Quantitative and Qualitative Analysis of Medication Errors: The New York Experience

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Abstract

Objectives: In June 2000, the New York State Department of Health (NYSDOH) expanded its New York Patient Occurrence Reporting and Tracking System (NYPORTS) mandatory adverse event reporting system to include the reporting of medication errors. The errors included were those that resulted in a severity of patient harm that met the National Coordinating Council Medication Error Reporting Program (NCC MERP) criteria for categories G (resulting in permanent patient harm), H (resulting in a near-death event) and I (resulting in patient death). Root cause analyses (RCA) that examine systems issues and identify mechanisms for future prevention of these events were studied. **Methods:** A panel of 11 multidisciplinary professionals performed a quantitative and qualitative analysis of 24 months of medication errors reports submitted to the NYPORTS system. NYPORTS requires that the 249 hospitals in New York State (NYS) electronically notify the NYSDOH of reportable errors within 24 hours of occurrence detection and that a RCA for that occurrence be submitted within 30 days. **Results:** Qualitative analysis of the RCAs included findings related to lessons learned, emergent themes, and use of system fixes instead of punitive fixes or inappropriate/incomplete system fixes. The quantitative analysis examined several variables. These included where in the process the error occurred, what disciplines were involved, the error distribution, the occurrence type, the medication or medication classes involved, and the breakdown by patient outcome. **Conclusions:** Mandatory medication error reporting can provide useful information about systems contributing to errors, strategies for prevention, and evidence-based information about patient safety concepts. This information is important for hospitals to consider both when analyzing medication errors and when implementing systems to improve safety. This report is intended to help guide public policy and provide guidance to other states interested in establishing mandatory reporting systems.

Introduction

During a statewide meeting of the New York Patient Occurrence Reporting and Tracking System (NYPORTS) Council, held on September 18, 1998, there was a consensus that a special subcommittee should be formed to address the reporting of medication errors. The first meeting of the multidisciplinary committee took place in October 1998. Nurses, pharmacists, and New York State Department of Health (NYSDOH) administrators were recruited to join the

subcommittee. The medication subcommittee was charged with developing reporting criteria and a mechanism by which this data would be reported, and with analyzing submitted reports. When the Institute of Medicine (IOM) report on medical errors[1] was issued, the subcommittee reviewed the report to incorporate applicable recommendations into the proposed reporting process. In preparation for data analysis, the subcommittee was expanded to include more individuals with practical expertise needed to make meaningful data interpretations. Physicians with expertise in error and systems analysis, and experience with the poison control center, were recruited to join the panel. Organizational and geographic balance was sought by recruiting clinicians from the private and public sector, different regions of the state, large urban academic medical centers, and small community hospitals. Wide panel diversification was sought to ensure that proposed system fixes would be applicable across a broad spectrum of care settings.

Implementation

Issues discussed by the medication subcommittee included the following:

- What do we want to learn from this system?
- What information will we need in order to draw valid conclusions?
- What definitions will be used?
- Which errors will be reportable?
- Do we want to incorporate national standards?

The goal of data collection on medication errors was to provide useful, practical data to hospitals, not only regarding errors themselves, but regarding methods used to reduce their incidence. Subcommittee consensus determined that only medication errors would be included, with a focus on system approaches and not individual practitioners. In determining the medication error criteria, the subcommittee considered the American Society of Health Systems Pharmacists (ASHP) severity index,[2] the ASHP guidelines,[3] the medical event reporting system for transfusion medicine (MERS-TM)[4] and the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) definition for outcome based event categories,[5] as well as criteria developed by local medical centers with strong, successful medication error reporting programs. The subcommittee determined that the NCC MERP outcome severity index and definition of a medication error were nationally recognized standards already in use in many hospitals, and thus would lend themselves to benchmarking of data and provide clear, understandable categories for reporting of errors. The subcommittee felt using the NCC MERP information would provide the best potential for meeting the IOM recommendation of standardized data collection using a defined list of adverse events.[1]

