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A Survey of Hospital Quality Improvement Activities

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Five years after the Institute of Medicine (IOM) called for a redesigned U.S. health care system, relatively little was known about the extent to which hospitals had undertaken quality improvement (QI) efforts to address deficiencies in patient care. To examine the state of hospital QI activities in 2006, the authors designed and conducted a survey of short-term, general hospitals with 25 or more beds. In a sample of 470 hospitals, they found that many were actively engaged in improvement efforts but that these activities varied in method and impact. Hospitals with high levels of perceived quality, as

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reflected in assessments by their quality managers, were more likely to have embraced QI as a strategic priority, employed quality practices and processes consistent with IOM aims, fostered staff training and involvement in QI methods, engaged in an array of QI activities and clinical QI strategies, and maintained staffing levels favoring fewer patients per nurse.

Keywords: *quality of care; quality improvement; hospitals*

The quality of health care in the United States has been the subject of intense debate in recent years, with deficiencies in patient care well recognized and documented (Institute of Medicine [IOM], 2000, 2001; McGlynn et al., 2003; Ross et al., 2007). In its twin landmark reports, *To Err is Human* and *Crossing the Quality Chasm*, the IOM (2000, 2001) called for a redesigned U.S. health care system that could deliver safe, effective, efficient, timely, patient-centered, and equitable health care to all Americans. Numerous public and private organizations responded to this call by developing and supporting broad-based quality improvement (QI) and patient safety initiatives aimed at improving patient care, particularly within hospitals (Galvin & Milstein, 2002; Heget, Bagian, Lee, & Gosbee, 2002; Kizer, 2001; National Quality Forum, 2002, 2003). To measure improvements in hospital care, a consortium of organizations, led by the Centers for Medicare and Medicaid Services (CMS), the Joint Commission, and the American Hospital Association (AHA), initiated the Hospital Quality Alliance (HQA) to develop and maintain a national public database containing condition-specific measures of hospital performance to serve as indicators of hospital care quality (Jha, Li, Orav, & Epstein, 2005). The Agency for Healthcare Research and Quality (AHRQ) also began to release annual National Healthcare Quality Reports and launched an effort to develop reliable patient safety indicators (Jha et al., 2005; Leape & Berwick, 2005). Yet, despite this dramatic increase in attention and activity devoted to QI and patient safety, progress toward a redesigned system 5 years after the release of the first IOM report appeared slow and insufficient (Leape & Berwick, 2005; Wachter, 2004).

In addition, relatively little was known about the extent to which hospitals were engaging in QI activities and pursuing structural and process changes in order to become high-performing systems of care. Therefore, we undertook a comprehensive, survey-based study to shed light on these and other questions regarding the state of QI activities in American hospitals during 2006.

Research Questions and Hypotheses

This is the first of several papers to emerge from the study, whose broad aim was to examine the nature and extent of hospital QI activities in relation to several measures of hospital performance, including HQA performance measures, and

assessments of hospital quality by clinicians and quality managers. In this article, we focus on two principal research questions:

(a) What is the current state of hospital QI activities?
(b) What is the relationship between QI activities and quality managers' assessments of quality?

To address the first question, we performed a descriptive analysis of QI activities and methods used by hospitals that responded to our survey. To address the second, we analyzed the relationships between quality managers' assessments of quality of care in their institutions and various aspects of their hospitals' QI efforts. Specifically, we examined hypotheses that hospitals with higher levels of perceived quality were more likely than hospitals with lower perceived quality to exhibit:

- strong organizational commitment to QI;
- high numbers of quality practices and processes consistent with IOM aims;
- high levels of staff training in QI methods and involvement in QI activities;
- wide use of QI activities and clinical QI strategies and approaches; and
- nurse staffing levels that favor fewer patients per nurse.

New Contribution

To our knowledge, no other study in recent years has attempted to examine, on a national basis, the extent to which hospitals have embraced QI principles and methods. In a review of the literature covering 1995-2006, we identified only one study with a similar aim. Weiner et al. (2006) published findings from a 1997 mailed survey in which they analyzed the association between the scope of QI implementation and hospital performance on selected condition-specific quality indicators, such as inpatient mortality rates for acute myocardial infarction (AMI), congestive heart failure (CHF), coronary artery bypass graft surgery (CABG), pneumonia, and stroke in 1,784 community hospitals. This study, however, predated the IOM reports and the subsequent increase in activity, and examined much more limited measures of QI activity than those considered in our study. Thus, the survey findings reported here are unique in both scope and currency.

Our study attempted to obtain an overview of hospital QI activities in 2006 and to assess the views of hospital quality managers and frontline clinicians. Toward that end, we developed two survey instruments—the Quality Improvement Activities Survey (QAS) and the Clinicians' Perceptions of Quality Survey (CPS). In this article, we report findings from the QAS, with particular attention to the nature and extent of QI activities, approaches, and methods undertaken by hospitals.

Method

Survey content. The QAS was intended for completion by each hospital's chief quality officer (CQO) or designated lead quality manager. The instrument was designed to gather information about the nature and extent of QI activities undertaken and their impact on hospital quality of care. Although it contained mostly new and unique items, the questionnaire also included some questions adapted from established surveys (Leapfrog Group, 2005; Shortell, 1995) as well as questions regarding QI activities endorsed by the Institute for Healthcare Improvement (IHI) in its 100,000 Lives Campaign. Several questions also were adapted from the first-wave survey instrument developed by members of our team, in collaboration with colleagues from Boston University and the VA Boston Healthcare System, for an evaluation of the Robert Wood Johnson Foundation's Pursuing Perfection Program. The final questionnaire was derived based on pilot testing in a small sample of hospital CQOs and on feedback from experienced health services researchers with expertise in survey research. The final instrument contained 173 questions and took approximately 45 min to complete. The study design, instruments, and informed consent procedures were approved by the institutional review boards of Boston University and the Health Research & Educational Trust (HRET).

For most questions in the QAS, we employed a 5-point scale that asked respondents to indicate their agreement with statements about the hospital and/or its practices. Response categories ranged from *strongly disagree* to *strongly agree*.

Sample design. The sampling frame for the survey included all short-term, nonfederal, general service hospitals in the United States that had at least 25 beds according to the 2004 AHA Annual Survey of Hospitals. Pediatric, psychiatric, rehabilitative, orthopedic, and chronic disease hospitals were excluded from the sample. Initially, we drew a random sample of 2,500 hospitals—stratified by bed-size categories (small = 25-99 beds, medium = 100-399 beds, and large = 400 or more beds) and census region (Midwest, Northeast, South, and West)—from the universe of 4,237 hospitals.

Hospital recruitment and survey administration. Hospital recruitment letters from the presidents of AHA and HRET were sent to each hospital CEO in the sample, inviting the institution to participate in the study and requesting that the QAS instrument be completed by the CQO or other appropriate senior officer charged with lead responsibility for hospital-wide quality management. The letters also asked the CEO to designate appropriate senior managers to oversee the distribution of CPS questionnaires to frontline physicians and nurses (see the appendix for a detailed description of survey administration procedures). Survey respondents were given the option of completing the questionnaire either electronically via a secure Internet connection or in hard-copy form via the mail.

