TIPS

Improving the Bar Code Medication Administration (BCMA) System in VHA

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IN THE SPRING OF 2003, NCPS, the VA National BCMA Program Office (PMO) and NASA began working together to develop a Collaborative Breakthrough Series focused on improving the safety and efficiency of the BCMA system.

In October 2003, 30 BCMA improvement teams came together to learn strategies to enhance their use of the BCMA system and to create a model for implementing changes. Five weeks prior to this, the teams had collected information concerning the most difficult challenges they had with BCMA from frontline staff and their patient safety managers.

The teams consisted of at least three clinicians, ideally from the same unit. We suggested they could include a local BCMA program manager, a nurse, a clinical applications coordinator, a pharmacist, the patient safety manager, and an information technology staff member.

After the initial meeting, the teams were supported through coaching, conference calls, e-mail, and a listserv to improve BCMA at their facilities.

Between the first and second learning sessions, the team members showed significant improvement in their ability to understand one another's strengths and weaknesses. Because the effort was grounded in a systems approach to problem solving, their awareness of the importance of a culture of safety was enhanced.

At the second session, in April 2004, the teams exchanged information, shared ideas for potential changes and developed an action plan for the next year.

Thirteen types of scanning circumvention issues were categorized. Solutions related to BCMA issues for some of these categories are listed on the back page.

Although the BCMA process has been in place in the VHA since 2000, through the collaborative process we discovered that many sites were still working to successfully implement BCMA in particular areas. One such area was the intensive care unit, pertaining to respiratory therapy treatments or intravenous fluids administration.

Through participation in the Breakthrough Series, facilities have improved their medication management processes, resulting in a more consistent and reliable use of BCMA. The majority of the teams reported learning new skills and the importance of information sharing. Furthermore, they stated that the project added value to their facilities.

For VA employees, more information is available at: *vaww1.va.gov/bcmapmo/* and *vaww.ncps.med.va.gov/bcma/ index.html*

VAMedSAFE: The VISN 12 Center for Medication Safety — Translating Research into Action
Mission of the Patient Safety Center of Inquiry, Hines, Ill.

By Francesca E. Cunningham, Pharm.D.; Mariscelle M. Sales, Pharm.D.; Muriel L. Burk, Pharm.D.; Chester B. Good, M.D., MPH; and Peter Glassman, MBBS, MPH

OUR MISSION IS TO identify, track, and address preventable adverse drug events (ADEs) in the VA healthcare system. We emphasize that medication safety projects be conducted at the regional and national level. To further decrease preventable ADEs, we offer interventions and education.

General action steps used by VA MedSAFE include:

- Post-Marketing Surveillance of drug use in VA
- Response to and further analysis of ADE signals through ADE reports, safety reports and various safety actions by FDA
- Linking results of safety event analyses to formulary activities and medication use systems and policies within VA
- Disseminating information on ADE and ADE prevention

Our VA MedSAFE Web site (*www.vapbm.org/PBM/vamed safe.htm*) has information on the projects in progress. The following specific examples illustrate our role in VA safety initiatives.

Post-Marketing Surveillance (PMS)

PMS of drugs allows us to identify potential ADEs, as well as risk factors for developing ADEs, that were not detected during preapproval studies. Non-detection is due to controlled conditions, strict inclusion or exclusion criteria, and limited study population and size.

Regulatory bodies provide systems for PMS to monitor potential ADEs after a new drug has been offered for use. For example, the FDA mandates adverse event reporting by drug manufacturing companies subject to its post-marketing safety reporting regulations. Furthermore, previously unknown side effects and the evaluation of ADEs in registries, such as the voluntary reporting of adverse effects through the FDA's MedWatch program, have been instituted to capture a wide range of anticipated and unanticipated ADEs.

Because the VA's healthcare system is of sufficient size and richness with regard to medical and pharmaceutical data, PMS can facilitate a comprehensive evaluation of our adverse outcomes. The beneficial effects related to medication use or administration can also be evaluated. Therefore, the VA represents a unique resource for PMS, because of high medication use, fairly rapid penetration of new drugs, and a system for monitoring outcomes.

Although VA records adverse events through the FDA MedWatch program, underreporting may occur due to ADE information submission being voluntary. Because of this, constant surveillance (via PMS) of drugs is required to minimize veterans' exposure to known ADEs and potential new hazards.