The subcommittee adopted the NCC MERP definition of a medication error:[5]

> *A medication error is any preventable event that may cause or lead to inappropriate use or* patient harm while the medication is in control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures and systems including prescribing; order communication; administration; education; monitoring and use.*

The NCC MERP definitions for outcome categories—G (resulting in permanent harm), H (resulting in near death), and I (resulting in death)—were incorporated into the NYPORTS database (Table 1).[6] Focusing on these errors followed the IOM mandate that mandatory error reporting programs gather data on errors associated with fatal outcomes or serious injuries.[1] A supplemental form for medication was developed to capture error-specific data. The form was pilot tested, revised on the basis of the pilot test results, and finalized by the Statewide NYPORTS Council for adoption and implementation statewide in June 2000.

Table 1. Medication errors resulting in death, near death experience, or permanent patient harm—New York Patient Occurrence Reporting and Tracking System (NYPORTS)

NYPORTS occurrence code	NYPORTS definition	Corresponding NCC MERP medication error category and definition
108	A medication error occurred that resulted in permanent patient harm.	**-G-** An error occurred that may have contributed to or resulted in permanent patient harm.
109	A medication error occurred that resulted in a near-death event (e.g., anaphylaxis, cardiac arrest).	**-H-** An error occurred that required an intervention necessary to sustain life.
110	A medication error occurred that resulted in a patient death.	**-I-** An error occurred that may have contributed to or resulted in the patient's death.

NOTE: All medication errors require a corresponding 900 code and submission of a root cause analysis.
NCC MERP = National Coordinating Council Medication Error Reporting Program

Methods

NYPORTS provides both an epidemiological data source that has historically been relied upon to assess trends or potential vulnerabilities that can impact patient safety, and a database of serious events that require retrospective root cause analysis (RCA).[6]

* Because the committee decided to start with reporting of medication errors resulting in harm, the word "or" in the above definition was changed to "and."

The methodology used to assess these occurrences utilized the taxonomy for human error that is based on the work of James Reason.[7] Evaluation of the submitted RCAs took place only if there was representation from each professional discipline (pharmacy, medicine, nursing, and NYSDOH administration). A total of 108 reports were reviewed by the Medication Committee, 53 of which were submitted with RCAs (June 2000 through May 2002).

Medication data was extracted directly from the NYPORTS database and exported in Microsoft™ Access 2000 format. Microsoft Access was also utilized to extract those medication error cases submitted without a medication error code. A quantitative analysis was performed to examine where in the medication use process the error occurred (prescribing, transcribing, dispensing, administering, monitoring), the disciplines involved (physicians, pharmacists, nurses, respiratory therapists), the breakdown by occurrence type (wrong dose, wrong route, etc.), which medications or medication classes were involved in the errors, the breakdown by patient outcome, patient age, and occurrence data by facility.

Qualitative data analysis relied on the expertise of the medication panel and reference to the current literature. The medication panel used the Agency for Healthcare Research and Quality (AHRQ) model employed in the Evidence Report on patient safety practices[8] for their review. The AHRQ model includes practice description, evidence, potential for harm (unintended outcomes), opportunities for impact, cost, and implementation when determining the strength of the proposed system fixes. The medication panel felt that the AHRQ model carried the greatest potential for identifying best practices, incorporating evidence-based medicine, bringing methodological rigor to systems improvements, and allowing scalability to other institutions. The panel used human factors engineering[9] and error theory[7] to suggest corrections for inappropriate system fixes and to build better systems.

Results

Quantitative analysis

A total of 108 NYPORTS reports were analyzed for the review period. The categories of reportable medication errors used in this analysis are defined in Table 1. Of the medication errors reviewed, errors resulting in permanent harm accounted for 18 percent, near-death errors accounted for 48 percent, and errors resulting in death accounted for 23 percent of the reports. Unexpected deaths (code 915 only) related to medication errors accounted for 11 percent (Figure 1).

