Patient Safety

Findings from the ISMP Medication Safety Self-Assessment® for Hospitals

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The minimum that patients should expect (and deserve) when they enter the hospital is safe and compassionate care. But in today's complex world of medicine, the best intentions can have unforeseen and sometimes harmful consequences,[1–9] and this has, over time, eroded the public's confidence in the health care system in the United States.[10,11] To regain the public's trust and begin our journey toward building a safer health care system, an honest assessment of medication safety is needed to identify processes and organizational infrastructures that place patients at risk.

In spite of research attention to the scope of adverse drug events,[12–14] their implications,[15,16] and their underlying causes,[17–22] and to error-reduction strategies,[1,23–37] as well as the call to make patient safety a national priority (Institute of Medicine report *To Err Is Human*[10,38]), little is known about the status of medication practices in hospitals in the United States.

In May 2000 the American Hospital Association (AHA) and the Institute for Safe Medication Practices (ISMP) distributed the ISMP Medication Safety Self-Assessment® to all hospitals in the United States.* This tool was designed to assess medication safety practices in hospitals and heighten awareness of the distinguishing characteristics of a safe medication system. ISMP, AHA, and other organizations that endorsed the tool (Table 1, page 587) encouraged hospitals to

* A copy can be found at http://www.ismp.org/survey.

Article-at-a-Glance

Background: Hospital medication practices should be assessed, awareness of the characteristics of a safe medication system heightened, and baseline data to identify national priorities established.

Design: A cross-sectional survey of U.S. hospitals (N = 6,180) was conducted in May 2000. The survey instrument contained 194 self-assessment items organized into 20 core characteristics and 10 larger domains. Hospitals were asked to voluntarily submit their confidential assessment data to the Institute for Safe Medication Practices (ISMP) for aggregate analysis.

Method: A weighting structure was applied to the individual items and used to calculate core characteristic scores, domain scores, and overall self-assessment scores. These scores were then compared to identify areas most in need of improvement.

Results: The 1,435 participating hospitals scored highest in domains related to drug storage and distribution; environmental factors; infusion pumps; and medication labeling, packaging, and nomenclature issues. These hospitals scored lowest in domains related to accessible patient information, communication of medication orders, patient education, and quality processes such as double-check systems and organizational culture.

Conclusions: Enormous opportunities exist to improve medication safety, especially in domains related to culture, information management, and communication.

Table 1. Organizations that Endorsed the ISMP Medication Safety Self-Assessment®

- American Hospital Association
- American Organization of Nurse Executives
- American Pharmaceutical Association
- American Society of Health-System Pharmacists
- Amerinet
- Association of American Medical Colleges
- Catholic Health Association
- Federation of American Health Systems
- Joint Commission on Accreditation of Healthcare Organizations
- National Association of Children's Hospitals
- National Association of Public Hospitals and Health Systems
- Premier
- United States Pharmacopeia
- VHA

complete the assessment and submit their findings confidentially to ISMP.*

In January 2001 preliminary comparative data were presented to participating hospitals in the form of a workbook to help them identify and prioritize medication safety initiatives. In response, ISMP, the Health Research and Educational Trust (HRET), and AHA received many anecdotal reports that participating hospitals had used the workbook to establish action plans to implement selected ideas presented in the tool. In addition, several hospital groups, working with their state associations or other consortia, used the preliminary data to guide collaborative efforts to improve medication safety. One of these groups has already demonstrated a 20% increase in self-assessment scores after implementing selected best practices suggested in the survey.[39]

This article provides a descriptive analysis of the definitive key findings from the 2000 ISMP Medication Safety Self-Assessment®, with a focus on key areas where improvements in medication safety are needed.

* ISMP and HRET, the research and educational affiliate of the AHA, received a grant from The Commonwealth Fund to support analysis and dissemination of the study findings plus follow-up phone calls to the survey recipients to increase sample size and to gather information about possible causes for nonresponse.

Methods

Instrument

The ISMP Medication Safety Self-Assessment® is composed of 194 self-assessment items organized into 20 core characteristics and 10 larger domains representing safe medication use.† The instrument was tested by a small subset of hospitals before being distributed to all hospitals in the United States.