Throughout the data collection period (April-October 2006), intensive follow-up was employed, including e-mail reminders (with copies to hospital CEOs) to nonresponding CQOs, additional mailings of the questionnaire, and telephone callbacks. Midway through the collection period, we had received responses to the QAS from 345 hospitals. At that point, we decided to invite the remaining 1,737 hospitals to participate in the survey (see the appendix for a discussion of the complexities of hospital recruitment). In the end, we received completed questionnaires from 477 hospitals. We excluded 7 from the analysis—4 that did not meet study criteria (2 long-term-care facilities, 1 federal hospital, and 1 hospital with fewer than 25 beds) and 3 that had insufficient numbers of completed items.

Database construction. For each hospital in the sample, we merged the QAS data with corresponding data from the 2005 AHA Annual Survey of Hospitals. Medicare disproportionate-share hospital status was obtained from the 2005 CMS Prospective Payment System Impact File. All personal identifiers were removed from the database, and randomly generated identification numbers were assigned to individual hospitals so that all analyses were investigator-blind.

Final sample. The final QAS sample contained 470 hospitals, representing 11% of the population from which they were drawn. The length and complexity of the questionnaire likely contributed to the lower-than-desired response rate. As seen in Table 1, sample hospitals were fairly similar to the population of hospitals (2005 AHA annual survey, N = 4,222) along a number of dimensions. The main differences were the higher percentages of large hospitals and teaching hospitals and the smaller percentages of nonmetropolitan hospitals and for-profit hospitals in our sample. Because of concerns about the overrepresentation of large hospitals (a characteristic correlated with teaching status) and the underrepresentation of small hospitals (a characteristic correlated with nonmetropolitan location and for-profit ownership status), we calculated sampling weights to obtain a distribution similar to the population in terms of bed size and census region (the variables initially used in defining sampling strata). The weighted sample was similar to the population in terms of network and system affiliations, Medicare disproportionate-share hospital designation, and metropolitan county location but still contained a somewhat higher percentage of teaching hospitals (9.1% vs. 6.5% in the population) and a much lower percentage of for-profit institutions (5.1% vs. 15.7% in the population). We conducted all analyses using both weighted and unweighted samples. There were no notable differences in the results. Therefore, all analyses presented in this article were performed using unweighted sample data.

We also compared the characteristics of the 345 hospitals drawn from the initial sampling frame of 2,500 hospitals with those of the 125 hospitals drawn from the remaining 1,737 hospitals in the expanded sample and found no significant differences between these two respondent groups in either the unweighted or weighted samples.

Table 1
Sample and Population Characteristics

Hospital Characteristic	Category	Unweighted Sample (n = 470) n(%)	Population (N = 4,222) n(%)
Bed size	25-99 beds	145(30.9)	1,810(42.9)
	100-399 beds	237(50.4)	2,000(47.4)
	400 or more beds	88(18.7)	412(9.7)
Region	Midwest	161(34.3)	1,223(28.9)
	Northeast	87(18.5)	593(14.1)
	South	160(34.0)	1,638(38.8)
	West	62(13.2)	768(18.2)
Ownership	For-profit	21(4.5)	662(15.7)
	Government, nonfederal	96(20.4)	951(22.5)
	Nonprofit	353(75.1)	2,609(61.8)
Teaching status[a]	Yes	67(14.3)	275(6.5)
	No	403(85.7)	3,947(93.5)
Network affiliation	Yes	164(34.9)	1,278(30.3)
	No	261(55.5)	2,187(51.8)
	Missing values	45(9.6)	757(17.9)
System affiliation	Yes	214(45.5)	1,900(45.0)
	No	253(53.8)	2,322(55.0)
	Missing values	3(0.6)	
Medicare DSH[b]	Yes	289(61.5)	2,428(57.5)
	No	116(24.7)	889(21.1)
	Missing values	65(13.8)	905(21.4)
Metropolitan county	Yes	302(64.3)	2,486(58.9)
	No	168(35.7)	1,735(41.1)
	Missing values		1(0)

Source: American Hospital Association Annual Survey, 2005.
a. Member, Council of Teaching Hospitals, Association of American Medical Colleges.
b. Disproportionate share hospital.

Finally, to understand the extent to which responding hospitals may have been in the forefront of commitment to QI, we compared sample hospitals to the population of hospitals in terms of their performance on the HQA process measures for AMI (6 measures), CHF (4 measures) and pneumonia (5 measures). We downloaded performance data for calendar year 2005 from the HQA Web site (http://www.hospitalcompare.hhs.gov) and, as recommended by CMS, we used denominator-based weights to calculate a composite measure of performance for each condition for the 3,275 hospitals of the 4,222 hospitals in the population in which the sum of the denominators was at least 100. We also used denominator-based weights to calculate

an overall composite measure for each hospital across all three conditions and 15 measures, a reasonable approach to constructing a measure of hospital performance even when the individual HQA measures are not highly correlated (Shwartz et al., in press). When the composite performance measures were divided into deciles, the average hospital in the population fell into the fifth decile, while the average hospital in the sample was one decile higher in terms of quality. Similar results were obtained when analyses were conducted separately for each of the three conditions. Thus, while hospitals responding to the survey performed somewhat better on the HQA measures than hospitals in the population, the differences were not large.

However, their higher performance levels on these measures suggested that they may be in the vanguard of QI efforts (i.e., more likely to have embraced QI aims and to have engaged more extensively in QI activities) than nonparticipating hospitals. To the extent that this is true, survey findings from sample hospitals may offer lessons for other, perhaps less engaged institutions to consider. Also, because the observed levels of activity and performance in sample hospitals still fell well below targets set by the IOM and other QI proponents, our results indicate that there is substantial room for improvement, even in leading organizations.

Statistical analysis. We used descriptive statistics (percentages, means, medians, and percentile ranges) to examine the responses to each QAS question. For some questions, we used *t* tests to examine the statistical significance of differences in means, and for others, we used chi-square tests to examine differences in percentages. For chi-square tests, we combined the top two response categories (*strongly agree* and *agree*) and the bottom three categories (*neither agree nor disagree*, *disagree*, and *strongly disagree*) for each question and compared them to five questions relating to quality managers' assessments of hospital patient care quality. For each of the five questions—"patient care today versus what it should be," "patient care today versus 3 years ago," "comfort in having a family member treated without being present to monitor the care," "the hospital's QI focus has resulted in major performance gains," and "patient satisfaction is where it should be"—we also combined the top two categories and the bottom three categories when performing chi-square tests. We interpreted *p* values of less than .05 as indicating statistically significant differences. Survey data were analyzed using SPSS version 15.0.