All medication errors require the submission of an RCA and corresponding 900 code. The 900 code series (901 to 920) is utilized with the 100 code series and generally indicates a serious outcome to the patient and requires that the facility perform a detailed RCA. There was an initial lack of compliance with this mandate (Table 2). Reeducation of hospitals and redesign of the electronic system has corrected this problem.

Figure 1. Percentage breakdown of reported medication errors included in project (N = 108)

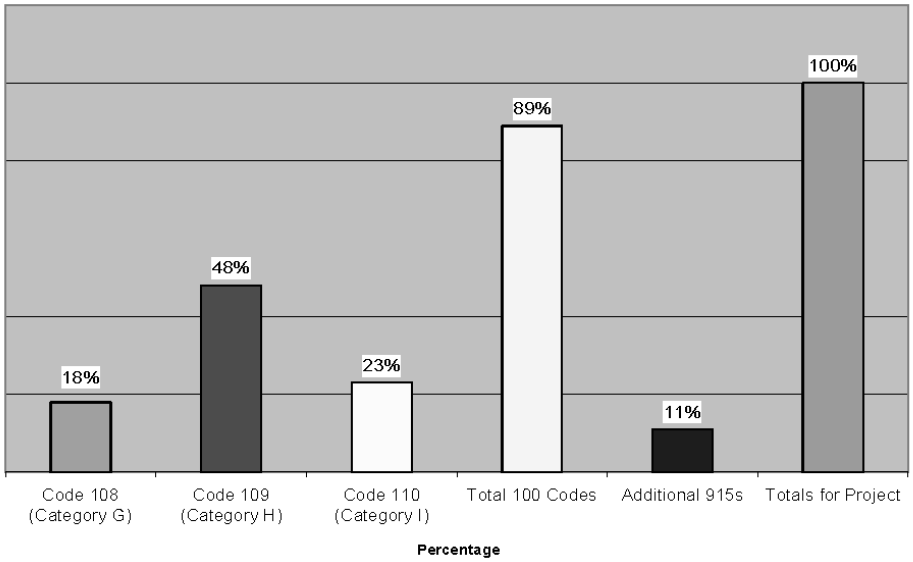


Table 2. Breakdown of 100 code medication errors by associated 900-series codes (N = 96)

Code #	Description of code	Number of reports with a 100 code medication error n (%)
901	Serious occurrence warranting Department of Health notification, not covered by codes 911-963.	6 (6)
915	Any unexpected adverse occurrence not directly related to the natural course of the patient's illness or underlying condition resulting in death.	25 (26)
916	Any unexpected adverse occurrence not directly related to the natural course of the patient's illness or underlying condition resulting in cardiac and/or respiratory arrest requiring basic life support/advanced cardiac life support intervention.	11 (11)
918	Any unexpected adverse occurrence not directly related to the natural course of the patient's illness or underlying condition resulting in impairment of limb.	2 (2)
919	Any unexpected adverse occurrence not directly related to the natural course of the patient's illness or underlying condition resulting in loss or impairment of bodily functions.	4 (4)
920	Errors of omission resulting in death or serious injury related to the patient's underlying condition.	6 (6)
Not assigned a 900 code and root cause analysis not submitted		42 (44)

The NYPORTS program also collects as part of submitted medication errors the type of occurrence of the medication error. Analysis of the data by type of occurrence (Figure 2) identified the most commonly occurring error as wrong dose, followed by wrong drug. When analyzing where in the medication use process the error occurred, it was found that the administration process accounted for the greatest number of errors (Figure 3). This finding is not unexpected, as 90 percent of the errors involved administration of a drug (errors of commission). A further drill-down into the data indicated that in prescribing, verbal orders accounted for 15 percent of the prescribing errors, while written orders accounted for 74 percent of the errors. In the dispensing error category, the drug not being available accounted for 11 percent of the errors. Of note, NYPORTS collects monitoring errors only as a "type of occurrence" and not as part of the "medication use process." A review of the categories of staff involved in the medication occurrences indicated that a registered nurse was involved in 77 percent of the cases, physicians were involved in 58 percent of the cases, and a registered pharmacist was involved in 18 percent of the cases. A breakdown by patient age revealed that the medication errors were more prevalent in patients above 65 years old (46 percent). Further breakdown showed 40 percent of errors occurred in the 18–65 year-old range, and 14 percent in patients younger than 18 years old.