Overall, the survey instrument demonstrated good internal reliability with Cronbach's alpha for the 20 core characteristics (alpha = 0.90). However, the average correlation among the items composing each core characteristic varied considerably, with alphas ranging from 0.44 to 0.84. Nevertheless, alpha exceeded 0.70 for 10 core characteristics and 0.60 for 16, reflecting moderate to good correlations between most of the items within the core characteristics. Proven infection control practices (alpha = 0.47), unit-based floor stock restricted (0.44), dosage standardizations (0.52), and hazardous chemicals secured (0.55) had the lowest internal reliability.

Scoring Methods

Each item had five possible responses, from A to E (Table 2, page 588). Weighted scores were assigned to the response choices, using a scale of 0 to 16. Items had variable maximum weights, depending on several factors (Table 3, page 588). Weights were not visible during the assessment phase. Participating hospitals received their numeric weighted scores only after submitting their findings via a Web-based tool.

For the purpose of quantitative analysis, core characteristic and domain scores were calculated on the basis of the weighted individual items (Table 4, page 589). The following was used for the purpose of descriptive analysis of the survey items, unless otherwise stated:

- All A and B responses were grouped together to describe the percentage of respondents who had no activity or implementation of the item

† The domains and their core characteristics are listed in Table 7 (pages 592–593) and are defined in full at http://www.ismp.org.

Table 2. Possible Responses to Self-Assessment Items

A	There has been no *activity* to implement this characteristic.
B	This characteristic has been *discussed* for possible implementation but not implemented.
C	This characteristic has *been partially implemented in some or all areas* of the organization.
D	This characteristic *is fully implemented in some areas* of the organization.
E	This characteristic *is fully implemented throughout* the organization.

- C and D responses were grouped together to describe partial implementation of the item
- E responses were used to describe full, widespread, and/or consistent implementation of the item.

Distribution

In May 2000 the ISMP Medication Safety Self-Assessment® was mailed to 6,180 hospitals in the United States that were on a mailing list provided by AHA. A follow-up telephone survey of randomly selected hospitals confirmed receipt of the self-assessment, encouraged its use, and identified reasons hospitals may not complete it or submit findings to ISMP.

Each self-assessment contained a unique, randomly assigned password, which was required to submit data to ISMP. Once data were submitted, the unique number was no longer valid or linked to the respondent. This allowed anonymity of the data while ensuring that each hospital transmitted data only once.

Results

By October 2000, 1,435 hospitals had submitted data to ISMP, for a response rate of 23%. The characteristics of responding hospitals were compared with those of a national sample.[40] The results indicated that the set of hospitals returning the self-assessment was not representative of the national universe of hospitals (Table 5, page 590). In particular, responding hospitals tended to be large and nonprofit when compared with the national sample. These differences, although statistically significant, mostly reflect small differences (5%–10%) between responding hospitals and the national sample in a very large data set.

Table 3. Characteristics of Items with Higher Weighted Value*

To determine the weight of each item, a standard process was used to determine its impact on patient safety and its ability to sustain improvement. The following are characteristics of items with higher weighted value:

- Demonstrate through scientific evidence that they were effective in reducing serious medication errors
- Simplify complex, error-prone processes
- Target improvement in systems of care, not individuals in the workforce
- Do not rely heavily upon human memory and vigilance
- Solve several medication error–related problems at the same time
- Prevent errors with high-alert medications that have the greatest potential to cause patient harm
- Safeguard high-risk patient populations
- Make it hard for health care practitioners to do their job wrong and easy for them to do it right

* Some items were weighted with no numeric score unless there was full implementation throughout the organization.

Self-assessment scores for individual hospitals ranged from 26% to 85% of the total possible score (average, 56%). To determine which core characteristics and domains were most in need of improvement, the weighted scores were converted to percentages of the maximum possible score for the core characteristics or domain. On average, participating hospitals scored highest in domains related to drug storage and distribution, environmental factors, and use of medication delivery devices such as infusion pumps (Table 6, page 591). However, opportunities for improvement exist even within these top-scoring domains.

For example, whereas 69% of hospitals prohibited use of sample medications for inpatients, only 13% always required pharmacy screening of orders for sample medications distributed in outpatient units. Although intravenous (IV) preparation areas were isolated to minimize distractions in 64% of hospitals, fewer than a quarter of respondents reported distraction-free

Table 4. Definitions and Description of Scoring Procedures

Weighted Domain or Core Characteristic Score

A hospital's score on a domain or core characteristic, calculated by summing the weighted scores for all the items defining a particular domain or core characteristic. (Each domain and core characteristic is composed of a different number of items, and the items differ in their total possible scores because of the weighting structure.)