Results

Hospital Quality Managers and Their Roles

Hospital quality managers reported having roles and responsibilities that extended well beyond the traditional focus on quality assurance, reflecting a broad definition of quality management. While only 5 respondents (1%) cited QI as their sole area of responsibility, the remaining 458 reported having responsibilities that encompassed

several other areas. Their responsibilities most often included—in addition to QI—performance measurement (93%) or patient safety (83%); at least half of them reported holding responsibility for risk management (56%), infection control (55%), or patient satisfaction measurement (50%) in addition to QI. Eighty-five percent of respondents reported having responsibility for QI *plus two* of the following areas—patient safety, patient satisfaction measurement, and performance measurement—while 42% claimed a scope of responsibility that included *all four* of these areas.

Most respondents (80%) reported long affiliations with their hospitals, with 55% having worked there more than 10 years and 25% reporting tenures between 3 and 10 years. A clear majority (63%) also reported having served as quality manager for more than 3 years, with 25% having served for more than 10 years.

Quality Managers' Assessments of Hospital Quality and QI Activity Impact

Assessments of patient care quality. When asked to rate patient care today at their hospitals compared with what they thought it should be, using a 5-point scale ranging from *well below expectations* to *well above expectations* (see Table 2), 36% of quality managers said that patient care was either above or well above their expectations. When asked to rate patient care today compared with 3 years ago, using a 5-point scale ranging from *much worse* to *much better*, 87% said that it was better or much better. While 68% of quality managers agreed or strongly agreed that they would feel comfortable having a family member treated at the hospital without being present to monitor the care, only 28% agreed or strongly agreed that patient satisfaction was at the level where it should be.

Assessments of QI activity impact. Quality managers perceived QI activities as having produced positive impacts in their hospitals:

- 97% reported a positive or very positive impact on patient care outcomes;
- 86% and 82% cited positive or very positive impacts on staff member skills and on patient satisfaction, respectively;
- 70% to 78% reported positive or very positive impacts on productivity, hospital length of stay, staff motivation to be involved in QI efforts, and hospital–physician relations; and
- 68% and 66% cited positive or very positive impacts on physician–nurse relations and on employee empowerment, respectively.

In contrast, fewer than half of quality managers reported positive or very positive impacts on hospital–insurer relations, inpatient volume, and the hospital's ability to recruit and retain physicians.

Table 2
Quality Managers' Assessments of Hospital Quality

Question	*n*	Well Below Expectations *n*(%)	Below Expectations *n*(%)	Meets Expectations *n*(%)	Above Expectations *n*(%)	Well Above Expectations *n*(%)
Patient care today compared with what it should be	460	0(0)	85(19)	207(45)	149(32)	19(4)
		Much Worse *n*(%)	Worse *n*(%)	About the Same *n*(%)	Better *n*(%)	Much Better *n*(%)
Patient care today compared with 3 years ago	430[a]	1(0.2)	13(3)	43(10)	206(48)	167(39)
		Strongly Disagree *n*(%)	Disagree *n*(%)	Neither Agree nor Disagree *n*(%)	Agree *n*(%)	Strongly Agree *n*(%)
Comfortable having a family member treated without being present	461	13(3)	63(14)	67(15)	197(42)	121(26)
Hospital focus on improving patient care has resulted in major performance gains	459	4(1)	21(5)	63(14)	247(54)	124(26)
Patient satisfaction is where it should be	461	33(7)	200(43)	99(22)	110(24)	19(4)

a. Based on 430 respondents. Thirty-one respondents reported that they were not at their current hospital 3 years ago.

When asked to estimate the impact of QI activities on the hospital's annual operating expenses in 2005, quality managers estimated a median 5% reduction in annual expenses (25th percentile = 1%; 75th percentile = 10%). When asked to estimate the impact of QI activities on the hospital's margin, one third responded that they did not know. Of the 67% who offered estimates, two thirds thought that the effect had been positive, while one third perceived a neutral or negative effect.

Scope and Nature of QI Activities in Hospitals

Hospital commitment to QI. Hospitals reported a high level of commitment to QI as an organizational goal, with 93% claiming that QI was explicitly stated as a priority in their strategic and/or business plans, 96% stating that they had a quality council or other high-level management committee whose primary purpose was to oversee and coordinate QI activities, and 72% indicating that a standing committee or subcommittee of the board of trustees was charged with monitoring and improving patient care quality. Hospitals reported having made institutional commitments to QI generally 6 to 10 years prior to the survey. For a high-level quality management committee, the median response was 10 years (25th percentile = 5 years; 75th percentile = 13 years); for a standing committee of the board charged with QI oversight, the median also was 10 years (25th percentile = 5 years; 75th percentile = 12 years); but for making QI a strategic priority of the hospital, the median was considerably more recent—6 years (25th percentile = 3 years; 75th percentile = 10 years).

Hospitals whose quality managers had rated patient care today as much better or better than 3 years ago were significantly more likely to have strategic plans in which QI was a stated priority than hospitals whose quality managers had rated patient care as the same or worse than 3 years ago (88% vs. 67%, $p < .001$). Hospitals whose quality managers had reported major performance gains resulting from their QI focus also were significantly more likely to make QI a strategic priority than hospitals whose quality managers had not perceived such gains (82% vs. 57%, $p < .001$).

Quality practices and processes in the hospital. As shown in Table 3, quality managers either agreed or strongly agreed that in their hospitals "progress toward achieving hospital-wide QI goals is tracked and communicated to clinical staff" (95%); "people and processes are in place to identify, analyze, and act upon all adverse events to prevent future occurrences" (94%); "QI project results are regularly communicated to clinical staff" (88%); and "corrective action is taken if progress toward achieving hospital-wide QI goals is not adequate" (87%). In contrast, only 34% of quality managers either agreed or strongly agreed with the statement that "the hospital regularly communicates achievement of hospital-wide QI goals to the general public."

Table 3
Hospital Quality Practices and Processes

Quality Improvement (QI) Practice/Process	*n*	Agree or Strongly Agree *n*(%)	Disagree or Strongly Disagree *n*(%)
Progress toward achieving hospital-wide quality goals is tracked and communicated to clinical staff.	467	445(95)	6(1)
People and processes are in place to identify, analyze, and act upon all adverse events to prevent future occurrences.	467	440(94)	4(1)
QI project results are regularly communicated to clinical staff.	469	415(88)	16(3)
Corrective action is taken if progress toward achieving hospital-wide quality goals is not adequate.	469	407(87)	26(6)
People and processes are in place to identify, analyze, and act upon near misses to prevent future occurrences.	468	401(86)	29(6)
Patient care processes are standardized, where and when appropriate.	469	375(80)	38(8)
There is little coordination of QI efforts across departments and workgroups.[a]	466	369(79)[b]	50(11)
The hospital's structure and work processes impede coordination across departments and workgroups.[a]	468	303(65)[b]	74(16)
Clinicians involve patients and families in efforts to improve patient care.	468	303(65)	46(10)
Senior managers regularly celebrate successful QI projects and give recognition to project team members.	469	279(60)	91(19)
The hospital regularly communicates achievement of hospital-wide quality goals to the general public.	468	159(34)	183(39)

a. Question was reverse coded.
b. Most quality managers responded either "disagree" or "strongly disagree."

