to all three departments (r-square=0.02 for 2005 and r-square=0.04 for 2009). The only significant findings were that hospitals with computer-only reporting systems were significantly less likely to distribute reports to these departments in 2005, and that hospitals with patient safety programs were significantly more likely to do so in 2009.

Table 3.22 Factors Associated with Discussion of Adverse Events with the Hospital Senior administration, Nursing, and Medical Administration, 2005 and 2009

	Adverse Events Discussed at All Three Departments			
	2005 Survey		2009 Survey	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Bed size (0-74 beds reference)				
75-199 beds	0.87 (0.64, 1.18)	0.364	0.71 (0.45, 1.12)	0.143
200+ beds	0.91 (0.62, 1.33)	0.621	0.65 (0.38, 1.13)	0.131
CAH status	0.71 (0.47, 1.09)	0.114	0.78 (0.42, 1.44)	0.427
Rural location	1.09 (0.82, 1.43)	0.567	0.87 (0.57, 1.33)	0.518
Ownership (non-profit reference)				
For-profit	1.31 (0.94, 1.82)	0.109	1.27 (0.80, 2.04)	0.314
Government	1.11 (0.83, 1.47)	0.485	1.33 (0.87, 2.04)	0.188
Teaching hospital	1.18 (0.88, 1.58)	0.282	1.05 (0.67, 1.65)	0.841
Joint Commission accredited	1.04 (0.74, 1.46)	0.826	1.12 (0.68, 1.86)	0.658
Computer-only reporting system	0.65 (0.45, 0.95) *	0.027	0.88 (0.57, 1.35)	0.557
Patient safety program	1.09 (0.76, 1.55)	0.656	2.87 (1.50, 5.49) **	0.002
Number with affirmative response	366 (n=1,042)		174 (n=840)	
Adjusted R-square	0.02		0.04	
c-statistic	0.56		0.60	
Hosmer-Lemeshow p-value	0.380		0.891	

* $p<0.05$; ** $p < 0.01$

We estimated that 73 percent (±2.3 percent) of risk managers responding to the 2005 survey reported that adverse events reports were discussed with both the board and medical executive committees, and 77 percent (±1.4 percent) of them reported doing so in 2009. Logistic regression results for the 2005 survey, shown in Table 2.23, suggest that for-profit hospitals were more likely than not-for-profit hospitals to discuss adverse events with both committees, and government-owned hospitals were less likely to do so. Hospitals with patient safety programs were more likely to discuss adverse events with these committees, whereas CAHs, teaching hospitals, and hospitals with computer-only reporting systems were less likely to do so.

Effects of hospital characteristics on discussion of adverse events with both committees were weaker for the 2009 survey, also shown in Table 3.23. The only significant finding was that for-profit hospitals were more likely to discuss events with both committees. All the other characteristics that were significant in 2005 were not significant in 2009.

Table 3.23 Factors Associated with Discussion of Adverse Events with the Hospital Board or Committees and the Medical Executive Committee, 2005 and 2009

	Adverse Events Discussed at Both Committees			
	2005 Survey		2009 Survey	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Bed size (0-74 beds reference)				
75-199 beds	0.84 (0.62, 1.15)	0.284	1.07 (0.64, 1.79)	0.788
200+ beds	0.83 (0.58, 1.20)	0.327	0.87 (0.50, 1.50)	0.612
CAH status	0.60 (0.41, 0.86)**	0.006	0.90 (0.50, 1.61)	0.722
Rural location	0.90 (0.68, 1.19)	0.468	1.05 (0.70, 1.58)	0.821
Ownership (non-profit reference)				
For-profit	1.94 (1.37, 2.75)***	0.001	3.30 (1.72, 6.33)***	<0.001
Government	0.76 (0.58, 0.99)*	0.046	0.75 (0.50, 1.11)	0.150
Teaching hospital	0.74 (0.56, 0.97)*	0.032	1.03 (0.68, 1.55)	0.900
Joint Commission accredited	1.12 (0.81, 1.55)	0.493	1.30 (0.79, 2.14)	0.306
Computer-only reporting system	0.70 (0.51, 0.97)*	0.030	0.90 (0.60, 1.37)	0.628
Patient safety program	1.47 (1.07, 2.02)*	0.017	1.12 (0.69, 1.82)	0.653
Number with affirmative response	997 (n=1,365)		634 (n=819)	
Adjusted R-square	0.07		0.07	
c-statistic	0.62		0.62	
Hosmer-Lemeshow p-value	0.631		0.969	

* p<0.05; ** p < 0.01; *** p<0.001

ACTIONS HOSPITALS TOOK BASED ON ADVERSE EVENT INFORMATION

In the previous part of this chapter, we used data from the 2005 and 2009 surveys to characterize the strengths and limitations of the adverse event reporting systems in U.S. hospitals. Three items on the survey also yielded some information that we used to gain insights regarding the types of actions that hospitals have taken in response to the event information reported into their systems.

One item asked the risk managers how often learning about occurrences led to immediate action at their hospitals, and the other item asked how often has learning about occurrences led to launching a quality or performance improvement initiative at their hospitals. The third item asked how often the hospital used the occurrence information for each of a list of specific reasons. The results from these items are presented in Table 3.24. In 2009, 49.7 percent of the hospitals said that adverse event information always or sometimes led to immediate actions by the hospitals, and 42.6 percent of them said it always or sometimes led to a performance improvement initiative. We did not have similar, overall data for 2005 for these items, so we could not compare the 2009 responses to responses on the earlier survey.

Of the list of possible uses of the information, the most frequent uses reported by hospitals were to produce trends of occurrences, perform actions to improve performance, and develop performance or quality indicators. Of interest, whereas only 42.6 percent of hospitals stated in 2009 that information on adverse events led to a performance improvement initiative, 84.5 percent of them said they used this information to perform actions to improve performance.

It is not clear why such a large difference would be found in these two measures, although they might be making a distinction between a full initiative versus more narrowly focused, individual improvement actions.

Table 3.24
Percentage of Hospitals Reporting They Always or Sometimes Used Adverse Event Information for Specific Reasons, 2005 and 2009

Use of Adverse Event Information	Percentage of Responses	
	2005 Survey	2009 Survey
Led to immediate actions by the hospital	NA	49.7%
Led to a performance improvement initiative	NA	42.6
Used for the following reasons:		
To develop performance or quality indicators	72.4	74.2
To produce trends of occurrences	90.7	90.9
For Failure Mode Effects (FME) analysis	40.8	41.1
To conduct root cause analysis	57.3	59.4
To educate or train	74.6	73.1
To compare against other hospitals	34.4	29.4
To fill a state or federal agency's requirement (e.g., FDA or CDC)	50.5	44.6
To report sentinel events to the Joint Commission	29.3	29.8
To counsel or correct physicians	29.0	25.2
To counsel or correct other employees	40.1	36.5
To perform actions to improve performance	83.7	84.5

Note: Data for 2005 are not available for the items marked NA because these overall questions were not asked in the 2005 survey; rather, they were asked relative to each source of information (e.g, "Did information from a hotline lead to immediate actions by the hospital?").