Maximum Weighted Score

The maximum number of points a hospital could score in each domain or core characteristic. It was calculated by summing the highest possible scores for the items defining a domain or core characteristic. (Each domain and core characteristic is composed of a different number of items, and the items differ in their total possible scores because of the weighting structure.)

Mean Weighted Score

The weighted score for a domain or core characteristic, averaged across all responding hospitals.

Percentage Score

The percentage of points scored in relationship to the maximum possible points a hospital could score in a domain and core characteristic. This transformation allows core characteristics or domains with different weightings to be compared. All percentage scores fall between 0% (no implementation) and 100% (full implementation) of the items within a core characteristic or domain.

Mean Percentage Score

A domain and core characteristic percentage score, averaged across all responding hospitals.

areas for nurses to prepare medications and for pharmacists to enter orders into the computer (24% and 14%, respectively). Although 89% of respondents limited the variety of general infusion devices to maximize staff competency, only 39% required all new devices to undergo thorough evaluation for error potential before purchasing decisions were made.

On average, hospitals scored lowest in domains related to accessibility of patient information, communication related to medications, patient education, and quality processes and risk management. A descriptive analysis of the core characteristics and items in those domains, which follows, should provide insight into why hospitals scored lowest in these areas. Core characteristic scores within each domain are shown in Table 7 (pages 592–593).

Patient Information

Survey respondents were asked to evaluate whether essential patient information is obtained, readily available in useful form, and considered when prescribing, dispensing, and administering medications. Responding hospitals achieved a mean weighted score of 43 out of 100 on this core characteristic.

Analysis of items within this core characteristic showed that respondents scored low on using automated technology to communicate important information about patients during medication use. Although 43% of respondents had discussed the possibility of implementing bar codes to verify patient identity during drug administration, only 3% used this technology in some areas, and only 1% had fully implemented it throughout the organization.

A direct interface between the laboratory computer and the medication order entry computer was functional in just 9% of hospitals. Thus, most respondents did not have an automated alert system to warn pharmacists and/or prescribers about potential drug therapy changes based on current laboratory results. Easy access to electronic laboratory values was available throughout the facility in 59% of hospitals for inpatients and in 42% for outpatients.

Just 4% of respondents reported that their pharmacy computer systems *required* the patient's weight to be entered before processing medication orders, and only 29% *required* entry of patient allergies. These two pieces of essential information (plus age) should be used by pharmacists to verify the correct drug and dose. If allergies were entered into the pharmacy system, 74% of respondents said that their computer would provide a warning to practitioners if a medication to which the patient was allergic had been ordered. Yet, in hospitals with computerized prescriber order entry (CPOE), only 33% of the systems provided allergy warnings to the prescriber.

Table 5. Respondent Profile Compared with a National Profile*

Demographic	Respondents *N* = 1,435	National Profile *N* = 6,180
Bed Size		
< 100 beds	35%	47%
100–299 beds	41%	37%
> 300 beds	24%	16%
Setting		
Rural	47%	40%
Urban	53%	60%
Region		
West	14%	18%
Midwest	35%	28%
Northeast	15%	15%
South	36%	38%
Ownership		
For profit	8%	18%
Nonprofit	75%	53%
Government	17%	29%
Physician Training		
Yes	30%	23%
No	70%	77%
Part of a Larger Health System		
Yes	57%	51%
No	43%	49%
Type of Hospital		
General medical/surgical	91%	82%
All others†	9%	18%

* National comparisons taken from Annual Survey Database, fiscal year 1999, Health Forum LLC, an American Hospital Association Company, copyright 2000. Z-scores were calculated to test the statistical significance of the difference between the two groups. Except for some regional comparisons (respondents and the national sample were equally likely to be in the northeast and south), essentially all comparisons were statistically significant at the $p < .001$ level.

† Examples of "others" include oncology, pediatric, and psychiatric hospitals.

