Original Article

Value of Pharmacist Medication Interviews on Optimizing the Electronic Medication Reconciliation Process

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Abstract

Purpose: Few studies have explored the impact of using different methods for obtaining accurate medication histories on medication safety. This study was conducted to compare the accuracy and clinical impact of pharmacist medication histories obtained by electronic medical record review (EMRR) alone with those obtained by direct interviews combined with EMRR.

Method: This 18-week prospective study included patients who were admitted to the Inpatient Medicine Service at the study institution and who had a pharmacist-conducted medication reconciliation EMRR within 48 hours of hospital admission. A chart review was performed to collect data to determine whether differences existed in the number of discrepancies, recommendations, and medication errors between the EMRR alone group compared to the EMRR combined with the patient interview group.

Results: Five hundred thirteen discrepancies were identified with the EMRR group compared to 986 from the combined EMRR and patient interview group ($P < .001$). Significantly more recommendations were made in the combination interview group compared to the EMRR alone group (260 vs 97; $P < .001$). Fewer medication errors were identified for the EMRR alone group compared to the combination interview group (55 vs 134; $P < .001$). The most common errors were omitted medications followed by extra dose/failure to discontinue therapy and wrong dose/frequency errors.

Conclusion: Pharmacist-conducted admission medication interviews combined with EMRR can potentially identify harmful medication discrepancies and prevent medication errors.

Key Words—medication reconciliation, pharmacist medication interviews

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Patient safety is a national priority for The Joint Commission and the Institute of Medicine.^{1–3} It has been estimated that 25% of medication-related injuries are related to preventable medication errors.^{4–6} Many of these medication errors are related to unintentional medication discrepancies that occur

during transitional points of health care, including hospital admissions, transfers, and discharge.^{1,3,6–8} According to The Joint Commission, medication reconciliation is defined as “...the process of identifying the medications currently being taken by an individual.”³ These medications are compared to newly

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ordered medications, and discrepancies are identified and resolved. Medication reconciliation is an essential process that health care systems need to implement to avoid unnecessary harm to patients related to medication errors. Approximately 46% of all medication errors and 20% of adverse drug events (ADEs) have been attributed to a lack of medication reconciliation.^{2,7} As a result, The Joint Commission mandated that institutions comply with the National Safety Goal 8 to “accurately and completely reconcile medications across the continuum of care” to prevent drug omissions, duplications, and drug interactions.³ Recently, The Joint Commission revised its Hospital National Patient Safety goals related to medication reconciliation and currently requires hospitals to “maintain and communicate accurate patient medication information.”³ To accomplish this standard, a current list of the patient’s outpatient medications will be obtained upon admission and then compared with the patient’s hospital medication orders in efforts to identify and resolve discrepancies.^{1,3} At discharge, The Joint Commission recommends that patients should receive “written information on the medications” that the patients will be taking following discharge from the hospital and should receive patient education on the “importance of managing” their medication information.³

Although The Joint Commission recommends that medication reconciliation should be performed at admission, the agency does not provide guidance for how health care institutions should effectively conduct this process. One strategy is to follow the Institute of Medicine’s recommendations to implement information technologies, including the use of electronic medical records and computerized physician order entry systems.^{9,10} Ideally, the use of these technologies would facilitate the effectiveness and efficiency of performing chart reviews and, thereby, the medication reconciliation process. Another strategy is to obtain a medication history by directly interviewing the patient and/or the patient’s caregiver.⁹

Studies have revealed that obtaining an accurate and complete medication history is an important step for initiating the medication reconciliation process.^{6–21} Results from a review of 22 studies demonstrated that 27% to 54% of patients had at least one medication error on hospital admission.⁶ In particular, several studies have described the value of pharmacist-obtained medication histories.^{6,13,15,16} These studies have demonstrated that pharmacists identified a higher number of medications or medication discrepancies compared to physicians and other

nonphysician providers when obtaining medication histories. Other studies also demonstrate that pharmacist-initiated histories resulted in fewer medication errors^{15,18} and ADEs.^{11–13}

Despite these benefits, many health care institutions do not require that pharmacists routinely perform medication interviews as part of the medication reconciliation process, because of workload concerns and lack of pharmacy manpower.^{6,15} Moreover, with the use of information technologies, the need to have pharmacists conduct interviews may not be necessary if pharmacists can obtain a complete and accurate medication list through electronic medical chart review. Few studies have explored the impact of using different methods for obtaining accurate medication histories on medication safety.^{9,22,23} This study was conducted to compare the accuracy and clinical impact of pharmacist medication histories obtained by electronic medical record review (EMRR) alone with those obtained by direct interviews combined with EMRR.