ADDITIONAL INFORMATION FROM THE 2009 SURVEY

Two key new sets of items were added to the questionnaire for the 2009 AERS survey. One of these was a question about the importance of having standardized reporting formats across hospitals, which is an issue related to external reporting of events to organizations such as the Patient Safety Organizations established by AHRQ under the *Patient Safety and Quality Improvement Act of 2005* (U.S. Congress, 2005). The other is a set of items that provide expanded information about hospitals' patient safety programs, which enabled us to explore in more depth the characteristics of the hospital's programs. Only one item had been on the 2005 survey, which asked if a hospital had an organized patient safety program, so we could not develop information about the components of their programs at that time.

Importance of Common Formats for Reporting

On the 2009 AERS survey, we asked the risk managers their opinions about how important is it to have common formats that allow standardized reporting across hospitals. This question was added to provide AHRQ with information needed for its work on implementing the Patient Safety Organization program and related of patient safety data networks. As shown in Table 3.25, 70.1 percent of the risk managers responding to the survey thought it was very

important to have common reporting formats across hospitals, and another 25.1 percent thought it was somewhat important to have them (total of 95.2 percent).

Table 3.25
Distribution of Hospitals Regarding the Importance of Having Common Reporting Formats Across Hospitals, 2009

Level of Importance	Percentage of Hospitals
Very important	70.1
Somewhat important	25.1
Somewhat unimportant	3.2
Not important at all	1.6

Expanded Characterization of a Patient Safety Program

Several questions were included in the 2009 survey to gather information on the presence, characteristics, and strength of hospitals' patient safety programs. These questions were developed based on the elements of a comprehensive patient safety program delineated in the 2006 Safe Practices report published by the National Quality Forum (NQF). Such a program is one of 30 safe practices that the NQF recommended in that report (NQF, 2006).

Two general components of a hospital patient safety program were addressed by these survey questions: administrative aspects of the program and the involvement of the hospital governing board in overseeing patient safety activities. Within the administrative component, hospitals were asked if they had an organized patient safety program in place, if they had one person designated as a patient safety officer, and if they had administered a patient safety culture survey. Within the governing board involvement component, hospitals were asked if their governing boards reviewed each of five aspects of patient safety performance, and if safety reports were included on the agenda of all meetings of the board or a standing committee.

Using responses to the set of individual items included in each of these components, we calculated composites for each hospital for the two components of *safety program administration* and *governing board involvement*. For each component, an overall percentage was calculated that was measured as the number of items in the component to which the hospital responded "yes", divided by the number of items in the component to which the hospital responded (i.e., that had non-missing data). A third composite on the *overall safety program* also was calculated using the same method, in this case using responses to all the items across both the program administration and board involvement components. The average hospital responses to the composites and individual questions regarding their patient safety programs are presented in Table 3.26. We used these patient safety components as predictor variables in the analysis of the use of AHRQ products and tools, the results of which are reported in Chapter 5.

Table 3.26 The Status of Hospitals' Patient Safety Programs, As Reported in the Hospital Survey, 2009

AHRQ Product	Percentage Yes Responses	95% Confidence Interval	Percentage Missing
Patient safety program (composite)	84.2%	82.7 – 85.7	0.0
Organized patient safety program	87.2	85.1 – 89.3	0.7
One person as patient safety officer	86.4	84.3 – 88.6	0.7
Standardized patient safety culture survey	79.1	76.7 – 81.6	2.1
Governing board involvement (composite)	76.7	75.2 – 78.2	1.4
Review policies on patient safety	81.9	79.5 – 84.3	2.7
Review reports on risks, events	89.8	87.9 – 91.8	2.4
Review reports on culture survey	79.1	76.5 – 81.7	2.9
Review progress in safety actions	90.3	88.4 – 92.1	2.7
Review participation by patients and family in safety activities	38.4	35.3 – 41.5	2.7
Safety on board agenda every meeting	81.7	79.3 – 84.0	5.0
Safety program/board involvement (composite)	79.2	78.1 – 80.5	1.4

Note: Total number of responding hospitals = 952. Weighted averages.

The higher the percentage of yes responses for a safety program composite, the stronger was a hospital's patient safety program. In general, a large percentage of U.S. hospitals appeared to have comprehensive patient safety programs. Percentages of "yes" responses also were high for the individual items addressed (ranging from 79.1 percent to 90.3 percent), except for board review of participation by patients and families in safety activities (38.4 percent). In addition, the narrow 95 percent confidence intervals reflect limited variation across hospitals in the status of their safety programs. The composites for the two safety program components and for the overall program composite also were high, with narrow variation across hospitals, reflecting the performance on the items within them.

DISCUSSION

As patient safety became a priority for hospitals, there was general awareness among providers and policy makers that hospitals' adverse event reporting activities needed strengthening, but data were not available to confirm the need or to guide action. These survey results for two points in time (2005 and 2009) provide information that documents needs and highlights priorities for reporting improvements in U.S. hospitals. In particular, the relatively poor performance of hospitals on each of the four performance indexes for event reporting systems in both 2005 and 2009 suggests that hospitals have not pursued a clear trajectory of action during the past four years to strengthen their event reporting processes. This is a troubling finding that points to a need for additional intervention by AHRQ and other organizations to stimulate hospital actions through incentives and provision of technical support.

As AHRQ's PSO Program moves forward and growing numbers of hospitals report their adverse event data to the PSOs with which they are working, it has the potential to provide some of the needed technical support and structure for improvement. The results from the 2005 and

2009 surveys establish baseline data that can be used in future monitoring of improvement progress by hospitals through that work.

Results from the 2005 Survey

We published the results from the 2005 survey (Farley et al., 2008), and this discussion of the 2005 survey results draws from that paper. A positive finding from the surveys was the large percentage of hospitals that reported having centralized adverse event reporting systems, although the nature of their systems varied widely. Our results suggest that hospitals' processes for reporting adverse events and acting upon this information needed to be strengthened. Small percentages of hospitals scored highly on each of the four performance indexes, indicating that many hospitals had not established environments that protect privacy to support reporting, were incomplete in reporting adverse events, or were not fully distributing and working with summary reports on events identified in their systems.

These survey results highlight where actions are needed to improve the existing hospitals' adverse event reporting systems. A variety of factors can affect the usability of these systems, however, which cannot be captured readily in a national survey of this type. For example, reporting performance could be affected by the technical integrity of the system, adequacy of staff training on reporting methods, or consistency in employing effective reporting processes. Additional, more detailed assessments of hospital reporting systems are advisable, to identify actionable issues that can be corrected through performance improvement interventions.