Hospitals with high ratings on the "performance gains from QI focus" question were significantly more likely than hospitals with lower ratings to employ 10 of 11 quality practices and processes listed in Table 3. Differences ranged from 65% versus 39% for the "senior managers celebrate successful QI projects" practice ($p < .001$) to 91% versus 81% for the "QI project results are regularly communicated to staff" practice ($p < .01$). The "clinicians involve patients and families in efforts to improve patient care" practice was the only practice *not* significantly associated with *any* of the quality manager assessment questions.

Staff involvement and training in QI. Quality managers reported that physicians were less likely to be involved in QI activities and projects than managers or nurses, with fewer than half actively involved compared to more than 60% of CEOs, senior managers, other managers, and nurses (see Table 4). Quality managers also reported that physicians were less likely to receive formal training in QI (32%) than nurses (45%), other managers (70%), and senior managers (77%), and that both physicians and nurses were less likely than managers to receive performance-based compensation tied to meeting organizational quality goals—approximately 20% versus roughly 50%. Consistent with this, they perceived physicians and nurses to be less likely than managers to use QI principles, methods, and tools in their daily work.

Hospitals with high ratings on the "patient care today versus what it should be" question were significantly more likely than hospitals with low ratings to have staff members in all categories listed in Table 4 actively or very actively involved in QI activities or projects. Differences ranged from 62% versus 38% for physicians ($p < .001$) to 92% versus 83% for middle managers ($p < .01$). Hospitals with high ratings on the "performance gains from QI focus" question were significantly more likely to have higher percentages of middle managers (72% vs. 61%, $p < .01$), nurses (48% vs. 31%, $p < .01$), and physicians (34% vs. 23%, $p < .05$) formally trained in QI methods, and to use performance-based compensation for senior managers (72% vs. 47%, $p < .001$), middle managers (57% vs. 37%, $p < .01$), CEOs (75% vs. 57%, $p < .01$), and nurses (26% vs. 11%, $p < .01$). Hospitals with high ratings on the "family member" question were significantly more likely to have higher percentages of staff members who used QI methods and tools in their daily work; differences ranged from 66% versus 49% for senior managers ($p < .001$) to 36% versus 22% for physicians ($p < .001$).

Quality of care measures and reporting. From Table 5, we see that the measures most commonly reported to hospital boards of trustees include patient satisfaction results (95% of hospitals), QI project results (89%), hospital-acquired infection rates (84%), adverse events (82%), and medication error rates (81%). In general, quality measures are more likely to be reported to senior and department managers than to clinical staff, with even lower likelihood of being reported to other employees. Quality measures that go unmonitored by more than 20% of hospitals include waiting times for outpatient clinic appointments (45%), unplanned intensive care unit (ICU) readmission

Table 4
Staff Involvement, Training and Use of Quality Improvement (QI) Methods, and Compensation Based on Performance

Staff	Involved in QI Activities or Projects: Actively or Very Actively *n*(%)	Received Formal Training in QI: Mean %	Compensation Based in Part on Performance in Meeting Quality Goals: % Yes	Uses QI Principles, Methods and Tools in Daily Work: Mean %
CEO	296(64)	—[a]	53	—[a]
Senior managers	357(77)	77	58	61
Other managers	400(86)	70	49	57
Physicians	217(47)	32	18	32
Nurses	295(64)	45	21	40

a. Survey did not ask about CEO's formal training in QI or daily use of QI methods.

rates (43%), procedure-specific mortality rates (35%), disease-specific mortality rates (30%), and emergency department diversion rates (23%). Forty percent of hospitals indicated that they report 21 to 50 different QI measures to their boards of trustees, with an additional 22% saying that they report more than 50 measures.

QI activities and methods. The QI activities most frequently cited in Table 6 as widely used or used hospital-wide were benchmarking with other hospitals (70%) and benchmarking within the hospital (64%). All other activities listed in Table 6 were reported by at least one quarter of hospitals as being widely used, except for patient advisory groups, which were reported as being widely used in only 5% of hospitals. Hospitals with high ratings on the performance-gains question were significantly more likely to make hospital-wide use of all but two QI activities listed in Table 6 (patient advisory groups and management "walk-arounds" were the exceptions); differences ranged from 43% versus 19% for "patient flow improvement strategies" ($p < .001$) to 35% versus 23% for "learning best practices from other industries" ($p < .05$).

As shown in Table 7, the five most commonly used clinical QI strategies (i.e., used widely in 62% to 81% of hospitals) were related either to the prevention of adverse outcomes (e.g., surgical site infections, adverse drug events, central line infections, and ventilator-associated pneumonia) or to medication reconciliation. Only about half of sample hospitals reported widespread use of standing orders (52%), disease- or condition-specific QI projects (50%), and evidence-based practice

Table 5
Quality of Care Measures and Reporting

Quality Measure	% of Hospitals in Which Measures Are Reported to . . .					% of Hospitals in Which Measure Is Not Monitored
	Board of Trustees	Senior Managers	Department Managers	Clinical Staff	Other Employees	
Patient satisfaction results	95	97	97	90	66	0.9
QI project results	89	97	95	83	50	0.4
Hospital-acquired infection rates	84	92	89	78	33	0.2
Adverse events	82	93	83	63	22	0.7
Medication error rates	81	91	89	74	23	2
Overall hospital risk-adjusted mortality rates	70	77	50	39	15	13
Near-miss events	56	84	75	52	22	6
Unplanned hospital readmission rates	46	71	57	40	16	16
Disease-specific mortality rates	41	59	46	38	12	30
Emergency department diversion rates	40	71	59	36	12	23
Individual physician profiles of quality performance	37	50	11	28	14	17
Waiting times for procedures, tests, and test results	35	68	77	53	19	15
Procedure-specific mortality rates	32	51	38	31	11	35
Unplanned ICU readmission rates	19	38	46	30	5	43
Waiting times for outpatient clinic appointments	19	41	45	29	13	45

Note: ICU = intensive care unit.