METHODS

Study Site

The study was conducted at a Veterans Affairs (VA) Medical Center, an integrated health care facility that included a tertiary care teaching hospital; 134 acute care beds; an 18-bed surgical, medicine, and coronary care intensive care unit; a 120-bed nursing home care unit; and more than 220,000 clinic visits per year. At the time of the study, the medical center was providing care to approximately 25,000 veteran patients. In 1999, the medical center implemented its computerized physician order entry (CPOE) and barcode medication administration systems. During the study, there were 2 clinical pharmacists with PharmD degrees and residency training and 4 first-year pharmacy residents who participated in the medication reconciliation process.

Global Study Design

This 18-week prospective study was approved by the site’s Research and Development Committee and Institutional Review Board. Patients whose medication histories were reviewed were included in the study if they were admitted to the Inpatient Medicine Service and if a clinical pharmacist or pharmacy resident had performed a medication reconciliation EMRR and had interviewed the patients and/or patients’ caretaker within 48 hours of hospital admission. Patients were excluded if they were initially admitted to another service during the inpatient

stay, were transferred from a long-term care facility, were transferred from an outside hospital, or if the patients and/or caretakers could not be interviewed.

Medication Reconciliation Procedures

The clinical pharmacists and pharmacy residents were trained to perform medication reconciliation procedures using a standardized EMRR and interview process. For the standardized EMRR, they collected the patient's current weight, height, and serum creatinine and determined the patient's estimated creatinine clearance. Next, they obtained the most current and accurate outpatient medication list consisting of the patient's VA and non-VA medications. This list included the names of the patient's medications, dose, frequency, route, last fill date, day supply, expiration date, and prescription status. Progress notes from the Computerized Patient Record System (CPRS) were reviewed for any documented medication changes, allergies, or ADEs that were not reflected in the patient's active outpatient medication and allergy/ADE profile.

In addition, the clinical pharmacists and residents were trained to prepare for the interview by conducting an EMRR first as outlined in the aforementioned procedures. Upon interview, they were instructed to introduce themselves to the patient, caretaker, or individual involved with the administration and management of the patient's medications. The patient/caretaker was then asked if he or she had brought the patient's medication bottles or list. A comparative evaluation of the medication bottles and lists obtained from the patient/caretaker and from EMRR was then conducted with the patient/caretaker to generate an accurate and current medication list. The patient/caretaker was also interviewed to determine whether the patient received any non-VA medications, including over-the-counter medications, nutraceuticals, herbals, alternative medications, and/or prescribed medications filled at a non-VA pharmacy. When appropriate, the pharmacist/resident would contact the non-VA pharmacy to confirm the non-VA prescription information, including the name of the medication, dose, frequency, route, last fill date, and day supply. A brief allergy and ADE history was also conducted.

A comparison of the admission medication orders with the patient's compiled medication list was then conducted to identify any medication discrepancies. A medication discrepancy was defined as any unintentional difference between the patient's outpatient medication regimen and the admission medication

orders. Examples of discrepancies included medication omissions, duplications, changes, and/or additions. Clarifications were made with prescribers in an effort to reconcile the discrepancies, and recommendations were made for any unintentional medication discrepancies or for other medication-related issues when appropriate.

The pharmacists/residents were trained to document the medication reconciliation using an electronic medication reconciliation note template. The patient's most current inpatient medication list was imported within the note. The pharmacists/residents were required to document whether the medication reconciliation process took place during the patient's admission, unit transfer, or discharge. They were required to document the source of information from whom (eg, caretaker or patient) and/or where the medication information was obtained. They were required to document the patient's outpatient medication list, including non-VA medications, obtained from interview, EMRR, or both. They then listed any intentional and unintentional medication discrepancies that they had identified and the reason for the discrepancy if known. Documentation of medication changes and/or recommendations related to the discrepancies were specified in the note, and recommendations were directly communicated to the providers whenever possible.

Study Procedures

Data were collected on the baseline characteristics of patients including age, sex, number of active medications in outpatient profile, number of medications listed in the medication reconciliation admission note, and number of disease states listed in the patient's admission notes. Investigators also collected data on the type and number of discrepancies identified by the clinical pharmacist from EMRR and during the interview, number and type of recommendations made by the clinical pharmacist, name and VA medication class associated with each recommendation, and number of recommendations accepted by the provider.