Diagnostic Adverse Drug Events Series: Article 1, Contrast Media Events

By Carol Samples, BGS, NCPS program analyst and Mary Burkhardt, RPh, MS, FASHP

IT IS SUCH A routine thing . . . contrast media (contrast dye) is injected intravascularly to enhance visibility of specific organs, blood vessels, or types of tissue on X-rays, CT scans, ultrasounds, and MRIs. Yet, as with other high-alert medications, there are risks. Though most adverse side effects are not severe, patients have experienced compartment syndrome from extravasations and have died due to an allergy to contrast media.

A free text search of the NCPS SPOT database was conducted using the words "contrast" and "dye." We also conducted supporting searches using the names of common contrast media.

Not all drug reactions are analyzed through the RCA process. Many are analyzed through the adverse drug reaction monitoring process via documentation retrieved from the ART package. The ART package is available through CPRS and feeds information into VISTA for review and evaluation at the facility level; it may also be sent to the FDA.

NCPS has received more than 350 reports of adverse events related to the use of contrast media. One facility diligently submitted more than 50 reports. This heightened our awareness of the variation in the reporting process and the possible frequency of these events.

Top Contrast-Related Adverse Drug Events

Intravenous lines extravasated (56%). Patients generally complained of stinging, pain and swelling, but there was also evidence of compartment syndrome that required follow-up surgery.

Patients had reactions and allergies to contrast media (24%). Patients experienced nausea, cramping, sweating and itching. Patients with allergies (21% of patients that had reactions) experienced more serious symptoms: shortness of breath, rapid breathing, feelings of choking, numbness and sensations of paralysis and urticaria. Codes were called; patients were intubated; most regrettably, two patients died.

Patients received contrast media, though the order was to conduct the scan without it (8%). Renal failure has resulted from exposure to contrast media.

Wrong patients received contrast media (6%). Two identifiers were not used; only passive verification took place; patients did not have armbands or armbands were incorrect; specific orders were not available to the radiologist, and records were not systematically completed and submitted.

Wrong medications or inappropriate doses of medications were injected, and medications were administered by the wrong route (2%). Look-alike medications were in close proximity; set-up and take-down of equipment and medications for procedures were not standardized; and medications on the sterile field were not clearly identified.

Root Causes

- Communication issues between patient and technician during procedures
- Inability of the technician to stay with, or watch, the patient in the procedure room
- Delay in use of power injector after insertion of IV causing clot formation
- Symptoms that were not quickly identified
- Level of formal training in IV starts and power injection
- Allergic reactions that had not been entered in CPRS
- Misunderstandings about whose responsibility it was to enter allergies into CPRS
- Difficulties with using the allergy package in CPRS
- The level of completeness of pre-procedure assessments
- Availability of monitoring equipment during procedures
- The means for the technician to call for emergency help during a procedure
- Lack of training in allergy recognition
- Consistency of the process to verify and document conditions for which contrast is contraindicated.

Team Actions Taken

- Verify patient ID in the course of transfer to, and within, radiology
- Use common language when discussing allergies with the patient, use "dye, contrast or iodine" or ask about "rashes or itching"
- Use a pre-procedural template for consults
- Require radiologists to write specific orders for administration of contrast
- Analyze the allergy package and MRI screening questionnaire and check possibility of Imaging Vista package pulling allergy information onto imaging request form
- Require recent serum creatinine clearances prior to procedure for at-risk patients
- Separate look-alike/sound-alike medications
- Use repeat-back of contrast medications during procedures
- Use pulse oximeters with every patient
- Create a constant means of communication or visualization with the patient.
- Install code alert button in radiology suites
- Provide annual training on IV insertion, prevention of complications and recognition of reactions to contrast

Other Recommendations

The American College of Radiology (see the article at: *www.acr.org/s_acr/sec.asp?CID=2131&DID=16687)* recommends the following in regard to patient selection and preparation:

- Conduct a thorough history, including prior reactions and allergies
- Hydrate adequately, especially in compromised patients
- Assure that equipment and expertise is readily available
- Know the risks, patient status and possible reactions, the best response and where and how to get help if needed

VAMedSAFE and NCPS remind you:

- That clinical checking must be turned ON in CPRS, and
- To document reactions in the Adverse Reaction Tracking (ART) package.

In addition, the Institute for Safe Medical Practice (see the articles at: *www*.ismp.org/MSAarticles/loud.htm and *www*.ismp.org/MSAarticles/FatalPrint.htm suggests that healthcare delivery sites:

- Conduct a thorough analysis of the use of contrast media, including their distribution. If radiology requisitions these products, a pharmacist, rather than a technician or the purchasing department, should check them before

## Contrast Media *(continued from page 2)*

they are dispensed. (Some are fatal if given wrong route.)

