Medication Safety Alerts

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This column draws on US and Canadian experience and includes, with permission, material from the *ISMP Medication Safety Alert!*, a biweekly bulletin published by the Institute for Safe Medication Practices (ISMP), Huntingdon Valley, Pennsylvania.

NEWS

ISMP Canada has completed preparations for a research study entitled "Impact of Interventions for Improvement of Medication Use Systems in Ontario Hospitals", which is being funded by the Ontario Ministry of Health. Letters of agreement have been mailed to the presidents and CEOs of hospitals that have expressed interest in participating in the study. Approximately 30 hospitals will be enrolled and randomized to the control group or the study group.

Because of the number of reports and concerns related to infusion pump devices, ISMP Canada considers infusion device problems a priority issue in this country. Dr John Doyle of the University Health Network and Dr Kim Vicente of the University of Toronto's Cognitive Engineering Laboratory will lead a project to review the use of infusion pumps in Canadian hospitals. This joint project with ISMP Canada will involve a comprehensive survey of Canadian hospitals concerning their use of infusion pumps, problems related to the pumps, and other issues. CSHP has been invited to provide input and assistance with this important initiative.

SAFETY BRIEFS

Inadvertent Administration of Oral Solutions by Injection: A Systematic Approach to Reducing the Risk

ISMP Canada recently received a report from a hospital describing an incident in which an oral dose of a medication had been administered subcutaneously. The oral solution had been withdrawn into a parenteral syringe (1 mL "TB" syringe), and, although the label clearly indicated "for oral use", a needle was inadvertently added to the syringe (an action that was attributed to a "lapse of attention"). The contents of the syringe were then injected subcutaneously. Fortunately, the patient encountered no harm.

Similar incidents have been reported in the United States and in England, including cases in which patients died when oral solutions were administered intravenously. In most reported cases, the oral solution was withdrawn into a parenteral syringe because syringes specifically designed for oral use were not available in the patient care area. In most hospitals, syringes for oral use are available only in the inpatient and outpatient pharmacies.

Two of the reported deaths in the United States occurred when oral nimodipine intended for administration through a nasogastric feeding tube was inadvertently administered intravenously. Nimodipine is indicated for improvement of neurological deficits due to cerebral artery spasm after subarachnoid hemorrhage. The manufacturer suggests that if the patient cannot swallow, the contents of the nimodipine capsule be aspirated with a needle and syringe. The syringe contents can then be administered through a nasogastric tube.

Safe medication practice recommendations to reduce the risk of inadvertently administering oral solutions by injection include the following:

1. Ensure that specially designed syringes for oral administration are made available in *all* patient care areas. The design of oral syringes eliminates the possibility of adding a needle to the end of the syringe. The design also eliminates the possibility of connecting the syringe to IV tubing or an IV administration port. Require all hospital staff to administer oral solutions from a medication cup or an oral syringe.
2. Dispense oral doses of medications in unit-dose oral cups or in specially designed syringes for oral administration.
3. Purchase and use the amber oral syringes. The colour of the syringes will help to set them apart from the clear parenteral syringes. This colour difference affords an additional layer of safety.
4. Educate hospital staff about the risks of using parenteral syringes to withdraw oral medications.

5. Ensure that a mechanism is in place to identify situations in which an oral medication is being administered by parenteral syringe. Communication of such situations will help identify areas for additional system improvements.
6. Instead of asking nurses to withdraw the contents of capsules with a needle and syringe, have the pharmacy extract the liquid contents and then provide the doses in unit-dose oral syringes.
7. Ensure that the nasogastric feeding tubes used within the hospital are compatible with the oral syringes. This will facilitate administration of oral solutions by the nasogastric route.
8. Remind nurses to always include the route of administration on the medication administration record and to bring the record to the patient's bedside.
9. Ensure that labels on the oral syringes clearly state "FOR ORAL USE". In some instances it may be advisable to add an auxiliary label to the plunger of the oral syringe, as an added precaution.

Investigation of Near Misses Will Reveal System Weaknesses

Hospitals can learn a great deal from other industries when it comes to developing specific risk management strategies to prevent human error. The aviation industry remains a role model and gold standard in terms of its approach to evaluating potential error and targeting system changes when implementing strategies for improvement. Reporting near misses is an integral part of the aviation industry's risk reduction program.

For example, in one investigation of a near-miss aviation incident (in which the pilot had to change course unexpectedly to avert a midair collision with a commercial aircraft) it was found that air traffic controllers were not consistently using a particular "check system" that was already in place. It was determined that when the air traffic controllers were changing shifts, specific checklists for "giving report" to incoming staff were not being used. It was agreed that relying on memory was not sufficient and that the checklists served a valuable purpose. Orientation, education, and reinforcement of the checklists were implemented. Regular quality checks to ensure consistent use of the checklists were also put into place.

Not only is it important for Canadian hospitals to implement strategies to capture near-miss incidents, as has been done within the aviation industry, but adequate support and resources must be available to ensure that system improvements are undertaken. Review of the reported errors and the risks for their occurrence requires a multidisciplinary, objective, nonpunitive approach, as well as some form of root-cause analysis. Most importantly, follow-up and communication of the information so obtained will keep all staff motivated to continue reporting errors.