A review of the facility occurrence rates indicates that several facilities reported higher numbers of errors. One facility accounted for 5.5 percent of the medication errors, while a second facility accounted for 4.6 percent. Four facilities each had a reporting percentage of 3.7, and three facilities had a reporting percentage of 2.7. A review of medication classes involved revealed the most common classes to be cardiovascular drugs and narcotic analgesics, both at 14 percent; anticoagulants at 11 percent; followed by central nervous system (CNS) medications and antibiotics, both at 8 percent.

Figure 2. Percentage breakdown of data by type of occurrence (N = 96)

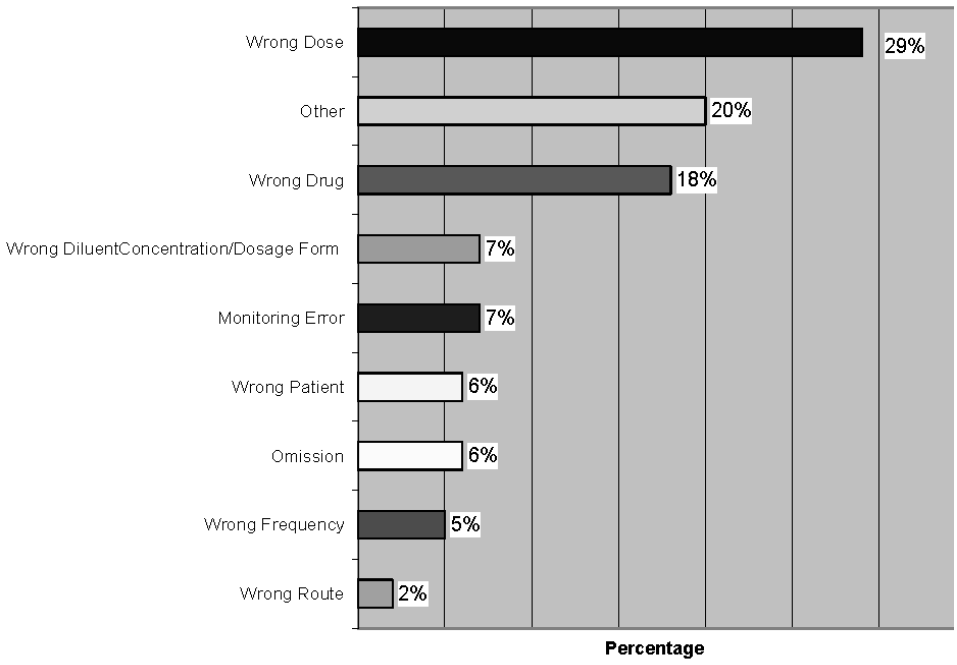
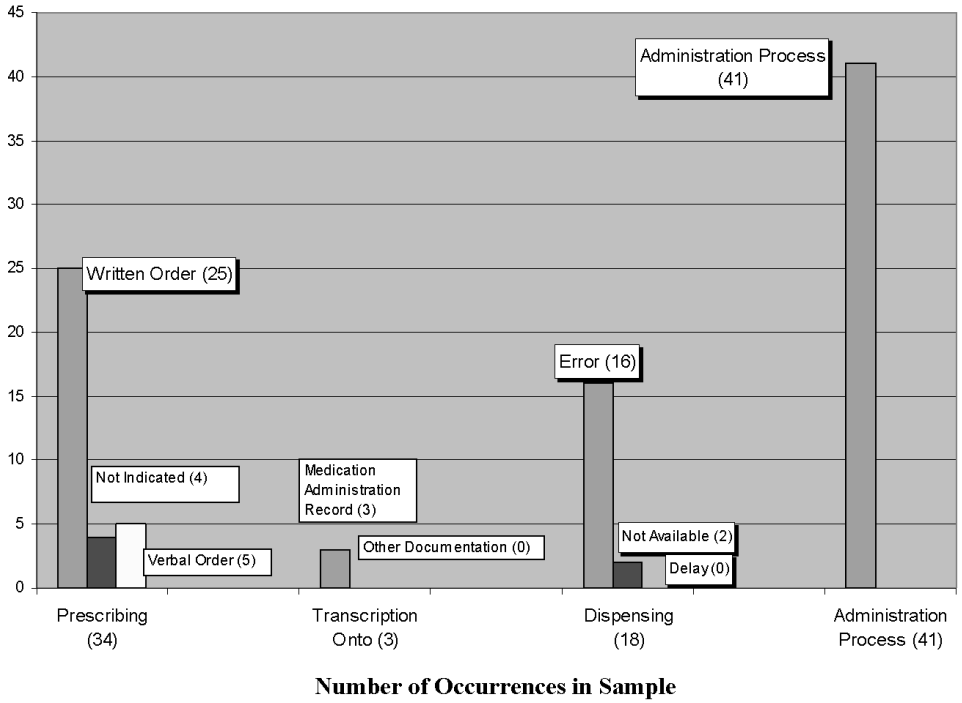