Our finding of low participation in adverse event reporting by physicians also has been found in other studies in the U.S. and other countries (Schuerer et al, 2006; Tuttle et al., 2004; Milch et al., 2006; Herdeiro et al, 2005; Madsen et al. 2006). Reasons identified for physician reluctance to participate in reporting include risk of liability exposure or professional embarrassment, burdensome reporting methods, time required for reporting, perceptions of the clinical import of adverse events, and lack of sense of ownership in the process (Waring, 2004; Kaldjian et al, 2006; Schectman and Plews-Ogan, 2006; AHRQ, 2007; AHRQ, 2008). Physician participation may be higher than observed, however, if they are asking other staff (e.g., nurses) to report identified adverse events, rather than doing it themselves. More work is needed to clarify these issues and seek solutions to enhance physician reporting.

Other research has found that hospital leaders are concerned that external adverse event reporting could increase their legal liability and increase lawsuits (Weissman et al., 2005), which might also diminish their commitment to internal reporting. The implementation of patient safety organizations, under PSQIA provisions, might help to alleviate these concerns and stimulate internal reporting activities by hospitals.

The wide variation in hospitals' dissemination of summary reports generated by adverse event reporting systems raises questions about the effectiveness of follow-up by hospitals on reported occurrences, especially the finding that almost 30 percent of the hospitals that generate summary reports state that they do not distribute them at all within the hospital. Such issues limit the information available to hospital decision makers about patient safety issues, which in turn, reduces the likelihood that hospitals will undertake actions to improve practices.

Hospitals with patient safety programs performed better in a variety of aspects of adverse event reporting processes. Our findings are consistent with other research showing wide variation across hospitals in the adoption of patient safety systems (Longo et al., 2005).

The survey finding that many hospitals did not have supportive reporting environments is consistent with data from the Hospital Survey of Patient Safety Culture (HSOPS) benchmark database. The "non-punitive response to error" composite had the lowest average percent positive response (43 percent and 44 percent for 2007 and 2008, respectively) among the hospitals submitting HSOPS data to the database. This composite addresses the extent to which staff feel that their mistakes and event reports are not held against them and that mistakes are not kept in their personnel file (AHRQ, 2007, 2008).

Hospitals varied widely in the extent to which they used information on reported events for a variety of actions, e.g., analysis of root causes, training of staff, or performance improvement actions. Additional work is needed to document the effectiveness of hospital actions in this phase of the process, and how they are influenced by the usability of the reporting systems used.

Comparison of 2005 and 2009 Survey Results

In general, results from the two AERS surveys are similar, but we found some indications of improved practices when we compared specific results from the 2005 and 2009 surveys. We have identified five trends that the combined survey results suggest may be occurring in the internal adverse event reporting systems and practices of U.S. hospitals:

- The percentage of hospitals that have computer-only event reporting systems appear to have increased from 2005 to 2009, and the increases appear to have occurred across types of hospitals, with or without a patient safety program.
- Hospitals appear to have been obtaining increased information on adverse events from two sources: hotlines and hospital rounds or walk-arounds.
- Hospitals appear to have improved on three of the four indexes we created to summarize hospital performance on four key aspects of event reporting processes:
  - Supportive environment for reporting – improvement in both measures from which the index is constructed.
  - Types of staff reporting – improvement related to increased reporting by technicians, therapists, pharmacy staff, or other staff; no increase in reporting by physicians.
  - Timely distribution of adverse event reports – no improvement in this index
  - Discussion with key departments and committees – improvement related to increased rates of discussion with committees; no increase in discussion with departments.
- Hospital characteristics appear to have been less important in 2009, in general, as factors related to the various measures of hospital reporting performance, compared with 2005.
- Critical access hospitals and hospitals with patient safety programs, both of which performed better than other hospitals in 2005, continued to show better performance in 2009, but they did not differ from other hospitals in improvements made from 2005.

Expanded Information on Patient Safety Program

The new set of items on the 2009 survey that gathered information on the characteristics of hospitals' patient safety programs yielded additional information that can be used to better understand the nature of the safety programs currently be used by hospitals. In addition, this information provides support for the one-item definition for patient safety program based on a self-reported yes/no response to the question, "Does your hospital have an organized patient

safety program," because the percentage of "yes" responses to this question is similar to the percentages of affirmative responses to all but one of the other items in this set. This result increases our confidence that the single question can yield valid information for use in the comparative analyses we have performed for the results of the 2005 and 2009 AERS surveys.

Study Limitations

Several study limitations merit consideration. Due to the effects of hurricane Katrina, our final sample is representative of hospitals in all of the United States except southern Louisiana and southern Mississippi, rather than the entire country. Given the size of the sample and the consistency of responses, it is not likely that results would differ for a full national sample.

Because the survey data are self-reported by hospital risk managers, often based solely on their perceptions without supporting data, these results may be optimistic estimates of the performance of hospital reporting systems. In addition, we found within-hospital inconsistencies in responses to 2005 and 2009 surveys. These inconsistencies could reflect real changes in aspects of hospitals' event reporting systems, or they could be due to turnover in risk managers for some hospitals between the two survey years, in which the two people in that position had differing perceptions of the hospitals' systems. We discuss this issue in Chapter 4, and we consider possible reasons for the observed year-to-year discrepancies in responses. Therefore, we interpret these cross-sectional comparison results with caution because it is not clear how much of observed changes may be real and how much may be due to differing perceptions on the part of different risk managers representing the same hospitals at two points in time.

CONCLUSIONS

Findings from these two baseline hospital adverse event reporting surveys document the current status of reporting systems, and point to several needed improvements in hospitals' processes for reporting and acting upon identified occurrences. This baseline data can be used for future assessment of trends for changes in these reporting systems. PSQIA protections for hospitals reporting to PSOs could encourage such reporting by alleviating hospitals' concerns about liability exposure, and could stimulate improvements in hospitals' internal reporting systems. Support of these activities through establishment of other mechanisms that encourage hospitals to strengthen their reporting systems also would be useful.

Chapter 4
Longitudinal Changes for 2005/2009 Hospital Cohort

The sample of hospitals for the 2009 AERS survey was designed to allow us to analyze within-hospital changes in adverse event systems and practices over time. As described in Chapter 2, the 2005 survey was the original baseline survey of practices before initiatives were undertaken nationally to encourage and support hospitals in improving their reporting processes, and the 2009 survey collects additional baseline data four years later, not long before AHRQ implemented the Patient Safety Organization program. With two sets of baseline data, future surveys that collect data after the PSO program has been in operation should have good comparisons for the analysis of their data.

Because both of these surveys generated data on pre-implementation reporting practices by hospitals, we did not expect large changes in the measures included in the survey, which was borne out in general in the cross-sectional analyses reported in Chapter 3. For the longitudinal analysis, we hypothesized that some of the hospitals would show improvements in their reporting practices and others would not, and we did not expect that performance of many hospitals would decrease between 2005 and 2009.