Information about the patient's chronic conditions was obtained, communicated to the pharmacy, and entered into the pharmacy computer consistently in 13% of hospitals. However, another 33% of respondents reported partial implementation, suggesting that information about chronic conditions was collected by clinical pharmacists working in patient care units but not communicated to the pharmacy or entered into the pharmacy computer.

Overall, hospitals scored best in areas that did not involve automation. For example, 71% reported full implementation and another 25% reported partial implementation for establishing monitoring criteria for patients who receive conscious sedation, patient-controlled analgesia, and other IV infusions to treat pain. Almost all respondents (96%) reported some level of activity with pharmacists or physicians who routinely adjusted doses of medications that may endanger patients with renal or liver impairment. However, only 40% felt that the dosing service was fully implemented throughout the hospital.

Communication of Drug Orders

Survey respondents were asked to evaluate whether the methods of communicating drug orders and other drug information were standardized and automated to minimize the risk for error. Responding hospitals achieved a mean weighted score of 43 out of 92 on this core characteristic. Analysis of items within this core characteristic showed that 10% of respondents have CPOE systems available for order communication. However, only 5% of hospitals reported that the CPOE system was interfaced with the pharmacy computer, and only 1% reported that CPOE was fully implemented throughout the hospital. It was discouraging to learn that only 50% of hospitals that used CPOE had systems equipped to alert prescribers to unsafe orders (for example, allergies, drug interactions). Only 13% of 18 CPOE users felt they had fully functional alert systems.

Only 27% of hospitals completely disallowed orders to "resume the same medication" or to "take medications

Table 6. Mean and Standard Deviations (SDs) for Domain Scores (Percent Scores and Weighted Scores)*

Domain	Percent Scores			Weighted Scores		
	Mean	SD	Range	Mean	SD	Maximum Possible
Drug standardization, storage, and distribution	73%	12.09	29.69–98.96	141	23.21	192
Environmental factors	70%	15.76	21.74–100.00	64	14.50	92
Medication delivery device use	69%	17.48	0–100.00	50	12.59	72
Drug labeling, packaging, and nomenclature	61%	15.39	15.00–98.75	49	12.32	80
Drug information	53%	14.62	4.61–100.00	81	22.23	152
Staff competency and education	53%	16.01	9.26–100.00	57	17.29	108
Quality processes and risk management	51%	13.51	12.67–95.00	152	40.53	300
Patient education	48%	17.55	0–100.00	25	9.13	52
Communication of drug orders	47%	13.88	9.78–94.57	43	12.77	92
Patient information	43%	11.39	10.00–88.00	43	11.39	100

* The mean weighted score represents the sum of the weighted scores for the items defining each domain averaged across respondent hospitals. The mean percent score was calculated by dividing the mean weighted score by the maximum possible weighted score multiplied by 100.

from home." Another factor that has been implicated in causing medication errors is the use of verbal orders. However, only 11% of hospitals had instituted and followed a policy that prohibited the use of verbal orders from on-site prescribers except in emergencies or during sterile procedures.

About half (48%) of all respondents reported using computer-generated or electronic medication administration records (MARs) that share a common database with the pharmacy in all inpatient areas of the hospital. However, 34% of respondents reported that nurses did not take the MAR to the bedside for reference during drug administration.

Patient Education

Survey respondents were asked to evaluate whether patients are included as active partners in their care through education about their medications and ways to avert errors. Responding hospitals achieved a mean weighted score of 25 out of 52 on this core characteristic.

Analysis of the items within this core characteristic showed that almost all respondents (94%) encouraged patients to ask questions about their medications. Yet when patients expressed concerns about a medication, just 24% reported that they had consistently investigated the issue before prescribing, dispensing, or administering the medication.

About two thirds of respondents reported that physicians (64%) and nurses (67%) inconsistently educated patients about their drug therapy. Written information about critical drugs was sometimes provided to patients in 61% of respondent hospitals and always provided in 21% of hospitals.

Respondents in 23% of surveyed hospitals reported that criteria for an automatic consultation by a pharmacist for patient education had been established. Only 8% of hospitals consistently designed drug administration schedules that considered the patient's lifestyle and minimized the number of times per day that medications must be taken for patients at high risk for noncompliance after discharge.