Figure 3. Where in the medication use process the error occurred (N = 96)



Discussion

Quantitative findings

The finding that nursing is the number one discipline involved in the errors is not surprising, given that the nurse administers most medications and is the final individual in the process. The pharmacist or nurse may intercept prescribing errors and the nurse may catch dispensing errors. In the absence of technological support, there is little or no opportunity for errors of administration to be intercepted or caught prior to completion. This information is consistent with voluntary reporting programs, where 2 percent of the errors of administration were trapped prior to completion.[10]

The population above age 65 sustained more injuries than did the pediatric population; this is consistent with the findings of a voluntary medication error reporting program.[11] This may be explained by an increased number of medications used in the elderly and the resilience of younger patients, who respond better to intervention and thus would not sustain an injury likely to meet the NYPORTS reporting threshold. The medication classes involved in the errors in this review are consistent with those reported to the Institute of Safe Medication Practices (ISMP).[12] Several of the root causes of the errors reviewed closely resemble those in the ISMP medication alerts.

Nine facilities accounted for 33 percent of the errors in the NYPORTS database. The findings raised the issue about whether these facilities are more

error-prone or more skilled at detecting errors. To answer this question, more data about the hospitals and medication processes would be needed. This is currently outside of the scope of the NYPORTS program. Historical data from NYPORTS nonmedication reporting suggests that the higher-reporting institutions are more safety vigilant and more likely to identify reportable errors.

Qualitative findings

While the quantitative data identifies processes for targeted improvements, it is the narrative data that provides the richest source for system fixes. The medication panel reviewed the 53 RCAs submitted for lessons that could be shared with the larger community to enhance safety. Emergent themes that presented threats to patient safety, weaknesses in system fixes, and failure-to-rescue type events where earlier intervention may have prevented patient injury were identified. Space limitations require examples from each of these areas be used to illustrate the concepts rather than a comprehensive overview of the entire dataset.

Emerging themes in patient safety threats

The medication panel noted common factors or themes that appeared as significant safety threats. The most significant potential for injury occurred in the transition of a patient across and between levels of care, with medications requiring complex dosing regimens, and in tightly coupled systems where staff faced unusual or uncommon situations. The transition between levels of care within the acute care setting or across the continuum of care resulted in opportunities for communication gaps that led to adverse outcomes. Inaccurate or incomplete data about medication regimens, when undetected, caused patient injuries. An example of such a case included a patient who gave the correct concentration and name of the product for glaucoma control upon admission, but the formulation was not correctly identified. The patient had been taking a long-acting (once-a-day) gel, but had the short-acting product ordered once a day when it was intended for twice-a-day dosing. The patient was given a discharge prescription for the short-acting drops and continued to follow this regimen at home. The patient's ophthalmologist discovered the error 6 weeks postdischarge, at a followup visit. At the time of error discovery, the patient had sustained irreversible eye damage. In other cases, providers omitted drugs that patients were already taking in the transition across levels of care, and the lack of redundant safety checks prevented detection prior to onset of an adverse effect. One example of this is when prescribers omitted chronic steroids in the transfer orders for a patient moving from an intensive care unit (ICU) to a lower level of care, resulting in Addisonian crisis and subsequent death.