To test these hypotheses, we analyzed data for the cohort of 952 hospitals that had responded to both the 2005 and 2009 surveys, which allowed us to compare responses given by each hospital at different times regarding their adverse event reporting systems and practices. We began the longitudinal analysis by calculating cross-tabulations of hospital responses for key descriptive measures of the reporting systems and patient safety programs, as well as the four performance indexes that we have examined in the cross-sectional analyses. Then we examined factors that might have influenced the patterns observed in the cross-tabs.

IDENTIFYING CHANGES IN PERFORMANCE

Presented in Table 4.1 is the cross-tabulation of responses in 2005 and 2009 by the hospitals in the cohort regarding the type of reporting system they had. The percentages reported in the table are row percentages that show the distribution of hospital responses in 2009 relative to what they reported in 2005. In general, we would expect that the largest percentages of responses would be on the diagonal of the table, in which hospitals would report the same types of systems in both 2005 and 2009.

Table 4.1
Type of Adverse Event Reporting System Reported by Hospitals, 2005 and 2009

System Type Reported in 2005	Number of Responses	System Type Reported in 2009 (%)		
		Paper only	Both paper and computer	Computer only
Paper only	139	51.1%	43.9%	5.0%
Both paper and computer	625	***10.4***	69.3	20.3
Computer only	108	***0.9***	***36.1***	63.0

Note: Unweighted frequencies; row percentages. Numbers in bold are decline from 2005.

Although we do find this pattern in Table 4.1, the percentages in the diagonal cells are smaller than might be expected for two points of time in the baseline period, suggesting that some of the hospitals had changed their systems in the four-year period. For those that reported they had paper-only systems in 2005, 43.9 percent reported in 2009 that they had paper-and-computer systems and another 5.0 percent reported they had computer-only systems. These changes represent upgrades, which one might expect to take place over time.

For hospitals with the other two types of reporting systems in 2005, their responses in 2009 raise some concern regarding their accuracy. A percentage of the hospitals with each of these system types in 2005 reported that they had less sophisticated systems in 2009. For those with paper-and-computer systems in 2005, 10.4 percent said they had paper-only systems in 2009. Further, for hospitals with computer-only systems in 2005, in 2009, 36.1 percent said they had paper-and-computer systems and another 0.9 percent said they had paper-only systems.

We also examined patterns of hospitals across 2005 and 2009 in their production of summary reports of adverse events reported into their systems. For this measure, 95.7 percent of the hospitals reported that they produced reports in 2005. Of these, 3.4 percent reported they did not produce reports in 2009. This change is plausible because production of reports is an operating process that would be easy to change, so it would be more likely to occur than an apparent reduction in type of system. By contrast, of the small number of hospitals that said they did not produce reports in 2005, 90.1 percent said they did in 2009, which also is reasonable.

Table 4.2
Hospitals Production of Adverse Event Reports, 2005 and 2009

		Use of Event Reports in 2009 (%)	
Use of Event Reports in 2005	Number of Responses	Does Not Produce Event Reports	Produces Event Reports
Does not produce event reports	11	9.1%	90.1%
Produces event reports	903	***3.4***	96.6

Note: Unweighted frequencies; row percentages. Numbers in bold are decline from 2005.

An organized patient safety program should be a stable characteristic of a hospital that, once established, would tend to stay in place except under circumstances of change within the hospital. However, we found that 26.9 percent of the hospitals that said they had a safety program in 2005 reported that they did not have one in 2009. Although this percentage is not as large as the percentages of change found for types of reporting system, it still raises concerns about the stability of the survey responses across the two years.

Table 4.3
Hospitals Reporting They Have an Organized Patient Safety Program, 2005 and 2009

		Patient Safety Program Reported in 2009 (%)	
Patient Safety Program Reported in 2005	Number of Responses	No Safety Program	Have a Safety Program
No safety program	130	26.9%	73.1%
Have a safety program	808	**10.5**	89.5

Note: Unweighted frequencies; row percentages. Numbers in bold are decline from 2005.

Comparisons of Index Scores by Year

We found mixed results in the cross-tabulations of the four index scores in 2005 and 2009, as shown in Table 4.4 through Table 4.7. Substantial percentages of hospitals that had scores of 1 or 2 on these indexes in 2005 had lower scores in 2009. For example, we found that only 47.8 percent of hospitals that had the highest score on the Supportive Environment index in 2005 also had the highest score in 2009 (Table 4.4). Other percentages for retention of highest scores in both years were 25.7 percent for the Range of Staff Reporting index (Table 4.5), 38.0 percent for the Timely Distribution of Reports index (Table 4.6), and 29.7 percent for the Discussion of Reports index (Table 4.7).

Table 4.4
Hospital Scores on Performance Index for Supporting Environment, 2005 and 2009

Supportive Environment Index in 2005	Number of Responses	Supportive Environment Index in 2009		
		0	1	2
0	195	37.4	43.1	19.5
1	418	***19.6***	44.3	36.1
2	289	***10.0***	***42.2***	47.8

Note: Unweighted frequencies; row percentages. Numbers in bold are decline from 2005.

Table 4.5
Hospital Scores on Performance Index for Range of Staff Reporting, 2005 and 2009

Range of Staff Reporting Index in 2005	Number of Responses	Range of Staff Reporting Index in 2009		
		0	1	2
0	134	26.9	64.2	9.0
1	569	***8.8***	77.3	13.9
2	101	***7.9***	***66.3***	25.7

Note: Unweighted frequencies; row percetages. Numbers in bold are decline from 2005.

Table 4.6
Hospital Scores on Performance Index for Timely Distribution of Reports, 2005 and 2009

Timely Distribution of Reports Index in 2005	Number of Responses	Timely Distribution of Reports Index in 2009			
		0	1	2	3
0	119	32.77	37.0	21.0	9.2
1	259	***16.6***	39.4	27.4	16.6
2	268	***15.3***	***31.7***	29.5	23.5
3	192	***11.5***	***22.4***	***28.1***	38.0

Note: Unweighted frequencies; row percentages. Numbers in bold are decline from 2005.

Table 4.7
Hospital Scores on Performance Index for Discussion of Reports, 2005 and 2009

Discussion of Reports Index in 2005	Number of Responses	Discussion of Report Index in 2009		
		0	1	2
0	143	37.8	53.2	9.1
1	350	**15.4**	68.0	16.6
2	128	**10.2**	**60.2**	29.7

Note: Unweighted frequencies; row percentages. Numbers in bold are decline from 2005.