Table 7. Means, Standard Deviations (SDs), and Maximum Possible Scores for Core Characteristics Defining Each Domain*

Domain and Core Characteristics	Percent Scores			Weighted Scores		
	Mean	SD	Range	Mean	SD	Maximum Possible
Drug standardization, storage, and distribution						
Hazardous chemicals secured	86%	14.88	12.50–100.00	20.53	3.57	24
Unit-based floor stock restricted	73%	14.43	8.33–100.00	69.95	13.85	96
Dosage standardizations	71%	16.78	10.71–100.00	19.77	4.70	28
Secure and timely medication delivery	70%	20.00	6.82–100.00	30.81	8.80	44
Environmental factors						
Qualified, well-rested practitioners match work load	71%	18.41	8.33–100.00	34.17	8.04	48
Adequate space, lighting; free of distractions	69%	18.26	4.55–100.00	30.27	8.84	44
Medication delivery device use						
Careful procurement/ standardization	69%	17.48	0.00–100.00	49.78	12.59	72
Drug labeling, packaging, and nomenclature						
Readable labels on all drug containers	74%	15.35	20.00–100.00	29.58	6.14	40
Minimize problems with look/sound-alike drugs	48%	21.52	0.00–100.00	19.77	4.70	40
Drug information						
Closed drug formulary system	56%	22.70	0.00–100.00	24.80	9.99	44
Essential drug information available	52%	14.65	3.70–100.00	55.80	15.83	108
Staff competency and education						
Sufficient orientation and baseline/annual evaluation	56%	16.03	5.88–100.00	37.93	10.90	68
Ongoing education	49%	21.78	0.00–100.00	19.48	8.71	40

Table 7. Means, Standard Deviations (SDs), and Maximum Possible Scores for Core Characteristics Defining Each Domain* *(continued)*

Domain and Core Characteristics	Percent Scores			Weighted Scores		
	Mean	SD	Range	Mean	SD	Maximum Possible
Quality processes and risk management						
Proven infection control practices followed	83%	14.07	0.00–100.00	23.15	3.94	28
Practitioners detect/report/analyze errors	55%	21.47	0.00–100.00	48.75	18.89	88
Nonpunitive system approach to error	46%	17.45	3.57–100.00	51.13	19.55	112
Redundancies and double-checks performed	41%	16.96	0.00–100.00	29.51	12.21	72
Patient education						
Patient included as active partner through education	48%	17.55	0.00–100.00	24.97	9.13	52
Communication of drug orders						
Standardized/automated methods of communication	47%	13.88	9.78–94.57	42.94	12.80	92
Patient information						
Essential patient information obtained	43%	11.39	10.00–88.00	42.72	11.39	100
Total Self-Assessment Score†	**56%**	**10.10**	**25.56–84.67**	**699.24**	**125.25**	**1,240**

* To calculate the mean percent scores for each domain (as presented in this table), sum the mean weighted score(s) for the core characteristic(s) defining the domain and divide by the sum of the maximum possible weighted score for the domain.

† A total score for the self-assessment was calculated only for hospitals that completed all 194 items. The total score was calculated by summing the weighted scores for all the individual items.

Quality Processes and Risk Management

Survey respondents were asked to evaluate whether simple redundancies that support a system of independent double-checks or an automated verification process were used for vulnerable parts of the medication system. Responding hospitals achieved a mean weighted score of 30 out of 72 on this core characteristic.

Hospitals scored low on items related to the implementation of automated redundancies. Fewer than 2% of respondents used bar coding in any capacity, and only 10% used this technology in some areas of the hospital or for some drugs dispensed.

Respondents also scored low on implementing manual redundancies before dispensing or administering certain high-alert medications (for example, insulin, chemotherapy, IV opiates). Although errors may or may not be more common with these drugs than with others, high-alert medications bear a heightened risk of causing

injury when they are misused. In 45% of hospitals surveyed, high-alert medications were not double-checked by a second practitioner when obtained from unit stock.

Only 40% of the hospitals without CPOE systems reported that medications were always prepared and verified in the pharmacy using both a copy of the prescriber's order and a pharmacy computer-generated label. Comparing both the pharmacy label and the order copy to a product label offers an additional safeguard to ensure that the product dispensed matches the product prescribed. Pharmacists in 62% of hospitals with CPOE always verified medication orders entered directly into the system by the prescriber. This finding means that close to 40% of hospitals with CPOE do not have the medication order verified by a pharmacist, even though it is an important step in error-reduction efforts.