Complex medication dosing regimens or overlap between multiple drug formulations created serious threats to patient safety. Correctly dosing patients with low molecular weight heparin (LMWH) for the proper indication, the patient's renal function, therapeutic substitutions, and bridge therapy between short- and long-term anticoagulation creates a level of complexity that requires

careful oversight, which was frequently lacking. RCA teams identified a lack of evidence-based information as a barrier to establishing protocols for care. Cost justification of LMWH usage may include the elimination of lab values for monitoring. In the absence of a lab value, the indicator of therapeutic adjustment was the resulting adverse patient outcome. Unfortunately, the outcomes may be the occurrence of catastrophic bleeds or embolic events that result in irreversible injury or death. Allowing inadequate time between dosing with LMWH and initiating unfractionated heparin or inadvertent use of several regimens concurrently went undetected until an adverse event occurred.

Liposomal amphotericin preparations can have a dosing regimen up to 10-fold higher than for conventional amphotericin formulations.[13] Ordering conventional amphotericin at the liposomal dose resulted in fatal overdoses. The lack of 24-hour pharmacy oversight and the emergent need for prompt initiation of therapy compounded the potential for an error to go undetected until signs of toxicity presented. Intervention was unsuccessful in reversing the effects of the drug for patients with symptoms of amphotericin overdose.

Tightly coupled systems are those in which an action is taken that directly affects the outcome. There is little buffer or slack in the system.[14] Tightly coupled systems pose a great threat of harm because the time from action to response is so narrow that detection of the error is often lacking. The areas identified in the NYPORTS system where tightly coupled systems played a role in adverse patient outcomes were ICUs, emergency departments (EDs), and diagnostic/ interventional areas.

Rare or unfamiliar circumstances compounded the potential that an adverse event would occur. For example, ketamine is the drug of choice for rapid sequence induction in patients with status asthmaticus. It is rarely used in EDs except for this purpose. Patients presenting in status asthmaticus are critically ill and require prompt intervention and rapid estimation of their weight to dose them appropriately. In the absence of prepared dosing guidelines, the risk of an error in dose calculation is significant. System fixes included affixing laminated dosing guidelines to patient clipboards and having the guidelines available to practitioners in the medication rooms.

Physicians assuming roles that they are unaccustomed to, especially in tightly coupled systems, creates a risky environment for patients. One such case involved an ED patient being evaluated for change in mental status in the middle of the night, who was sent to radiology accompanied by a medical resident. The attending physician instructed the resident about the sedative agent to be administered, but the resident was told in radiology that the agent was unavailable. Time pressures—due to limited CT scanner availability; the critical nature of the patient's condition; lack of immediate access to the attending physician; and the need for the resident to order, procure, and administer the drug without nursing or pharmacy support—contributed to the patient receiving a paralyzing agent instead of a sedative agent. Intubation was necessary and saved the patient from a fatal outcome. The reporting hospital changed its practice to staff the radiology suite around-the-clock with a registered nurse (RN) to provide

the necessary skill set in this situation. The aforementioned fixes provide safety nets that focus on the system, but not all of the reporting hospitals displayed the skills required to attain better outcomes, as described in the next section.