The inconsistencies in patterns for the four indexes reflect patterns in the underlying, individual measures that comprise each index. We tested several of the key measures that contribute to the indexes and found the same pattern of apparent decline in performance for some of the hospitals from 2005 to 2009. The measures we tested were provision for anonymous reporting, frequency that physicians report events, hospital distributes summary event reports, reporting to medical leadership, and discussion of events with board or committee.

FACTORS THAT MIGHT AFFECT CHANGES FROM 2005 TO 2009

To attempt to identify what might be contributing to the observed inconsistency in reporting between 2005 and 2009, we looked at the characteristics of the hospitals, as well as turnover of risk manager staff as possible factors. We did so by estimating multivariate logistic models in which the direction of change in reported performance measures was the dependent variable and the independent variables were the hospitals characteristic variables used throughout our analysis, plus a variable that indicated a change in risk managers between 2005 and 2009. Details of the models are described below.

Changes in Risk Managers from 2005 to 2009

Unfortunately, the 2009 survey did not include a question about whether the risk manager had also responded to the 2005 survey, so we had to work with a less precise measure of staff change. A change in the background of risk manager between the 2005 and 2009 surveys is a signal that the person in the position has changed between those years. Such a measure does not capture all personnel changes because an individual with a particular degree who left the position could be replaced with someone else with the same degree. However, it might provide some information regarding relationships between risk manager changes and inconsistency in reporting on the two surveys.

To identify the measure of staff turnover to use, we examined three measures for the professional backgrounds of the risk managers in 2005 and 2009. These are whether the risk manager had a nursing degree, law degree, or other credential. We found evidence of substantial shifts in personnel in the risk manager position using all three of these measures. We found that 20.3 percent of the risk managers had a nursing degree in one year but not the other (Table 4.8), that 6.0 percent of them had a law degree in only one of the years (Table 4.9), and that 30.1 percent of them had another credential (unspecified) in only one of the years (Table 4.10).

Table 4.8
Risk Managers Reporting They Had a Nursing Degree, 2005 and 2009

Reported Nursing Degree in 2005	Reported Nursing Degree in 2009		
	Yes	No	Total
Yes	616 (65.4%)	***88*** ***(9.3%)***	704 (74.7%)
No	***104*** ***(11.0)***	134 (14.2%)	238 (25.3%)
Total	720 (76.4%)	222 (23.6%)	942 (100.0%)

Note: Unweighted frequencies. Numbers in bold are change from 2005 to 2009.

Table 4.9
Risk Managers Reporting They Had a Law Degree, 2005 and 2009

Reported Law Degree in 2005	Reported Law Degree in 2009		
	Yes	No	Total
Yes	28 (3.0%)	***25*** ***(2.7%)***	53 (5.6%)
No	***31*** ***(3.3%)***	859 (91.1%)	890 (94.4%)
Total	59 96.3%)	884 (93.7%)	943 (100.0%)

Note: Unweighted frequencies. Numbers in bold are change from 2005 to 2009.

Table 4.10
Risk Managers Reporting They Had Another Credential, 2005 and 2009

Reported Other Credential in 2005	Reported Other Credential in 2009		
	Yes	No	Total
Yes	277 (30.4%)	***152*** ***(16.7%)***	429 (47.1%)
No	***122*** ***(13.4%)***	360 (39.5%)	482 (52.9%)
Total	399 (43.8%)	512 (56.2%)	911 (100.0%)

Note: Unweighted frequencies. Numbers in bold are change from 2005 to 2009.

Estimating Factors Affecting Performance Change

To examine the effects of hospital characteristics and risk manager staff turnover on hospital reporting performance changes between 2005 and 2009, we estimated multivariate logistic regression models in which the dependent variable for each model was a score for the direction of change in one of the performance components, with a decrease in performance being a value = -1, no change being a value = 0, and an increase in performance being a value = 1.

The independent variables in the models were the hospital characteristics used throughout the analysis of survey results, plus a measure of risk manager turnover between 2005 and 2009. The risk manager turnover variable was a dichotomous variable that was given the value=1 if the risk manager reported he/she had a nursing degree in only one of the two years, otherwise it was given the value=0. We chose this measure because it represented one professional degree, and there was a substantial average change of 20.3 percent in nursing degree between 2005 and 2009 (from Table 4.8).

From these regression models, summarized in Table 4.11, we found that very few of the decreases in reporting performance were associated with the hospital characteristics or the variable for risk manager turnover. A decrease in provision for anonymous reporting was the only measure associated with a hospital characteristic, which was for-profit ownership status. In addition, the risk manager turnover variable affected only two of the performance measures—type of reporting system and frequency of physicians reporting events.

Table 4.11
Factors Affecting Apparent Decrease in Hospital Reporting Performance, 2005 and 2009

Performance Measure	Significant Factor	Odds Ratio	p-value
Type of reporting system	Risk manager	1.76	0.020
Provide for anonymous reporting	For-profit	2.58	<0.001
Frequency physician report events	Risk manager	1.72	0.012
Distributes summary event reports	none		
Report to medical leadership	none		
Events discussed in board or committee	none		

DISCUSSION

Although our goal in the longitudinal analysis was to analyze within-hospital changes in adverse event systems and practices over time, we quickly found inconsistencies in the information provided by the risk managers at the cohort of hospitals in both the 2005 and 2009 surveys. Because the two surveys were conducted during a baseline period, before initiatives were undertaken nationally to encourage and support hospitals in improving their reporting processes, we expected to find small to moderate changes in the survey responses for the two years. However, we did not expect to find the degree of inconsistency in responses that the risk managers provided.

We note that the risk managers' responses suggested that performance on reporting process measures had improved for many hospitals, even as we found unexpected declines for other hospitals. If the apparent declines were not real, however, they also cast doubt on the accuracy of the apparent improvements reported by other hospitals.

In our exploration of factors that might have contributed to reporting inconsistencies, we could not find any factors that were clearly affecting the apparent decline in hospital performance. We found no effect of any of the hospitals' structural characteristics on performance declines, and effects of turnover in risk manager staff were limited to two measures.

Our analysis of the effects of risk manager turnover was limited by the absence of a definitive measure that captured all of the risk manager turnover that occurred from 2005 to

2009, because we did not include a question on the 2009 survey that specifically asked whether a risk manager also had completed the 2005 survey. We have anecdotal information from our survey data collection staff that as many as half of the risk managers that responded to the 2009 survey may have been new since we conducted the 2005 survey.

We know from previous work that hospitals are in the relatively early stages of implementing patient safety practices in general, including adverse event reporting practices, which are likely to involve both successes and failures (Farley et al., 2009). For example, the decommissioning of poorly performing health information systems could result in a shift of a hospital's reporting system from a computerized to paper-based system. Changes in hospital leadership or risk management staff also may have brought with them a change in priorities away from some patient safety activities. In addition, concerns about lack of protection from legal discovery, and related liability exposure, could lead a new manager to move away from reporting activities. Given this context, some of the apparent declines in performance on the measures used in these surveys may be real.