Survey respondents were also asked to evaluate whether a nonpunitive, system-based approach to error reduction is in place and supported by management, senior administration, and the board of trustees/directors. Responding hospitals achieved a mean weighted score of 51 out of 112 on this core characteristic.

The responses to items within this core characteristic tell a story about health care's struggle to adopt a nonpunitive, system-based approach to error reduction. Fewer than half (46%) of hospitals reported full confidence that error-reduction strategies throughout their organization targeted the system, not individuals. Likewise, only 59% of respondents reported that demerits were never assigned to individuals who made errors, and even fewer (42%) reported full assurance that disciplinary action would not be taken against those who made errors (allowing for rare exceptions for illegal or malicious behavior). Only 23% of respondents felt confident that staff throughout the facility could openly report and discuss errors without undue embarrassment or fear of reprisal. Seventy-six percent of respondents reported that management and administration failed to provide positive incentives for individuals to report errors.

The full board's commitment to patient safety was demonstrated in 37% of hospitals. On the other hand, 27% reported the complete absence of evidence to support the board's commitment to safety, and 62% reported that specific medication safety objectives were not included in the chief executive officer's (CEO's) strategic plans. In only 26% of hospitals was a practitioner assigned responsibility to enhance detection of medication errors, oversee analysis, and coordinate an error-reduction plan.

Organizational Culture and Error Prevention

A number of core characteristics addressed organizational culture and staff education regarding error prevention. To examine the relationship of these factors with the overall success of medication safety initiatives, Pearson correlations were calculated for the relevant core characteristics. In general, the better a hospital scored on establishing a leadership-supported, nonpunitive approach to error reduction, the better the hospital scored on detecting, reporting, and analyzing errors (r = 0.60, p < .001). Scores related to ongoing staff education about medication error prevention also correlated with the scores for detecting, reporting, and analyzing errors (r = 0.60, p = < .001). These strong correlations suggest that a supportive, nonpunitive culture and consistent staff education and feedback about medication errors and their system-based causes can facilitate improved detection of errors, thorough analysis of adverse events, and effective use of the information to prevent errors.

Differences Related to Hospital Demographics

We anticipated that scores would differ in relationship with demographics such as hospital size, teaching affiliation, and setting. To evaluate these factors' individual and joint contributions to the self-assessment scores, linear regression models were created.[41] Scores for the 20 core characteristics were regressed on hospital size (based on number of beds), hospital setting (urban versus rural), and teaching affiliation (teaching versus nonteaching hospitals), using a stepwise selection procedure.

Surprisingly, these models indicated that only a small amount of the variance in scores for each core characteristic (3% on average) could be explained by the combination of these three demographic variables. In general, large hospitals, urban hospitals, and hospitals with physician training programs tended to score higher on implementing automated technology, assigning staff to clinical and research functions, and performing activities that require 24-hour pharmacy services. Small and rural hospitals tended to score higher with rapid communication and dissemination of information, logistical efficiencies due to size,

Table 8. Scores on Composite Variables Reflecting Difficulty and Cost Associated with Implementation*

Cost and Difficulty with Implementing Items	Mean Percent Score	SD	Mean Weighted Score	SD	Maximum Possible Weighted Score	Number of Items in Composite
Low	60%	11.59	271	52.38	452	89
Moderately Low	62%	11.95	258	49.71	416	64
Moderate	57%	12.29	116	25.07	204	25
High	48%	13.72	50	14.27	104	10
Very High	13%	12.88	8	8.24	64	5

* SD, standard deviation.

and adequate staffing patterns. However, because these demographic factors explained only an average of 3% of the variance in the core scores, other factors that influenced the self-assessment scores remain to be explored.

Difficulty and Costs Associated with Implementation

Self-assessment items were sorted into categories associated with the cost and difficulty of implementation. As expected, the items that were either difficult or expensive to implement were least used—including application and maximization of technology such as CPOE, barcoded drug dispensing and administration, and laboratory and medication order entry system integration. On average, hospitals scored only 13% of the maximum possible score associated with this set of items. By comparison, hospitals scored an average of 60% of the maximum possible score for the set of items that were least expensive or difficult to implement (see Table 8, above).