Table 6
Quality Improvement (QI) Activities

QI Activity	*n*	Used Widely or Hospital-Wide *n*(%)	Used Moderately *n*(%)	Used Minimally or Not at All
Benchmarking with other hospitals	462	326(70)	105(23)	31(7)
Benchmarking within the hospital	461	297(64)	119(26)	45(10)
Management "walk-arounds" to identify quality problems or issues	463	184(40)	144(31)	135(29)
Patient flow improvement strategies	463	181(39)	187(40)	95(21)
Work process redesign or reengineering	460	154(34)	195(42)	111(24)
Learning best practices from other industries	462	154(32)	162(35)	146(33)
Profiling of individual provider performance	457	137(30)	140(31)	180(39)
QI activities to improve workforce recruitment, retention, and development	462	130(28)	167(36)	165(36)
Patient advisory groups	458	23(5)	86(19)	349(76)

guidelines or clinical pathways (47%). Of the remaining clinical strategies, four were widely used by 20% or fewer hospitals; two involved nurses (shared governance with physicians and the use of advanced practice nurses to coordinate care) while two were related to the treatment of chronically ill patients (chronic disease registries and the Wagner planned care model). In the case of rapid response teams (medical emergency teams that provide critical care at the patient's bedside), 46% of hospitals reported using this method widely or hospital-wide while 40% reported using it minimally or not at all. Except for planned care for chronic illness, all clinical strategies listed in Table 7 were significantly more likely to be used widely in hospitals with high ratings on the performance-gains question; differences ranged from 77% versus 41% for actions to prevent adverse drug events ($p < .001$) to 11% versus 2% for chronic disease registries ($p < .05$).

Seventy percent of hospitals reported making wide use of the plan-do-study-act (PDSA) method. Of these, 80% did so in conjunction with root cause analysis (which is often regarded as a component of PDSA) while only 25% also made wide use of statistical process control (SPC) methods. Overall, other QI methods appear

Table 7
Clinical Quality Improvement (QI) Strategies and Approaches

QI Strategy/ Approach	*n*	Used Widely or Hospital-Wide *n*(%)	Used Moderately *n*(%)	Used Minimally or Not at All *n*(%)
Actions to prevent surgical site infections	461	375(81)	68(15)	18(4)
Actions to prevent adverse drug events	462	322(70)	106(23)	34(7)
Actions to prevent central line infections	460	329(72)	83(18)	48(10)
Actions to prevent ventilator-associated pneumonia	456	330(72)	74(16)	52(12)
Medication reconciliation	461	285(62)	122(26)	54(12)
Standing orders	463	242(52)	154(33)	67(15)
Disease- or condition-specific QI projects	463	231(50)	177(38)	55(12)
Evidence-based practice guidelines/clinical pathways	463	219(47)	170(37)	74(16)
Rapid response teams	461	211(46)	63(14)	187(40)
Multidisciplinary rounds	463	159(34)	121(26)	183(40)
Specific strategies to reduce the number of patients assigned to each nurse	457	142(31)	153(34)	162(35)
Pharmacists placed in patient care units	461	141(31)	84(18)	236(51)
Shared clinical governance by nurses and physicians	460	92(20)	102(22)	266(58)
Use of advanced practice nurses to coordinate or manage patient care	460	65(14)	91(20)	304(66)
Chronic disease registries	454	43(9)	112(25)	299(66)
Planned care for chronic illness (Wagner's chronic disease model)	450	11(2)	59(13)	380(85)

to be used less frequently, with 19% of all hospitals reporting hospital-wide use of SPC, 14% using 90-day improvement cycles, 11% using high-reliability methods, 6% using six sigma methods, and 6% using Toyota lean thinking techniques. Only 13 hospitals (3%) reported either not using or making minimal use of any of these seven QI methods. All methods but one (Toyota lean thinking techniques) were significantly more likely to be used widely in hospitals with high ratings on the

performance-gains question, with differences ranging from 75% versus 49% for root cause analysis ($p < .001$) to 16% versus 7% for 90-day improvement cycles ($p < .05$).

Influence of external initiatives and organizations on QI activities. Quality managers were asked to characterize on a 5-point scale from *very negative* to *very positive* the influence of 17 nationally prominent QI initiatives and organizations on their hospitals' QI efforts. The CMS's Quality Improvement Organizations and the IHI's 100,000 Lives Campaign were, respectively, the organization and initiative most often cited (89%, 88%) by respondents as having had very positive or somewhat positive influence on their hospitals (see Table 8). Also reported as having had very positive or somewhat positive influence were the Joint Commission (82% of hospitals), the AHA's Surgical Care Improvement Project (79%), the Hospital Quality Alliance (77%), the IOM's *Crossing the Quality Chasm* report (73%), the National Quality Forum (73%), the IHI's IMPACT Network (68%), pay-for-performance initiatives (65%), and other IHI initiatives (61%).

Adoption and implementation of health information technology. Quality managers reported that medication management systems (e.g., Pyxis) and picture archival communications systems (PACS) were the most commonly adopted health information technologies (HITs), having been implemented hospital-wide in 69% and 51% of hospitals, respectively. However, hospital-wide implementation of other information technologies has been limited: inpatient electronic medical records (EMR) systems (28% of hospitals), outpatient EMR systems (14%), bar coding technology for the prevention of medication errors (11%), inpatient computerized physician order entry (CPOE) systems (8%), outpatient CPOE systems (4%), and radio frequency identification (RFID) technology for QI (2%).

Nurse staffing levels. Hospital nurse-to-patient ratios were significantly associated with two of the quality manager assessment questions. For the "patient care today compared with what it should be" question, the mean ratio for hospitals with high ratings (above or well above expectations) was 1 nurse to 5.0 patients, while the mean ratio for hospitals with lower ratings was 1 nurse to 5.4 patients ($p < .01$). For the "patient satisfaction" question, the mean ratios were similar (1 nurse to 5.0 patients in hospitals with high ratings vs. 1 nurse to 5.4 patients in those with lower ratings, $p < .01$).

Nurse vacancy rates showed statistically significant relationships with three of five assessment questions. Mean vacancy rates for hospitals with high versus low ratings on the "patient care today versus what it should be" question were 5.7% and 8.3%, respectively ($p < .001$): mean rates for hospitals with high versus low ratings on the family-member question were 6.2% and 9.6% ($p < .001$), and rates on the patient-satisfaction question were 5.9% and 7.8% ($p < .01$).

Table 8
Influence of Initiatives and Organizations on Quality Improvement (QI) Activities

Initiative/ Organization	*n*	Very Positive *n*(%)	Somewhat Positive *n*(%)	Neither Positive nor Negative *n*(%)	Somewhat Negative or Very Negative *n*(%)	Don't Know *n*(%)
IHI's 100,000 Lives Campaign	460	296(64)	111(24)	27(6)	4(1)	22(5)
CMS's Quality Improvement Organizations	461	266(58)	142(31)	34(7)	9(2)	10(2)
AHA's Surgical Care Improvement Project	460	215(47)	148(32)	63(14)	5(1)	29(6)
Hospital Quality Alliance	460	206(45)	148(32)	71(15)	3(1)	32(7)
IHI's IMPACT Network	461	208(45)	106(23)	73(16)	5(1)	69(15)
The Joint Commission	457	199(44)	176(38)	50(11)	18(4)	14(3)
Other IHI initiatives	450	160(35)	116(26)	71(16)	3(1)	100(22)
IOM's Crossing the Quality Chasm report	458	158(35)	175(38)	66(14)	3(1)	56(12)
National Quality Forum	461	148(32)	187(41)	81(18)	2(0.4)	43(9)
Pay-for-performance initiatives	460	142(31)	157(34)	94(21)	24(5)	43(9)
ANA's Magnet Nursing Service Recognition	457	115(25)	81(18)	157(34)	8(2)	96(21)
ACC's Get With the Guidelines	456	104(23)	123(27)	136(30)	4(1)	89(19)
Leapfrog Group	455	75(16)	137(30)	158(35)	32(7)	53(12)
Magazine report cards (e.g., *U.S. News and World Report*)	457	44(10)	115(25)	198(43)	35(8)	65(14)
Intermountain Healthcare's Advanced Training Program	453	16(4)	23(5)	147(33)	2(0.4)	265(58)
Institute for Clinical Systems Integration	457	12(2)	26(6)	143(31)	3(1)	273(60)
Cochrane Collaboration Systematic Reviews	450	4(1)	27(6)	143(32)	3(0.6)	273(61)

Note: IHI = Institute for Healthcare Improvement; CMS = Centers for Medicare and Medicaid Services; AHA = American Hospital Association; IOM = Institute of Medicine.