We believe, however, that some of the observed declines in performance may be related to differences in perspectives by new risk managers regarding the reporting practices at their hospitals, or differences in interpretation of the survey questions. Either factor could lead to differences in how they completed the survey, compared to their predecessors. It was found in the field testing of the original survey that the risk managers were the best positioned personnel in the hospital to provide valid information (Ginsberg et al., 2003), but we also knew that they would be using some judgment in responding to the survey questions.

Given that AHRQ is using this survey to track effects of the PSO program on hospitals' event reporting practices over time, it will be important to ensure that the survey responses are as accurate and consistent over time as possible. Therefore, there is a need to examine further this issue of survey response consistency, before proceeding with another survey. We suggest that a study be performed using case study methods, to explore the reasons for the apparent declines in performance on the reporting process measures. This information can only be obtained by talking with the risk managers and other management staff at some of the hospitals in the sample whose risk managers changed between 2005 and 2009. This study should assess how much of the apparent declines in reporting process performance was real, as opposed to being differences in staff definitions or perceptions of those processes. The study results would guide revisions to the questionnaire for future surveys, to increase the accuracy and consistency of the survey data collected.

Chapter 5
Use of the AHRQ Patient Safety Tools by U.S. Hospitals, 2009

In this chapter, we present the results of the 2009 Hospital Adverse Event Reporting System (AERS) survey with respect to the extent that U.S. hospitals have been making use of the various patient safety tools developed by AHRQ. Since the inception of AHRQ's patient safety initiative, the agency has developed a wide array of tools that hospitals (and other providers) can use to support their patient safety improvement activities. AHRQ has been actively disseminating these tools over the past few years. AHRQ can use the information from this survey to guide its future tool development and dissemination activities.

The survey contained a set of questions that asked if a hospital had used each of a list of patient safety tools developed by AHRQ (with yes/no responses). The tools addressed consisted of 10 tools organized into three groups, as well as the toolkits developed by the Partnerships in Improving Patient Safety projects funded by AHRQ. The three groups of tools were general patient safety products, publications and materials, and AHRQ patient safety Web sites.

We estimated use rates for each individual tool, and we also calculated a composite use rate for each of the three tool groups. To do so, we created a yes/no variable for each group, in which a hospital was coded as "yes" if it reported using at least one type of tool in that group (and coded as "no" otherwise).

AVERAGE HOSPITAL USE OF AHRQ TOOLS

The estimated overall percentages of hospitals that have used the AHRQ tools, along with the confidence intervals for these estimates, are presented in Table 5.1. More than half of the hospitals in the country are estimated to have used at least one tool in each group: 52.3 percent used a general patient safety product, 66.5 percent used a publication or material, and 51.6 percent used an AHRQ patient safety Web site.

The reported use rates of individual tools within each tool group varied widely. For example, within the general patient safety product group, an estimated 41.9 percent of hospitals used Hospital SOPS (HSOPS), whereas only 3.1 percent used the Patient Safety Improvement Corps (PSIC) DVD. The three individual tools that had the highest rates of use were patient brochures or pamphlets (49.8 percent), Hospital SOPS (41.9 percent), and the patient safety organization Web site (40.3 percent).

Using data from responses to two questions on the survey, we also were able to assess the extent to which hospitals that had conducted patient safety culture surveys had used the Hospital SOPS developed by AHRQ. An estimated 81.5 percent of hospitals reported having fielded a patient safety culture survey. As shown in Table 5.2, an estimated 53.7 percent of the hospitals that had administered a survey reported that they had used HSOPS.

Table 5.1 Percentage of Hospitals Reporting Use of AHRQ Patient Safety Tools, 2009

AHRQ Product	Percentage Yes Responses	95% Confidence Interval	Percentage Missing
General patient safety products	52.3%	49.0 – 55.5	3.1
Hospital SOPS	41.9	38.7 – 45.1	5.7
TeamSTEPPS	19.2	16.6 – 21.7	4.0
Patient Safety Improvement Corps DVD	3.1	2.0 – 4.2	4.7
Publications and Materials	66.5	63.4 – 69.5	4.0
Evidence report	30.9	27.9 – 33.9	7.1
AHRQ fact sheets for providers	32.1	29.1 – 35.2	6.7
AHRQ fact sheets for patients	19.4	16.8 – 22.0	7.7
Patient brochures or pamphlets	49.8	46.5 – 53.1	6.1
AHRQ patient safety Web sites	51.6	48.4 – 54.8	4.3
PSNet	30.2	27.3 – 33.2	5.8
WebM&M	15.7	13.4 – 18.0	6.0
Patient safety organization site	40.3	37.2 – 43.5	6.0
Toolkits developed by PIPS projects *	17.6	15.1 – 20.1	8.1

Note: Total number of responding hospitals = 952. All percentages are weighted averages.
* PIPS = Partnerships in Improving Patient Safety

Table 5.2 For Hospitals That Conducted Patient Safety Culture Surveys, the Percentage That Used the AHRQ Hospital Patient Safety Survey (HSOPS), 2009 *

For Hospitals that Conducted a Survey	Number of Hospitals	Percentage of Hospitals **	95% Confidence Interval for Percentage
Used AHRQ HSOPS	378	53.7	50.0 – 57.4
Did not use AHRQ HSOPS	324	46.3	42.6 – 50.0

* 81.5 percent of the hospitals reported they conducted patient safety culture surveys.
** All percentages are weighted averages. Missing = 61 of 763 (8.0 percent)

VARIATIONS IN TOOL USE BY HOSPITAL CHARACTERISTICS

In Table 5.3 through Table 5.5, estimated use rates of the AHRQ tools by hospitals are presented by hospital characteristics. The characteristics examined are bed size, ownership status, accreditation status, teaching status, and status as a Critical Access Hospital (CAH).

As shown in Table 5.3, differences in *use rates of the AHRQ patient safety products* by hospital characteristics vary across the individual tools, and the strongest differences are for HSOPS, with either weak or no differences found for either TeamSTEPPS or PSIC DVD. In particular, 46.1 percent of hospitals with Joint Commission accreditation have used HSOPS, while only 31.2 percent of non-accredited hospitals have used it. HSOPS use rates also differ by teaching status, in which an estimated 50.1 percent of teaching hospitals having used HSOPS but only 39.5 percent of non-teaching hospitals have used it. In addition, a lower percentage of critical access hospitals (CAH) have used HSOPS than non-CAHs; 32.3 percent as compared with 44.2 percent.

The hospital characteristics that appeared to be most strongly associated with differences in use rates of the patient safety products are accreditation status, teaching status, and CAH status. No use rate variations were found for bed size, and relationships between tool use and ownership status were weak.