Recommendations were based upon Hepler and Strand definitions of drug-related problems and from previous clinical studies.^{24,25} Recommendations were defined as suggestions made to a provider that involved application of the pharmacist's knowledge specific to a patient or physician order.²⁵ As an example, for the category "untreated diagnosis," the pharmacist would recommend initiating treatment for an identified but untreated medical condition.^{24,25}

Recommendations related to the discrepancies were considered accepted if changes were made by the provider during the patient's hospital admission while on the Inpatient Medicine Service. Recommendations were reclassified as medication errors based upon a classification tool adapted from the National Coordinating Council for Medication Error Reporting and Prevention (see **Appendix 1**). Clinical pharmacist recommendations that were accepted by the provider were categorized as medication errors averted. Recommendations that were not accepted by the provider were categorized as medication errors identified.

Each of the medication errors averted and identified was assessed for its potential to cause patient harm based upon an adapted Severity Assessment Code (SAC) scoring system (see **Appendix 2** for scoring criteria) or harm scale.²⁶ Each medication error was assigned a severity category (minor, moderate, severe, catastrophic) and probability category (remote, uncommon, occasional, frequent) by an independent evaluator.²⁶ Based upon the severity and probability categories, the medication error was then assigned a harm score from 1 to 3 from the SAC matrix (1 associated with a minor [eg, requiring no increased level of care] or moderate [eg, requiring increased level of care] outcome of severity, 2 with a moderate or major [eg, increased level of care] outcome of severity, and 3 with a major or catastrophic [eg, death or permanent injury] outcome of severity).²⁶ The medication errors and SAC harm scores were then reviewed and verified by a panel of 2 other evaluators.

Differences in the number of discrepancies, recommendations, and medication errors identified and averted based upon EMRR alone to EMRR combined with the patient interview were compared by the paired Student *t* test using Microsoft Excel (Microsoft, Redmond, WA). The chi-square test was used to compare the SAC scores and the percentage of accepted recommendations using the SigmaStat Version 2.0 program.

RESULTS

A total of 610 patients with Pharmacist Medication Reconciliation progress notes were screened during the study period of October 1, 2007 to February 15, 2008. Four hundred seventy-seven patients were excluded (276 patients were admitted to a non-Inpatient Medicine Service, 121 patients did not have a pharmacist interview, 33 patients had EMRR notes written at transfer or discharge, 22 patients had notes written beyond 48 hours after admission, 18 patients

Table 1. Patient demographics (*N*=133)

Demographics	<i>N</i> (%) or mean $\pm$ <i>SD</i> (range)
Gender	
Male	131 (98.5%)
Female	2 (1.5%)
Age, years	68.2 $\pm$ 11.4 (38–96)
No. of outpatient prescriptions per patient	13.5 $\pm$ 7.7 (0–46)
No. of inpatient prescriptions per patient	14.6 $\pm$ 6.4 (1–31)
No. of disease states per patient	9.8 $\pm$ 5.0 (0–29)

had interviews that were not conducted by a pharmacist, 4 patients were transferred from an outside hospital, and 3 patients were transferred from a long-term care facility). One hundred thirty-three of 610 patients were included and were predominately male (98.5%), with a mean age of 68 years (range, 38–96 years) and an average number of 14 outpatient prescriptions, 15 inpatient medications, and 10 medical conditions (see **Table 1**).

A significantly higher number of medication discrepancies were identified in the EMRR combined with interview group (combination group) compared to the EMRR alone group (986 vs 513; *P* < .001). As shown in **Table 2**, the most frequent type of medication discrepancy for both groups involved omitted medications. The combination group had higher frequencies of discrepancies that involved medications that were not indicated, medications with a change in the prescribed dose/frequency or route of administration, and medications that were not listed on the patient's medication profile. The combination group also had a higher frequency of discrepancies related to patients' actual medication regimens differing from their prescribed one. The combination group had a significantly higher number of pharmacist recommendations related to the medication discrepancies compared to the EMRR group (260 vs 97; *P* < .001). As depicted in **Table 3**, treatment recommendations for untreated diagnoses represented the most common type of recommendation for both groups, followed by recommendations for discontinuing drug duplications and making dose/frequency adjustments. For the EMRR group, 43% (42/97) of recommendations were accepted by providers compared to 48% (126/260) of recommendations in the combination group, which was a nonsignificant finding (*P* = .433).