Implications for Practice and Policy

Sample hospitals generally were actively engaged in patient care improvement efforts, although individual hospitals varied in how they approached this goal. For the most part, hospital quality managers perceived QI activities as benefiting their hospitals by helping to improve quality and productivity. The finding that quality managers had broad roles extending beyond the boundaries of traditional quality assurance to encompass not only QI but also patient safety, performance measurement, and other areas of responsibility emphasizes their importance to hospitals. Overall, the survey findings also confirmed our hypotheses regarding the relationships between QI activities and quality managers' assessments of quality—that is, that hospitals with high levels of perceived quality were *more likely* to have embraced QI as a strategic priority, employed quality practices and processes consistent with IOM aims, fostered staff training and involvement in QI methods, engaged in an array of QI activities and clinical QI strategies, and maintained staffing levels favoring fewer patients per nurse.

QI as a strategic priority. While it is reassuring to note that a high percentage of quality managers (87%) believed that patient care at their hospitals today was better than 3 years earlier, the finding that only one third felt that quality of care and patient satisfaction levels today compared with where they should be had exceeded their expectations suggests that improvement is still needed. The finding that more than half of sample hospitals had made important commitments to QI (i.e., had implemented a high-level quality management committee or a standing committee of the board of trustees dedicated to QI) *before* the release of the IOM reports was consistent with trends in QI implementation during the 1990s (Weiner et al., 2006). However, the median number of years for having made QI a strategic priority of the hospital was 6 years, suggesting that QI became a priority in half of all hospitals either at the time of or shortly after the release of the IOM reports. Taken together, while it seems that the IOM reports may have had a salutary effect on many hospitals' QI initiatives, it also appears that QI implementation is an evolutionary process that takes years, perhaps a decade or longer, to transform a hospital into a high-performing organization.

Training needs of clinicians and managers. Adoption of the practices and processes listed in Table 3 requires substantial training and involvement of staff, especially clinicians. However, compared with managers, and as cited in the literature (Berwick, Godfrey, & Roessner, 1990; Reinertsen, Gosfield, Rupp, & Whittington, 2007), physicians were perceived to be less involved in QI activities and projects, less likely to receive formal training in QI methods and to use those methods in daily work, and less likely to be compensated for their performance in meeting quality goals. Nurse involvement levels in these activities were assessed as being above those of physicians but considerably below those of managers. These

findings are consistent with studies citing the lack of physician involvement in QI efforts as a barrier to improvement (Laschober, Maxfield, Felt-Lisk, & Miranda, 2007). Thus, there is much room for improvement in the training and engagement of physicians and nurses, as well as opportunities for creating incentive-based performance measurement and compensation systems for these two groups of frontline caregivers.

Better measurement, monitoring, and use of evidence-based information. The finding in Table 5 that almost one half of sample hospitals (81% of which had hospital-based outpatient clinics) did not monitor wait times for outpatient clinic appointments was noteworthy in view of evidence indicating that delayed access to outpatient health care may lead to negative health outcomes such as mortality (Prentice & Pizer, 2007). Without such monitoring of clinic appointment wait times, hospitals are likely to encounter difficulty in improving patient access to care. Equally noteworthy were findings in Table 7 that evidence-based practice guidelines were used widely in fewer than half of hospitals, despite determined efforts by public, private, and professional organizations to increase their use. Rapid response teams, which have received considerable attention in recent years, were used widely in two fifths of hospitals but also minimally or not at all in an equal proportion of hospitals, suggesting an unusual pattern of adoption that may be the result of strong advocacy for the approach from some groups counterbalanced by conflicting clinical evidence regarding its effectiveness (Winters, Pham, & Pronovost, 2006). Other QI approaches, such as planned care for chronic illness (Wagner, Austin, & Von Korff, 1996), chronic disease registries, and patient advisory groups, appear to be used minimally or not at all. Taken together, these findings suggest a need for wider use of science-based methods of patient care as well as further examination of strategies that promote increased patient and family involvement in patient care and QI activities.

Broader adoption of health information technology. The limited adoption of various health information technologies by hospitals—despite many years of exhortations by the federal government and private organizations, such as the IOM and the Leapfrog Group, to embrace these innovations—likely is a function, at least in part, of the high cost and complexity associated with their implementation (Shortliffe, 2005). A key challenge for hospitals in the future will be to find ways to overcome such obstacles and to accelerate the adoption of quality-enhancing information technologies.

Nurse staffing levels. The finding that hospitals with higher perceived quality had significantly better nurse-to-patient ratios and lower nurse vacancy rates is consistent with studies that found better clinical outcomes of hospital care associated with nurse-to-patient ratios approaching 1 to 4 (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002). Yet, only 31% of all sample hospitals reported hospital-wide use of specific strategies to reduce the

number of patients assigned to each nurse, and another 35% reported minimal or no use of these strategies (see Table 7). In view of the critical roles played by nurses in both patient care and QI efforts, hospital managers would be wise to reexamine their institutions' policies and practices regarding nurse staffing levels.

Study limitations. A limitation of the study is the survey response rate of 11%. We cannot rule out the possibility that unmeasured, complex motivational factors may have contributed to the selective response by hospitals to participate in the survey. As described in the Method section, teaching hospitals were overrepresented in the sample, and sample hospitals, on average, performed better on HQA process measures for AMI, CHF, and pneumonia than hospitals in the population. It also is possible that participating hospitals may have embraced QI aims and activities to a greater extent than nonparticipating hospitals, causing the survey to overestimate the levels of QI activity and improvement progress made in hospitals. Even so, the experiences of these 470 hospitals, many of whom may be in the forefront of QI efforts, provide valuable lessons regarding the use of QI practices and processes. Moreover, it should be noted that the activity and performance levels of these more advanced institutions are far from perfect, underscoring the immense challenge that still lies before the nation.