Weaknesses of system fixes

The most common pitfalls in the RCAs were solutions that fixed the situation and not the system. Several times, nurses administered incorrect doses from multidose oral solution bottles. RCA analysis identified a "cognitive flip" in which the RN administered the *milligram* dose as a dose in *milliliters*. In one situation, the physician ordered 20 mg of a drug, and the RN administered 20 mL. This same type of error was reported several times in the NYPORTS database. Organizations with expertise in systems analysis produced solutions that looked at all oral liquids in their formularies and dispensed these oral solutions to the nursing units in unit-dose form. Facilities with less expertise frequently proposed less effective solutions, ranging from unit-dose dispensing only for the drug involved in the actual error to affixing a "check strength/concentration" sticker to the product. Unit-dose dispensing of the drug involved in the error will prevent an error with that drug, but not prevent occurrences with other drugs. The sticker will not prevent cognitive flips and is an ineffective solution to the problem. Affixing a label that tells the nurse the dose in milliliters is more likely to reduce a cognitive flip but requires more time on the part of the pharmacy during dispensing.

Another commonly identified weakness of system fixes was to propose educational fixes in the absence of a knowledge deficit. One physician was required to attend a class after a memory lapse that resulted in administration of a contraindicated thrombolytic agent, resulting in a subsequent fatal bleed. The literature tells us that education will not prevent memory lapses.[7] A stronger systems fix would be developing a preprinted anticoagulation order sheet. This sheet would require the prescriber to verify all data has been checked and provides prompts about contraindications at the time of ordering (just-in-time education that reduces the potential that critical information will be overlooked).

Lessons learned

A limitation of the NYPORTS data is that the system fixes proposed often are those that RCA teams plan to implement. Consequently, there is a lack of evidence to measure the impact of the changes made at the time of submission. In addition, with rare events, the absence of injury is not necessarily the best indication that the system fixes have corrected the latent errors. The lessons learned that had the strongest potential for contributing to safety were those extrapolated from other areas within health care or from the literature.

Fatal dosing errors occurred when concentrated narcotics were stored on nursing units so that nurses could mix narcotic infusions. Removal of concentrated narcotics from these areas was recommended, utilizing the same processes applied for reducing deaths from concentrated electrolytes. The medication panel felt that, in addition to removing the concentrated narcotics,

supplying the nursing units with premixed narcotic infusions or having the pharmacy mix the narcotic infusions would avoid delays in treating patients who were in pain and prevent inadvertent reintroduction of concentrated narcotics onto the nursing units.

Organizations that do not have 24-hour pharmacy services need to develop procedural barriers to prevent high-risk drugs from being obtained without pharmacy review. One example is a fatal overdose from conventional amphotericin that was ordered at the liposomal dose. The usual dose of conventional amphotericin is not to exceed 1.5 mg/kg/day, and dosing at 3 mg/kg/day can be fatal.[13] Normal dosing for liposomal amphotericin is 2.5–5 mg/kg/day. The order for 5mg/kg/day of conventional amphotericin was placed after the pharmacy closed and the urgent nature of initiating therapy required access to this medication. The drug was accessed from the automated drug-dispensing unit designated for off-hour use by the nursing supervisor. As result of the error, the hospital focused on eliminating the need for after-hours access. The panel recommended that the unpredictable need for the drug should be anticipated, with the drug carrying a message on the outside of the vial that dose verification was required by a pharmacist on-call prior to release of this medication to the nursing unit. Limiting the amount of available drug to the maximum recommended adult dose would create a barrier that would force the nursing supervisor to call for the location of additional vials. Each organization would need to identify all high-risk drugs contained in the off-hour cabinet/supply and develop similar barriers.

Hospitals relied on education and physician specialists (e.g., hematologists) to avoid errors with sound-alike names or medications with multiple dosing regimens. The panel felt a more effective system fix would be to require the prescriber to include an indication as part of the order, to assist in error detection. Methotrexate is given weekly for rheumatoid arthritis, but an incident where the prescriber ordered it on a daily basis—which is the oncology regimen—was described. The error was detected when bone marrow suppression occurred and the patient developed an episode of fatal sepsis. Lack of ready access to the patient's full medical history prevents the pharmacy from being able to validate the appropriate use of some agents and allow timely dispensing of drugs. A New York State (NYS) hospital demonstrated significant improvement in patient safety when it implemented the requirement that orders for drugs with multiple indications designate the specific use for which the agent is being ordered. Orders for drugs with only one indication or dosing regimen would not need to carry the indication to keep the prescribing burden low and reduce the risk of clinician noncompliance.