Table 2. Type of medication discrepancies in EMRR alone versus EMRR plus interview

	EMRR (<i>n</i> = 513)		EMRR and interview (<i>n</i> = 986)	
	<i>n</i> (%)	Per 1,000 patient days ^a	<i>n</i> (%)	Per 1,000 patient days ^a
Not ordered by provider in hospital	362 (70.6)	55	454 (46)	69
Inpatient order with dose / frequency / route different from outpatient prescription	68 (13.3)	10	89 (9)	13
Not indicated	47 (9.2)	7	71 (7.2)	10
Patient taking regimen different from outpatient prescription	34 (6.6)	5	243 (24.6)	37
Patient taking non-VA medications not documented on medication profile ^b	2 (0.4)	0.3	129 (13.1)	19

Note: EMRR = electronic medical record review; VA = Veterans Affairs.

^aThe rates of each type of discrepancy were reported per the 1,000 patient days using local bed day occupancy rates for the Inpatient Medicine Service.

^bExamples of a non-VA medication could include prescriptions filled at outside pharmacies or over-the-counter medications (such as aspirin).

Table 3. Distribution of recommendations, medication errors, and medication class associated with the errors in EMRR alone versus EMRR plus interview

Types of recommendations	EMRR (<i>n</i> = 97) <i>n</i> (%)	EMRR and interview (<i>n</i> = 260) <i>n</i> (%)
Untreated diagnosis	47 (48.5)	106 (40.8)
Duplication of therapy	19 (19.6)	77 (30.6)
Dose or frequency change	15 (15.5)	47 (18.1)
Prevent or manage ADE	10 (10.3)	17 (6.5)
Evaluate response	4 (4.1)	4 (1.5)
Duration of therapy	1 (1)	7 (2.7)
Drug interaction	1 (1)	2 (0.4)
Types of medication errors		
Omitted drug	47 (48.5)	106 (41)
Extra dose/failure to discontinue	19 (19.6)	77 (30)
Wrong dose/frequency/schedule	15 (15.5)	47 (18)
Wrong drug/dosage form/route	10 (10.3)	17 (6.5)
Lack of drug monitoring	4 (4.1)	4 (1.5)
Wrong duration of therapy	1 (1)	7 (2.7)
Drug-food/drug-drug interaction	1 (1)	2 (1)
Medication classes		
Cardiovascular	33 (34)	57 (21.9)
Miscellaneous	22 (22.7)	53 (20.4)
Gastrointestinal	16 (16.5)	37 (14.2)
Endocrine	10 (10.3)	25 (9.6)
Respiratory	7 (7.2)	27 (10.4)
Neurologic / opioid / psychiatric	5 (5.2)	35 (13.5)
Skin	4 (4.1)	26 (10)

Note: ADR = adverse drug event; EMRR = electronic medical record review.

The combination group had a significantly higher number of medication errors identified (134 vs 55) and averted (126 vs 42) compared to the EMRR group. Table 3 describes the frequency of distribution of medication errors by type. Errors related to omitted medications were common in both groups, followed by extra dose/failure to discontinue therapy and wrong dose/frequency errors. Cardiovascular medications were the most common medication class linked with errors in both the EMRR alone and combination groups, followed by miscellaneous and gastrointestinal medications.

Overall, medication errors related to the discrepancies for the combination and the EMRR alone groups had a median SAC score of 1. Sixty-seven percent of medication errors (174/260) had a SAC score of 1 in the combination group compared to 63% (61/97) for the EMRR alone group ($P = .555$). Both groups had a similar frequency of SAC scores of 2 (EMRR, 36/97 [37%] vs combination, 86/260 [33%]; $P = .555$), and both groups did not have any SAC scores of 3 assigned to their medication errors.

DISCUSSION

Even with the widespread application of information technologies within the study institution, this study demonstrated the valuable benefit of having pharmacists perform detailed admission medication interviews as part of the medication reconciliation process. This study suggests that reliance on chart review as the sole source of information for admission medication reconciliation is inadequate even when using a highly integrated medical information system. Patients often take medications in ways that are different from those prescribed, and this study explains in part why a thorough patient interview reveals more discrepancies. This study shows that significantly higher number of medication discrepancies and medication errors were identified or averted as result of the pharmacist interviews in comparison to EMRR alone. One recent study by Stewart et al provides evidence for the value of the pharmacist and pharmacy student interview.²⁷ The Stewart study revealed that 51.5% (257 of 499) of medications with discrepancies were reported by patients but were not listed in the EMRR.²⁷ One limitation with the Stewart study was that investigators did not evaluate whether the medication discrepancies could have resulted in potential patient harm. In comparison, this study demonstrated that at least 33% of the medication errors associated