The use of the QAS to assess patient care improvements (i.e., perceived outcomes) in relation to QI activities (i.e., practices) poses another potential study limitation. Common methods bias, in which there is a tendency for survey participants to respond uniformly to questions throughout the survey, may induce an artificial correlation between the practices and the outcomes (Mitchell, 1985). Though the magnitude of this potential bias is difficult to ascertain, there are several indications that our results were not seriously biased in this way. First, as shown in Table 2, we observed different distributions of responses to different assessment questions, ranging from a high of 39% who considered patient care today much better than 3 years ago to a low of 4% who strongly agreed that patient satisfaction was where it should be (the highest category response in each case). Likewise, there were different distributions associated with many of the QI activity questions. Second, for questions involving numeric responses, such as in the case of nurse-to-patient ratios and nurse vacancy rates, we found meaningful correlations between responses to those questions and responses to assessment questions, lending some face validity to the assessment question response patterns. Finally, we examined the correlation between the assessment questions and the overall composite HQA performance measure (calculated from the 15 process measures). There were significant correlations for four of five assessment questions—patient care today versus what it should be ($r = .18$, $p < .001$), patient care today versus 3 years ago ($r = .14$, $p < .01$), comfort in having a family member treated without being present ($r = .11$, $p < .05$), and QI focus has led to major performance gains ($r = .26$, $p < .001$). These results are evidence of external validity to quality managers' assessments of hospital quality.

Conclusion

This cross-sectional snapshot of a sample of 470 hospitals offers some interesting findings regarding the nature and extent of hospital QI activities. Further analysis is needed to examine the relationships of these activities to various hospital characteristics, to hospital performance measures (such as hospital mortality and HQA performance measures), to financial measures of hospital efficiency, to levels of health information technology adoption, and to clinicians' assessments of patient care quality. Insights gained from the survey, however, must be tempered by the realization that QI is a dynamic, continuous, and evolutionary process. Although progress toward improved patient care is being made in many hospitals, there is a clear need for greater innovation and creativity, sustained achievement of performance gains, and concerted effort by managers, clinicians, and policy makers to attain organizational and systemwide quality goals.

Appendix
Sampling and Survey Administration Methods

Hospital recruitment strategy. As described in the Method section, hospitals and clinicians were recruited into our sample using a two-step procedure. First, a letter of invitation cosigned by the presidents of the American Hospital Association (AHA) and the Health Research & Educational Trust (HRET) was mailed to the CEO of each target hospital. The letter explained the expectations for involvement, including target numbers of clinicians to be recruited for the Clinicians' Perceptions of Quality Survey (CPS). In addition, the CEO received (a) a list of survey question areas encompassing both the CPS and the Quality Improvement Activities Survey (QAS); (b) a suggested questionnaire distribution chart; (c) a study fact sheet; and (d) a fax response form. Second, each CEO was asked to commit his or her institution to participate in the study by agreeing to (a) have the QAS questionnaire completed by the hospital's chief quality officer (CQO) or other appropriate officer charged with *lead responsibility* for hospital-wide quality management; (b) have the CPS questionnaires completed by frontline nurses and physicians in the hospital; and (c) fax back contact information for the CQO and other senior managers responsible for CPS distribution. As incentives for participation, hospitals were informed that they would receive a summary of the study's findings together with hospital-specific benchmarking data, and that five hospitals would be randomly selected from among those with the highest rates of clinician participation to receive honoraria of $500 each.

QAS questionnaire distribution. Upon receipt of the fax response form, we forwarded to the CQO a packet containing a letter of invitation, a QAS with prepaid return envelope, a study fact sheet, and a frequently asked questions (FAQ) sheet, with instructions for online survey completion.

CPS questionnaire disribution. We contacted the senior managers designated with responsibility for distributing the CPS and forwarded to each the appropriate number of questionnaires for distribution, based on hospital bed size. The questionnaires included a Web address for electronic completion of the surveys for respondents preferring this option. We believed that this approach

offered the best means for recruiting a random sample of clinicians into the study, based on advice received from several hospital managers, clinicians, and human resources (HR) heads whom we interviewed prior to and during the pilot test of the survey. We also consulted with leaders of the Association for Healthcare Human Resources Administration, who were helpful in obtaining the advice of HR heads in small rural hospitals, where response rates were likely to be low. These discussions led us to conclude that a preferred strategy for distributing the CPS to clinicians should be communicated to the CEO but with the understanding that each hospital needed flexibility in determining the best method of distribution, based on its management structure, organizational culture, and professional norms.

Selection of nurses. In the case of nurses, the CEO was asked to designate either the chief nursing officer (CNO) or the head of HR to take responsibility for CPS questionnaire distribution. We mailed to this individual a recruitment letter, a study fact sheet, and instructions for forwarding survey materials to the unit managers of the largest medical/surgical units in the hospital. In small hospitals, the senior manager received one CPS packet; in midsize hospitals, she or he received two CPS packets; and in large hospitals, she or he received three CPS packets. Each CPS packet contained instructions for distributing questionnaires to frontline nurses; the appropriate number of CPS questionnaires, with prepaid return envelopes; and the appropriate number of FAQ sheets. CPS packets were forwarded to unit managers by the senior manager. Unit managers, in turn, were asked to select the appropriate target number of frontline nurses to complete the CPS. In small hospitals, a single unit manager was requested to recruit nine nurses from that unit; in midsize hospitals, two unit managers each were asked to select six nurses from their respective units; and in large hospitals, three unit managers each were asked to select six nurses from their units. Unit managers were instructed to select only registered nurses who were engaged in the direct care of patients and who did not hold management responsibilities in the hospital. Each selected nurse received a FAQ sheet and was given the choice of completing the CPS either via the Web or via a paper-based questionnaire that could be returned in a prepaid envelope.

Selection of physicians. In the case of physicians, the CEO was asked to designate either the chief medical officer (CMO) or the director of the medical staff office to take responsibility for CPS questionnaire distribution. We mailed to this individual a recruitment letter, a study fact sheet, and the requisite number of questionnaires and supporting materials. Senior managers also received instructions for selecting a sample of frontline physicians who were engaged in the direct care of inpatients and who did not hold management responsibilities in the hospital. Half of the physicians were to be medical specialists (i.e., family practitioners, general internists, hospitalists, or medical subspecialists, such as cardiologists or pulmonologists) and half were to be general surgeons, surgical subspecialists, or anesthesiologists (if the number of active surgeons was small). The CMO or medical staff director in small hospitals was asked to randomly select three medical specialists and three surgeons; in midsize hospitals, four from each category; and in large hospitals, six from each category. Each selected physician received a FAQ sheet and was given the choice of completing the CPS either via the Web or via a paper-based questionnaire that could be returned in a prepaid envelope.

Follow-up procedures. We employed an intensive follow-up strategy in which e-mail reminders were sent to QAS nonresponders (i.e., CQOs in hospitals that had committed to participate but for whom a QAS response had not been received within 3 weeks of initial contact). In each case, the hospital CEO was copied on the e-mail. In addition, new questionnaires were mailed concurrently. One week later, we conducted callbacks to all QAS nonresponders.