Table 5.3 Use of AHRQ Patient Safety Products by Hospital Characteristics, 2009

	Percentage Using AHRQ Patient Safety Products			
	Composite	HSOPS	TeamSTEPPS	PSIC DVD
Hospital bed size				
0-74 beds	51.1	39.4	19.0	4.1
75-199 beds	52.4	44.2	19.4	1.8
200 or more beds	54.1	43.8	19.1	2.8
Hospital ownership status				
Government	46.3 *	35.2 *	15.0 *	3.8
Not-for-profit	56.2 *	45.9 *	22.0 *	2.5
For-profit	48.5 *	39.2 *	16.3 *	3.8
Hospital accreditation status				
Accredited	55.4 **	46.1 ***	19.1	2.3 *
Not accredited	44.5 **	31.2 ***	19.3	5.0 *
Teaching status				
Teaching hospital	60.7 **	50.1 **	22.7	4.5
Non-teaching	49.7 **	39.5 **	18.1	2.7
Critical Access Hospital				
CAH	47.6	32.3 **	20.9	4.3
Non-CAH	53.4	44.2 **	18.7	2.8

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ (Chi-square tests)

Differences in *use rates of the AHRQ patient safety publications* by hospital characteristics also varied across the individual tools, as shown in Table 5.4, but the patterns of variation differed from that of the patient safety products. The strongest differences in use rates were for the evidence report and the provider fact sheets, with either weak or no differences found for either patient fact sheets or patient brochures. For the evidence report, significant use rate differences were found for all the hospital characteristics. For the provider fact sheets, differences were found for bed size, ownership status, and accreditation status, and weaker differences for teaching status or CAH status. Looking at relationships from the perspective of the hospital characteristics, bed size, ownership status, and accreditation appeared to be most strongly associated with differences in use rates for patient safety publications, with teaching status and CAH status having strong associations only with use rates of the evidence report.

Table 5.4 Use of AHRQ Patient Safety Publications by Hospital Characteristics, 2009

	Percentage Using AHRQ Patient Safety Publications				
	Composite	Evidence Report	Provider Fact Sheets	Patient Fact Sheets	Patient Brochures
Hospital bed size					
0-74 beds	62.6	24.5 ***	26.9 **	16.4	47.4
75-199 beds	69.0	31.1 ***	35.8 **	22.0	53.0
200 or more beds	70.4	42.6 ***	37.5 **	21.8	50.3
Hospital ownership status					
Government	58.4 **	27.4 **	24.5 ***	16.4	44.9
Not-for-profit	70.8 **	35.6 **	37.7 ***	21.7	51.7
For-profit	64.3 **	21.9 **	25.8 ***	16.8	50.5
Hospital accreditation status					
Accredited	69.0 **	33.4 **	35.9 ***	21.8 **	52.3 *
Not accredited	60.1 **	24.5 **	22.7 ***	13.6 **	43.6 *
Teaching status					
Teaching hospital	73.5 *	42.3 ***	39.0 *	22.3	52.3
Non-teaching	64.4 *	27.5 ***	30.2 *	18.6	49.1
Critical Access Hospital					
CAH	59.8 *	22.6 **	24.6 *	15.5	44.8
Non-CAH	68.1 *	32.9 **	34.0 *	20.4	51.0

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ (Chi-square tests)

As shown in Table 5.5, differences in *use rates of the AHRQ patient safety Web sites* by hospital characteristics were found for all the individual tools in this group, but no significant differences were found for *use rates of the toolkits developed by the PIPS projects*. Hospital bed size and ownership status appeared to be most strongly associated with differences in use rates for all the Web sites—PSNet, WebM&M, and the Patient Safety Organization Web site. Although significant differences in tool use rates also were found by accreditation status, teaching status, and CAH status, these relationships varied by the individual tool. In particular, relationships were weakest between these three hospital characteristics and use of the WebM&M.

Table 5.5 Use of AHRQ Patient Safety Web Sites and PIPS Toolkits by Hospital Characteristics, 2009

	Percentage Using AHRQ Patient Safety Web Sites				Percentage
	Composite	PSNet	WebM&M	Pt Safety Organization	Using PIPS Toolkits
Hospital bed size					
0-74 beds	42.2 ***	22.8 ***	13.6 ***	31.9 ***	16.0
75-199 beds	55.5 ***	27.7 ***	10.6 ***	46.1 ***	17.6
200 or more beds	64.3 ***	47.4 ***	26.1 ***	48.8 ***	20.7
Hospital ownership status					
Government	40.9 ***	24.8 ***	10.6 ***	31.5 ***	12.4
Not-for-profit	59.8 ***	35.4 ***	21.0 ***	47.1 ***	19.2
For-profit	41.6 ***	22.4 ***	7.2 ***	31.8 ***	19.5
Hospital accreditation status					
Accredited	55.3 ***	33.1 **	17.3 *	43.7 ***	19.2
Not accredited	42.4 ***	22.9 **	11.7 *	31.8 ***	13.8
Teaching status					
Teaching hospital	63.5 ***	45.9 ***	22.7 **	49.8 **	20.6
Non-teaching	48.1 ***	25.6 ***	13.6 **	37.6 **	16.7
Critical Access Hospital					
CAH	36.7 ***	18.1 ***	11.5	28.3 ***	14.9
Non-CAH	55.2 ***	33.1 ***	16.7	43.1 ***	18.3

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ (Chi-square tests)

VARIATIONS IN TOOL USE BY PATIENT SAFETY PROGRAM STATUS

Another factor that is hypothesized to be correlated with hospital use of the AHRQ patient safety tools is the existence of a comprehensive patient safety program in the hospital. Several questions were included in the survey to gather information on the presence and strength of hospitals' patient safety programs. As described in Chapter 3, these questions were developed based on the specifications for a comprehensive patient safety program that were delineated in the Safe Practices report approved in 2006 by the National Quality Forum (NQF) (NQF, 2006).

Two general components of a hospital patient safety program were addressed by the survey questions: administrative aspects of the program and the involvement of the hospital governing board in overseeing patient safety activities. Within the administrative component were items on having an organized patient safety program in place, having one person designated as a patient safety officer, and having administered a patient safety culture survey. Within the governing board component were items on whether hospital governing boards reviewed each of five aspects of patient safety performance and if safety reports were included on the agenda of all meetings of the board or a standing committee.

Three composites were calculated that were used in the analysis of factors influencing use of AHRQ products and tools. These were a composite for the administrative aspects of a patient safety program, the governing board involvement, and an overall composite across all the safety program items. For each hospital, an overall percentage was calculated for each composite, which was measured as the number of items in the component to which the hospital

responded "yes", divided by the number of items in the component to which the hospital responded (i.e., that had non-missing data). The higher the percentage of yes responses for a composite, the stronger was a hospital's patient safety program.