Study Limitations

A number of factors potentially limit the survey findings' generalizability and reliability. First, participating hospitals were instructed to complete the self-assessment through thoughtful deliberation by an interdisciplinary committee; however, there was no way to verify either that this procedure was followed or the accuracy of the self-reported data. Second, only 23% of hospitals that were sent the survey returned data. The length of the survey may be one possible factor, but the larger obstacle was clearly legal in nature. Anecdotal evidence suggests that many hospitals completed the self-assessment but failed to return data to ISMP. Phone calls to a random sample of hospitals confirmed that hospitals were concerned about waiving existing peer review protection of internal quality information if the data were shared with an external organization. One national and several state organizations publicly warned hospitals to carefully consider the legal risks of sharing data outside the organization. To overcome legal concerns, several state associations, mostly from the Midwest, facilitated agreements between respondents and ISMP to protect the data from legal discovery, which accounts for this region's higher response rate.

Hospitals that did return data, as noted earlier, were generally larger and more likely to be nonprofit compared with hospitals nationwide. However, the differences in demographic composition between the sampled hospitals and hospitals nationwide were generally small, and, we believe, were unlikely to meaningfully affect the generalizability of the study's conclusions. The finding that hospital demographics accounted for only a small amount of variation in scores for the 20 core characteristics further supports this interpretation.

A third possible study limitation is related to the survey instrument. Although the survey's overall internal reliability was good, items within some core characteristics did not appear to relate well to each other, perhaps reflecting the small number of items within each core characteristic; scales with fewer items tend to have smaller reliability coefficients.[42] In addition, the core characteristics were conceptualized as performance goals, exemplified by the

individual self-assessment items. Because not all items within a core characteristic were designed to measure the same aspect of that core characteristic, it is not surprising that some inter-item correlations were low. Nevertheless, the possibility that some items were grouped together in the same core characteristic, when it might have been better to view them as defining different core characteristics cannot be overlooked and will be explored further in the next round of survey evaluation and development.

The low internal reliability coefficients for some core characteristics do not affect the results as presented in this article. Both the domain scores and the overall self-assessment score are based on the individual items—not on the core characteristics in which the items were subgrouped. The average inter-item correlation between the 194 individual items was very strong.

During the three years since the survey was distributed, many hospitals have used their individual survey results to make substantive changes. Plans are under way to resurvey hospitals in the United States in 2004, with these 2000 findings as baseline data.

Discussion

Findings from the ISMP Medication Safety Self-Assessment® demonstrate an enormous opportunity to improve medication safety within our health care systems. Scores for 9 of the 10 domains and 16 of the 20 core characteristics were 70% or below—a score we may consider "borderline" or "poor," at least in an academic setting.

It is not surprising that hospitals tended to score lowest in domains related to organizational culture and how they manage and communicate information. First, the current culture in health care reflects the basic attitudes that people have developed over many years. Thus, cultures are slow to change. But if we continually introduce new behaviors—new ways of handling error, as presented in the ISMP Medication Safety Self-Assessment®—we can begin to embody a different set of assumptions, priorities, and values, and we will have then set the stage for the much-needed migration to a culture of safety.

Next, both providing information to patients about their prescribed therapy and communicating information *about* patients and their prescribed therapy among the entire health care team are inherently complex. Certainly, technological solutions such as CPOE, bar coding, and fully interfaced information systems will be helpful. However, as the survey findings show, there is ample room for improvement among less costly and less difficult-to-implement error-reduction strategies related to both information management and culture.

In general, participating hospitals tended to score better in domains related to the environment: safe procurement and storage of medications, safe physical spaces for drug preparation, and safe procurement and use of drug delivery devices. Each of these represents less complex areas over which organizations are likely to have more control than culture or information management.

Despite the hospitals' overall weak performance, the items on the self-assessment survey were never held out to be and should not be considered a minimum standard of practice. In fact, quite a few items represent ideal system enhancements known to be sparsely implemented in hospitals. Low scores were anticipated and reflect an honest assessment of medication practices. Hospitals completing the self-assessment spent considerable time evaluating their medication systems and demonstrated an exemplary commitment to safety, regardless of the scores achieved. Equally important, the self-assessment established a baseline of data about medication practices that can be used to evaluate improvement and identify national priorities. J

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