During a trial of the Analyze-ERR software product, ISMP Canada received data from 5 participating hospitals, including information and analysis of near misses. Preliminary data indicated that miscommunication was a first-order root cause for many errors in medication-use systems. The second-order question, "Why?", revealed a variety of contributing factors. Interestingly, several errors occurred when patients were transferred from one patient care area to another. Lack of timely and clear information resulted in extra or omitted doses of medication. ISMP Canada is now enhancing the Analyze-ERR software to include suggested options for system improvements in response to weaknesses identified during the root-cause analysis. These suggested improvements will be ones that have been proven in research or demonstrated in practice. If your hospital has implemented strategies to improve communication during patient transfers, please consider sharing your experiences and outcomes with ISMP Canada.

SPECIAL FEATURE

The special feature presented here is taken directly from *ISMP Medication Safety Alert!*, volume 6, issue 10, May 16, 2001. It is included here because of the continuing debate about use of electronic physician order entry and the need for Canadian hospitals to include implementation of such medication system safeguards as part of their strategic planning process.

Savings Offset Costs Associated with Computerized Physician Order Entry (CPOE): Can You Afford To Omit It in Future Strategic Plans?

Since the Institute of Medicine report in November 1999, professional and lay media have given unprecedented coverage to computerized prescriber order entry (CPOE). While few could argue with the clear evidence that well-designed CPOE systems hold enormous potential to reduce errors,[1] this technology could require millions of dollars to implement and maintain. For example, the CPOE system at Boston's Brigham and Women's Hospital (BWH) cost about $1.4 million (in the mid-1990s) for in-house development and hardware, and at least $500,000 a year for maintenance. While this dollar outlay seems staggering at first glance, the cost savings that accompany CPOE are even more impressive—between $5 and $10 million per year at BWH.[2] How are such large cost savings achieved? Just a glimpse into CPOE through the following scenario can quickly demonstrate its power to vastly improve care and reduce costs.

Before morning rounds, a physician logs on to the CPOE system to print a list of all patients on his service. He is immediately presented with an alert about a crucial dose modification for one of his patients on tobramycin with a low creatinine clearance based on today's lab values. With the click of a mouse, the physician enters the appropriate patient screen and makes the suggested dose modification. As he attempts to leave the patient profile, the system also suggests ordering appropriate follow-up creatinine levels. As rounds progress, most orders are straightforward and easily entered into the system. Other orders trigger assistance, reminders, or alerts as appropriate. For example, when the physician orders TPN [total parenteral nutrition], the system calculates the additives based on the patient's most current lab values, age, and weight. When prescribing an H^2-blocker, a screen succinctly explains a recent formulary change and the physician readily orders the hospital-selected H^2-blocker at the dose suggested. At one point, the system alerts the physician to a positive sputum culture and suggests appropriate medications while considering sensitivity information, drug interactions, and patient allergies. On another patient, the physician orders lab studies and easily requests the system to page him (via a beeper number already in the computer) as soon as the results are available. When discharging a patient, a template appears on the screen with all current drug therapy for review. After any necessary revisions, the physician prints a copy for the patient. After rounds, he prints patient-specific information sheets to give to covering physicians for reference. If a covering resident overrides a serious dose alert (e.g., chemotherapy), the order will be electronically conveyed to a senior staff physician, who must cosign the order before implementation.

Later during office hours, the physician diagnoses an elderly patient with community-acquired pneumonia and notifies the hospital of admission. He accesses the hospital CPOE system from his office and easily reviews information about prior hospital care. If a standard order set/pathway has been established for community-acquired pneumonia, the system displays an admission template with order options so he can check the parameters for each order. If there are no standard orders and he prescribes a third-generation cephalosporin, the system prompts for an indication and suggests another available choice that would reduce the risk of resistant strains. Additional prompts may suggest drug levels for certain antibiotics prescribed and low-level anticoagulation therapy if the patient is on bedrest. Each order is immediately transferred to the nursing unit and pharmacy, thus avoiding problems with delays, verbal orders, illegible handwritten orders and signatures, error-prone transcription, and time consuming order clarification. By the end of the day, the physician has spent about 27 minutes using the CPOE system, similar to time previously spent with paper order systems.[3]

The overall financial impact at BWH from CPOE was further broken down by specific interventions.[3] For example, over one year, enhanced allergy warnings and drug–drug interactions resulted in cost savings of $500,000 and $160,000, respectively. Simply displaying lab charges averted about $1 million in charges, and alerting prescribers to redundant lab orders saved another $75,000. Specific guidance when ordering human growth hormone resulted in an 85% reduction in orders and a cost saving of $177,000 in charges. Likewise, the hospital saved $500,000 after 92% of prescribers switched to an effective but less costly dosing frequency of ondansetron suggested by the system. Another $640,000 in costs was saved through suggestions to change doses based on the patient's renal function and age. These and many more examples point to real bottom-line savings when CPOE systems are fully maximized. Further, these savings relate to costs associated with extended length of stay and additional tests and treatments. It does not account for costs to the patient or health system for disability due to adverse outcomes.

While it's true that CPOE is very costly to implement and that vendor systems today may not perform at the precise level described above, we can no longer use financial constraints as a compelling reason to avoid such expenses in our strategic plans for the future. CPOE is a cost effective solution.

References

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