Failure-to-rescue events

Failure-to-rescue is defined as a situation in which a patient develops a complication and the providers fail to intervene, resulting in avoidable patient injury.[15] While the majority of errors were discovered with the onset of adverse effects, there were instances in which the error was discovered within the window

of opportunity for intervention. The options proposed by the medication panel to be considered when dealing with unintended medication administration were—

- Administer charcoal to block the absorption of the agents.
- Consult with the poison control center.
- Use reversal agents (naloxone–narcan; sodium polysterene-kayexlate, etc.).
- Administer diphenhydramine (Benadryl™) and steroids.
- Establish intravenous access for rapid intervention if an adverse effect occurs.
- Move the patient to a higher level of care for more careful monitoring.
- Institute watchful waiting.

Unless a clear reversal agent was indicated (e.g., naloxone for narcotics or glucose for insulin), the most common response reported was watchful waiting. In some situations, once there was onset of symptoms, the adverse effects could not be reversed and supportive treatment was unsuccessful. This was especially evident in cases where the patient had a significant medical history with poor cardiac reserve and inadvertently received myocardial suppressants. The RCAs reflected a lack of assessment of the risks to the patient and infrequent use of proactive interventions to offset potential adverse events. Reactive or supportive treatment was the most common response. It should be noted that if proactive intervention was taken and the patient did not experience a serious adverse event, this would preclude the event from being reported in the NYPORTS database.[6]

Intervention carries risks as well. Use of naloxone in the narcotic-dependent patient carries the risk of complete narcotic withdrawal with fatal, noncardiogenic pulmonary edema. One end-of-life patient apparently self-adjusted the infusion pump and received a large dose of morphine. The RCA describes acute shortness of breath, accompanied by severe pain, immediately following the administration of the naloxone. The clinicians continued to administer naloxone despite worsening symptoms. The patient died shortly after the naloxone was administered, but the RCA never discussed the potential of acute narcotic withdrawal to explain the symptoms. Titrating the naloxone to patient symptoms, rather than administering a predetermined amount, will help prevent patient injury associated with complete narcotic reversal. Balancing the need to intervene against potential risks of intervention requires expert knowledge of drugs that anticipates the impact on the patient's condition relative to his or her diagnosis and comorbidities. The poison control center has expertise that is available for clinical consultation to support patient safety, but few RCAs cited this as a strategy for minimizing injury.

Qualitative data analysis and information sharing

System fixes and RCAs are relatively new within health care, and the NYPORTS qualitative data analysis provides information that should help

hospitals increase their expertise in these areas. Sharing information among hospitals will facilitate learning about patient safety initiatives. Identifying weak system fixes and providing information about how to strengthen them will facilitate progress on the patient safety learning curve. Describing the options to eliminate failure-to-rescue type events may help hospitals to undertake proactive steps so that, when an error does occur, patient injury will be avoided.

Limitations of data

The data obtained from the NYPORTS program is from the hospitals' own analyses of medication errors and determination that events meets the NYPORTS criteria for reportability. The data includes only those errors that result in the most serious harm. Further research is needed to establish the generalizability of the data beyond the NYPORTS criteria, and readers are cautioned about drawing conclusions.

Conclusion

NYPORTS mandatory reporting of medication errors has successfully met the IOM mandate for a program that uses the lessons learned from fatal or near-fatal errors for patient safety improvements and information sharing. Next steps include educational initiatives to address identified weaknesses in the RCAs and to measure the impact of the educational initiatives. The qualitative data analysis process is being reviewed and streamlined for timelier data sharing. The panel is examining the potential for including other NCC MERP categories.[5] It is anticipated that each of these initiatives will provide hospitals with the knowledge and skills to proactively implement safer systems and reactively analyze systems to achieve better outcomes.

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