E-mail reminders also were sent to senior managers designated by the CEO to distribute the CPS questionnaires. The e-mails requested that the designated officials contact the clinicians to whom they had given survey questionnaires and encourage them to complete them. Once again, the hospital CEO was copied on the e-mail. Two weeks later, we conducted callbacks to hospitals with a partial CPS response (i.e., hospitals that had not yet met a minimum number of completed questionnaires). Shortly thereafter, we conducted follow-up calls with CPS nonresponders (i.e., hospitals that had submitted a QAS survey but for whom no CPS surveys had been received from clinicians). These procedures for both QAS and CPS follow-up were repeated at 1-month intervals.

Major challenges. We knew from the beginning that distribution of the survey, particularly the CPS to clinicians, would be challenging and likely would take time. However, we also knew from the pilot test and from discussions with former and current hospital CQOs that the proposed method of distribution was the "best available" for ensuring that questionnaires would reach their intended targets—the clinicians.

Hospitals are complex organizations, and many in our sample took much longer than anticipated to make decisions about participation. In some cases, the internal decision-making process was almost labyrinthine, involving numerous actors and multiple steps. CEOs often forwarded the letter of invitation to the CQO immediately upon receiving it, asking for advice on the benefit or value to the hospital of participating in the study. This prompted many quality managers to contact us for more information about the study, its products, and the process of survey administration. Quality managers were concerned about the nature of the survey questions, the time needed to complete each survey, whether their institutions would be identified in project reports, and the submission deadline for survey responses. Some insisted on reviewing the instruments before making a decision. All requests for additional information, including copies of the instruments, were accommodated. Initially, 634 CEOs indicated that their organizations would participate, but in the end, we received QAS responses from considerably fewer hospitals (470).

For some CQOs, the length of the QAS (173 questions) probably deterred them from completing the questionnaire, which likely accounted for the low response rate. In the case of CPS distribution, we did not have access to the clinicians at each hospital and were forced to rely on the designated senior managers to select and recruit appropriate clinicians to the survey. This made follow-up of CPS nonresponders extremely difficult, as we did not know to whom the questionnaires had been distributed, and all follow-up efforts had to be directed toward the senior managers in charge of distribution. Although the selection of physicians and nurses most likely was not random in many cases, it was clear that clinician respondents were indeed front-line caregivers, based on their survey responses to questions about personal characteristics. In the end, we received CPS responses from 5,383 clinicians (1,829 physicians and 3,554 nurses).

References

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association, 288*, 1987-1993.

American Hospital Association. (2005). *AHA annual survey database*. Chicago: Health Forum.

Berwick, D. M., Godfrey, A. B., & Roessner, J. (1990). *Curing health care: New strategies for improvement*. San Francisco: Jossey-Bass.

Galvin, R., & Milstein, A. (2002). Large employers' new strategies in health care. *New England Journal of Medicine*, *347*, 939-942.

Heget, J. R., Bagian, J. P., Lee, C. Z., & Gosbee, J. W. (2002). John M. Eisenberg Patient Safety Awards: System innovation: Veterans Health Administration National Center for Patient Safety. *Joint Commission Journal of Quality Improvement*, *28*, 660-665.

Institute of Medicine. (2000). *To err is human: Building a safer health system.* Washington, DC: National Academy Press.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century.* Washington, DC: National Academy Press.

Jha, A. K., Li, Z., Orav, E. J., & Epstein, A. M. (2005). Care in U.S. hospitals—The Hospital Quality Alliance program. *New England Journal of Medicine*, *353*, 265-274.

Kizer, K. W. (2001). Re-engineering the veterans healthcare system. In P. Ramsaroop, M. J. Ball, D. Beaulieu, & J. V. Douglas (Eds.), *Advancing federal sector health care: A model for technology transfer* (pp. 79-96). New York: Springer-Verlag.

Laschober, M., Maxfield, M., Felt-Lisk, S., & Miranda, D. J. (2007). Hospital response to public reporting of quality indicators. *Health Care Financing Review*, *28*, 61-76.

Leape, L. L., & Berwick, D. M. (2005). Five years after *To err is human*. What have we learned? *Journal of the American Medical Association*, *293*, 2384-2390.

Leapfrog Group. (2005). *Hospital Quality and Safety Survey*. Retrieved 2005 from http://leapfrog.medstat.com/(aud0023jrc3sa245wvvd3vrp)/index.aspx#refmaterials

McGlynn, E. A., Asch, S. M., Adams, J., Keesey, J., Hicks, J., DeCristofaro, A., et al. (2003). The quality of health care delivered to adults in the United States. *New England Journal of Medicine*, *348*, 2635-2645.

Mitchell, T. R. (1985). An evaluation of the validity of correlational research conducted in organizations. *Academy of Management Review*, *10*, 192-205.

National Quality Forum. (2002). *Serious reportable events in patient safety: A consensus report*. Washington, DC: Author.

National Quality Forum. (2003). *Safe practices for better health care: A consensus report*. Washington, DC: Author.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002). Nurse-staffing levels and the quality of care in hospitals. *New England Journal of Medicine*, *346*, 1715-1722.

Prentice J. C., & Pizer, S. D. (2007). Delayed access to health care and mortality. *Health Services Research*, *42*, 644-662.

Reinertsen, J. L., Gosfield, A. G., Rupp, W., & Whittington, J. W. (2007). *Engaging physicians in a shared quality agenda.* Cambridge, MA: Institute for Healthcare Improvement.

Ross, J. S., Cha, S. S., Epstein, A. J., Wang, Y., Bradley, E. H., Herrin, J., et al. (2007). Quality of care for acute myocardial infarction at urban safety-net hospitals. *Health Affairs*, *26*, 238-248.

Shortell, S. M. (1995). *National survey of hospital efforts to improve quality*. Evanston, IL: Northwestern University.

Shortliffe, E. H. (2005). Strategic action in health information technology: Why the obvious has taken so long. *Health Affairs*, *24*, 1222-1233.

Shwartz, M., Ren, Z. J., Peköz, E., Wang, X., Cohen, A. B., & Restuccia, J. (in press). Estimating a composite measure of hospital quality from the Hospital Compare database: Differences when using a Bayesian hierarchical latent variable model versus denominator-based weights. *Medical Care*.

Wachter, R. M. (2004). The end of the beginning: Patient safety five years after "To Err is Human." *Health Affairs*, *23*, W534-W545.

Wagner, E. H., Austin, B. T., & Von Korff, M. (1996). Organizing care for patients with chronic illness. *Milbank Quarterly*, *74*, 511-544.

Weiner, B. J., Alexander, J. A., Shortell, S. M., Baker, L. C., Becker, M., & Geppert, J. J. (2006). Quality improvement implementation and hospital performance on quality indicators. *Health Services Research*, *41*, 307-334.

Winters, B. D., Pham, J., & Pronovost, P. J. (2006). Rapid response teams—Walk, don't run. *Journal of the American Medical Association*, *296*, 1645-1647.