with the discrepancies could have resulted in potential moderate to severe patient harm (as ranked 2 on the harm scale). A study by Feldman et al revealed a slightly lower frequency of unintentional discrepancies that were ranked 2 or 3 on the harm scale (27.5% or 26/225).²⁰ However, the study by Feldman et al differed from the present study, because nurses performed the interviews and different harm scales were used. Another study involving 54 mental health patients found that the mean number of medications identified by pharmacists was significantly higher than the mean number identified by nurses (5.3 ± 3.7 vs 4.0 ± 3.2 ; $P < .05$).¹⁴

Similar to other studies, omitted medications represented the most frequent type of medication error and discrepancy.^{6,15,20,28} As shown in the Stewart et al study,²⁷ patient medication interviews facilitated the identification of discrepancies related to patients' actual or reported medication regimen differing from the prescribed or charted regimen. These findings reflect the value of the patient interview and how it enables pharmacists to identify not only potentially harmful medication discrepancies but also medication adherence problems and patients' lack of knowledge or understanding of their medications. The identification and electronic chart documentation of these medication discrepancies and other medication-related problems within 48 hours of admission can then facilitate the medication reconciliation and educational process at discharge.

Current Practice of Medication Reconciliation at Study Facility by Pharmacy Staff

Results from this study have been used to justify 2 full-time equivalent (FTE) inpatient medication reconciliation surgical and internal medicine pharmacist positions and 2 FTE inpatient pharmacy technician medication reconciliation positions. Currently, to facilitate the medication reconciliation process, clinical pharmacists at the study institution perform as many admission medication interviews as time permits. When the case load of newly admitted patients is high, the medication reconciliation pharmacy technicians and pharmacy students assist the pharmacists by conducting EMRRs and medication histories to determine whether patients are taking their medications as prescribed. The pharmacist then compiles and evaluates information obtained from the interview and EMRR to identify medication discrepancies that require therapeutic intervention. In addition, a national VA electronic medication reconciliation tool has been developed to facilitate the medication rec-

conciliation process for the pharmacy staff, students, and residents. This tool includes an electronic summary that lists the veteran patients' active inpatient medications, active outpatient medications dispensed at the local institution and other remote VA sites, and previously dispensed medication in the last year.

Limitations

This study was limited by its retrospective review of medication discrepancies and pharmacist recommendations. Because this study involved pharmacists with varying levels of expertise, clinical experience, and documentation skills, the complete scope of potentially harmful medication discrepancies and pharmacist recommendations may not have been completely identified. Although the sample size was large enough to detect a significant difference in the frequency of medication errors between the 2 groups, the sample size may not have been large enough to detect a significant difference between the SAC scores. The results from this study may also not be generalized to other non-veteran academic tertiary health care facilities or to other health care settings, because many of these sites lack access to comprehensive computerized medical records. Last, this study excluded patients who were transferred from long-term care facilities or outside hospitals because of limited access to patient medical records.

Future Direction

Future studies are needed to evaluate and compare the impact of medication admission interviews conducted by pharmacist technicians, pharmacy students, and pharmacy residents on performance measures related to the medication reconciliation process. Other studies will need to compare the clinical impact of medication interviews that are conducted by pharmacists, pharmacist technicians, nurses, physicians, and other health care providers. It will also be useful to determine whether the Veteran Administration's national medication reconciliation tool enhances the identification of medication discrepancies. The value of performing medication reconciliation in the community setting also requires further study.

Conclusion

Pharmacist-conducted admission medication interviews combined with EMRR can potentially identify harmful medication discrepancies and prevent medication errors.

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APPENDIX 1

Selected Pharmacist Recommendation and Medication Error Classification List

Selected Recommendations	Medication Error Classification
Drug dose/frequency adjustment	Wrong dose/frequency schedule
Drug interaction	Drug-food interaction/drug-drug interaction
Duplication of therapy	Extra dose/failure to discontinue medication
Duration of therapy	Wrong duration of therapy
Evaluate response	Lack of drug monitoring
Prevent/manage adverse drug event	Wrong drug/dosage form/route
Untreated diagnosis	Omitted drug

Adapted, with permission, from the San Francisco VA Pharmacy Service Medication Use Improvement Form, revised February 1, 2002.