The estimated relationships between each of the three patient safety composite scores and hospital use of the AHRQ patient safety tools are presented in Table 5.6. The odds ratios of tool use were estimated using a series of logistic regressions in which use of each tool (or tool category) was the dependent variable and percentage of "yes" responses for a safety program component was the independent variable. With the exception of only two tools, we found that hospitals with stronger patient safety programs tended to have significantly higher use rates of the AHRQ tools, and many of these relationships were quite strong. In general, the combined safety program/board composite had a stronger relationship with tool use than did either of the separate safety program or board involvement composites (an exception being use of HSOPS, for which the safety program composite had the strongest relationship).

Table 5.6 Relationships Between Having a Patient Safety Program and Hospitals' Use of AHRQ Tools, 2009

	Adjusted Odds Ratio for Tool Use +		
	Safety Program Composite	Board Involvement Composite	Program & Board Composite
At least one general patient safety product	1.26 ***	1.10 ***	1.23 ***
Hospital SOPS	1.38 ***	1.10 ***	1.27 ***
TeamSTEPPS	1.07	1.14**	1.17 **
Patient Safety Improvement Corps DVD	0.97	1.14	1.10
Publications and Materials	1.10 ***	1.11 ***	1.16 ***
Evidence report	1.16 ***	1.15 ***	1.24 ***
AHRQ fact sheets for providers	1.05	1.15 ***	1.18 ***
AHRQ fact sheets for patients	1.07	1.18 ***	1.22 ***
Patient brochures or pamphlets	1.09 **	1.11 ***	1.16 ***
AHRQ patient safety Web sites	1.15 ***	1.15 ***	1.23 ***
PSNet	1.10 **	1.17 ***	1.22 ***
WebM&M	1.04	1.06	1.08
Patient safety organization site	1.18 ***	1.17 ***	1.27 ***
Toolkits developed by PIPS projects ++	1.14 **	1.19 ***	1.28 ***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

+ Odds ratio for change in tool use associated with a 10 percent change in the strength of patient safety program

++ PIPS = Partnerships in Improving Patient Safety

The two tools for which no significant relationships with safety program strength were found were the Patient Safety Improvement Corps DVD and the WebM&M Web Site. The odds ratios for these tools were not significant for any of the three patient safety program composites. In addition, non-significant odds ratios were found for the effect of the patient safety composite on hospital use of TeamSTEPPS, AHRQ fact sheets for providers, and AHRQ fact sheets for

patients. Odds ratios for use of these three tools were significant, however, for the safety program composites for board involvement and combined program/board involvement.

MULTIVARIATE ANALYSIS OF AHRQ TOOL USE RATES

To test the independent effects of each hospital characteristic on hospitals' use of the AHRQ patient safety tools, controlling for effects of other characteristics, we estimated a series of logistic regression models in which tool use for a category of AHRQ tools was the dependent variable and the array of hospital characteristics were the independent variables. We calculated the odds ratios for effects of the characteristics on use of each tool category.

The results of these logistic regressions, which are reported in Table 5.7, show that the presence of an organized and comprehensive patient safety program in a hospital is the dominant factor related to use of the AHRQ patient safety tools. The odds ratios for the patient safety program composite are large and strongly significant for all four tool categories, with the largest effects on Toolkits by PIPs and the smallest effects on Patient Safety Publications. Of the other hospital characteristics, only ownership status had consistent significant effects, which were strongest for use of the patient safety Web sites, with both the government-owned and for-profit hospitals having lower use than not-for-profit hospitals. After controlling for the strength of hospitals patient safety program and ownership status only two other characteristics had any significant independent effect: lower use of patient safety Web sites for hospitals with small bed size, and higher use of patient safety products for teaching hospitals.

Table 5.7 Logistic Regression Results for Relationships Between Hospitals' Use of AHRQ Tools, Hospital Characteristics, and Patient Safety Program Status, 2009

	Adjusted Odds Ratio for Tool Use [+]			
	Patient Safety Products	Patient Safety Publications	Patient Safety Web Sites	Toolkits by PIPS Projects [++]
Hospital bed size				
0-74 beds (vs 200+ beds)	1.50	1.02	0.62 *	0.90
75-199 beds (vs 200+ beds)	1.17	1.10	0.84	0.85
Hospital ownership status				
Government (vs not-for-profit)	0.81	0.68 *	0.60 **	0.71
For-profit (vs not-for-profit)	0.65 *	0.70	0.43 ***	0.98
Joint Commission accreditation	1.44	1.09	0.83	1.09
Teaching hospital	1.58 *	1.41	1.35	1.17
Critical Access Hospital	1.09	0.96	0.65	1.21
Comprehensive safety program	7.10 ***	3.70 ***	6.61 ***	10.17 ***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

[+] Odds ratio for change in tool use associated with a 10 percent change in the strength of patient safety program

[++] PIPS = Partnerships in Improving Patient Safety

DISCUSSION

The results of the AERS survey regarding hospital use of the AHRQ patient safety tools indicates that the tools are being used actively in the U.S. hospital community. Although rates of use vary across the specific tools, we estimate that more than half of all hospitals in the U.S. are using at least one tool in each of the three tool categories (patient safety products, publications and materials, and Web sites). Lower use was found, however, for the toolkits developed by the PIPS projects. In addition, we estimated use rates of less than 20 percent for several specific tools: the AHRQ fact sheets for patients (19.4 percent), TeamSTEPPS (19.2 percent), the WebM&M Web site (15.7 percent), and the Patient Safety Improvement Corps DVD (3.1 percent).

This information on hospital use of the AHRQ tools can guide future steps by AHRQ to modify or update tools and to focus tool dissemination strategies. The first step would be for AHRQ to assess estimated levels of use for each of the specific tools, relative to the patient safety priorities it has established, in order to identify which tools should be the focus of additional development or dissemination efforts. Hospitals may not be using some tools because they are not aware that the tools are available, or because the tools are not useful to them. If lack of awareness of a tool is a problem, then AHRQ's strategy would be to pursue more active dissemination of the tool. If lack of usefulness is a problem, then AHRQ may have to invest further development resources for tool modification, including seeking input and guidance from hospitals regarding improvements needed to make it more useful to them.

Another, more indirect, strategy to encourage greater use of the AHRQ patient safety tools by hospitals might be to work actively with hospitals to help them establish organized and comprehensive patient safety programs. The survey results show a strong relationship between having such a safety program and use of AHRQ tools. It is not clear, however, what the nature or direction of causality might be in this relationship. Hospitals may have made a broad commitment to patient safety, through which they both established strong patient safety programs and used the tools available to them, including the AHRQ patient safety tools. On the other hand, hospitals might first have made active use of the AHRQ tools and then developed a strong safety program, or they might have done the reverse, starting with the safety program and then seeking tools. Regardless of the underlying dynamics, encouraging hospitals to take a comprehensive approach to patient safety could enhance their likelihood of making improvements as well as their use of AHRQ tools that are available to help them in these efforts.

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