APPENDIX 2

Safety Assessment Code Scoring System^a

The severity categories and the probability categories that are used to develop the safety assessment codes (SACs) for adverse events and close calls are presented below and are followed by information on the SAC matrix.

Severity Categories

1. Key factors for the severity categories are extent of injury, length of stay, level of care required for remedy, and actual or estimated physical plant costs. These 4 categories apply to actual adverse events and potential events (close calls). For **actual adverse events**, assign severity based on the patient's actual condition.
2. If the event is a **close call**, assign severity based on a reasonable "worst case" systems level scenario. **NOTE:** For example, if you entered a patient's room before they were able to complete a lethal suicide attempt, the event is catastrophic, because the reasonable "worst case" is suicide.

<i>Catastrophic</i>	<i>Major</i>
<p>Patients with actual or potential: Death or major permanent loss of function (sensory, motor, physiologic, or intellectual) not related to the natural course of the patient's illness or underlying condition (ie, acts of commission or omission). This includes outcomes that are a direct result of injuries sustained in a fall; or are associated with an unauthorized departure from an around-the-clock treatment setting; or are the result of an assault or other crime.</p> <p>Or any of the following:</p> <ul style="list-style-type: none"> • Suicide (inpatient or outpatient) • Rape • Hemolytic transfusion reaction • Surgery or procedure on the wrong patient or wrong body part • Infant abduction or infant discharge to the wrong family <p>Visitors: A death or hospitalization of 3 or more visitors</p> <p>Staff: A death or hospitalization of 3 or more staff</p> <p>Fire: Any fire that grows larger than an incipient stage</p>	<p>Patients with actual or potential: Permanent lessening of bodily functioning (sensory, motor, physiologic, or intellectual) not related to the natural course of the patient's illness or underlying conditions (ie, acts of commission or omission) or any of the following:</p> <ul style="list-style-type: none"> • Disfigurement • Surgical intervention required • Increased length of stay for 3 or more patients • Increased level of care for 3 or more patients <p>Visitors: Hospitalization of 1 or 2 visitors</p> <p>Staff: Hospitalization of 1 or 2 staff or 3 or more staff experiencing lost time or restricted duty injuries or illnesses</p> <p>Equipment or facility: Damage equal to or more than \$100,000</p>
<i>Moderate</i>	<i>Minor</i>
<p>Patients with actual or potential: Increased length of stay or increased level of care for 1 or 2 patients</p> <p>Visitors: Evaluation and treatment for 1 or 2 visitors (less than hospitalization)</p> <p>Staff: Medical expenses, lost time, or restricted duty injuries or illness for 1 or 2 staff</p> <p>Equipment or facility: Damage more than \$10,000 but less than \$100,000</p> <p>Fire: Incipient stage or smaller</p>	<p>Patients with actual or potential: No injury, nor increased length of stay, nor increased level of care</p> <p>Visitors: Evaluated and no treatment required or refused treatment</p> <p>Staff: First aid treatment only with no lost time, nor restricted duty injuries, nor illnesses</p> <p>Equipment or facility: Damage less than \$10,000 or loss of any utility without adverse patient outcome (eg, power, natural gas, electricity, water, communications, transport, heat and/or air conditioning)</p>

Probability Categories

1. Like the severity categories, the probability categories apply to actual adverse events and close calls.
2. In order to assign a probability rating for an adverse event or close call, it is ideal to know how often it occurs at your facility. Sometimes the data will be easily available because they are routinely tracked (eg, falls with injury, adverse drug events [ADEs], etc). Sometimes, getting a feel for the probability of events that are not routinely tracked will mean asking for a quick or informal opinion from staff most familiar with those events. Sometimes it will have to be your best educated guess. Adverse events or close calls are categorized as follows: frequent = likely to occur immediately or within a short period (may happen several times in 1 year); occasional = probably will occur (may

happen several times in 1 to 2 years); uncommon = possible to occur (may happen sometime in 2 to 5 years).; and remote = unlikely to occur (may happen sometime in 5 to 30 years).

Safety Assessment Codes (SAC) Matrix

Severity & probability	Catastrophic	Major	Moderate	Minor
Frequent	3	3	2	1
Occasional	3	2	1	1
Uncommon	3	2	1	1
Remote	3	2	1	1

^a The SAC scoring tool was obtained from the *Veterans Health Administration (VHA) National Patient Safety Improvement Handbook*. Washington, DC: Department of Veterans Affairs, Veterans Health Administration; 2007. VHA handbook 1050.01.