■ Consider placing prominent auxiliary labels on ionic media that should not be used for myelography; and posting charts to provide information about product differences in areas where contrast media is used.

■ Pay close attention to how and where contrast media is stored; each type should be stored separately, according to use, to reduce the chance of mix-ups.

■ Make an independent double check of contrast media as part of standard operating procedure any time it is used by clinical staff.

■ Prepare clinical staff to deal with the effects of errors in contrast administration; prompt recognition and treatment may prevent a fatal outcome.

We'd also like to stress the importance of developing a process for using information systems to communicate all medication use where possible.

If orders for contrast media are entered into CPRS, all caregivers will know that drugs were ordered and administered. This allows for clinical safety checks via computer, since some medications may be contraindicated.

For more information, VA employees can click to *vaww.ncps.med.va.gov/RCATopics/index.asp*
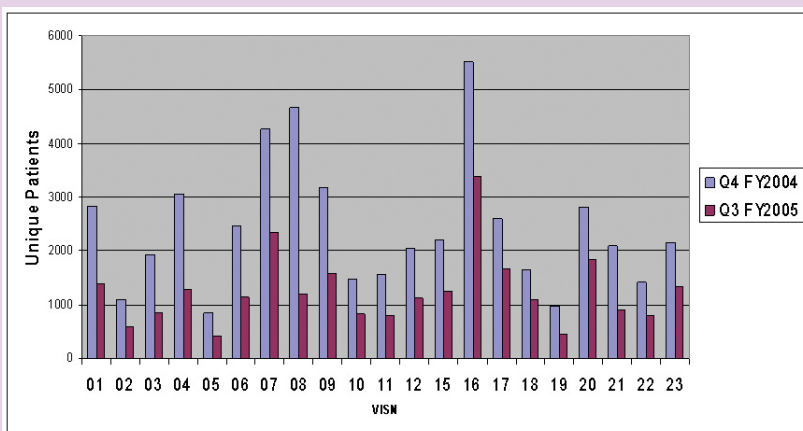
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Center for Medication Safety *(continued from front page)*

Our PMS program tracks new drugs with expected high use, as well as high-risk agents in widespread use within VA.

We use a number of linkable data sources, such as: the Pharmacy Benefits Management prescription database; the Austin Automation Center Patient Treatment Files and Outpatient Clinic files; the Beneficiary file; and the VHA ADE Database.

These databases permit efficient monitoring of ADEs and exposure rates. They also facilitate in-depth evaluations of specific drug classes; therefore, both switching patterns and geographic variation in prescribing patterns can be tracked.

This enables us to objectively examine the safe use of drugs within VA on a national level, with impact at the regional and local levels.

Actions taken:

■ Improving drug reaction reporting processing through the ART Package

■ Recommending improvements to the PBM extract (which gathers information from the databases) to better trap for population-wide medication safety issues such as allergy information and non-VA medications

Our evaluations can also assist in the formulary management decision-making processes, as seen in the following two examples.

An Antibiotic Study

This study examined the rate of blood sugar control problems in VA patients prescribed fluoroquinolones verses an antibiotic in a different class, azithromycin. The fluoroquinolones comprised ciprofloxacin, levofloxacin and gatifloxacin.

The outcome included severe hypo- or hyperglycemia, defined by medical diag-

nosis codes (ICD-9 codes) in the patient record, after the initiation of the prescription within the risk period (defined as the date of initiation of the drug, plus the daily supply, plus 10 days).

We found that a greater frequency of dysglycemias occurred with fluroquinolones compared to azithromycin. Diabetic patients showed more dysglycemia than nondiabetics.

Based on this, we recommended the judicious use of all fluoroquinolones in veterans with diabetes. Data from our study were incorporated into the Fluoroquinolone National Criteria for Use, to improve patient safety throughout the VA system.

Actions taken:

■ We recommended the judicious use of all fluoroquinolones in veterans with diabetes

■ Incorporating data from our study into the Fluoroquinolone National Criteria for Use is helping to prevent further reactions

A Vitamin E Evaluation

We also used PMS to enforce risk-benefit management of high-dose vitamin E (≥400 IU). It was initially believed to have beneficial effects in certain chronic diseases, such as cardiovascular disease and cancers, but was later found to increase all-cause mortality.

High-dose vitamin E has been beneficial in the treatment of Alzheimer's disease and neuroleptic-induced tardive dyskinesia.

Actions taken: As most VA patients are receiving high-dose vitamin E for cardiovascular purposes, we recommended the following:

■ High-dose vitamin E is not to be used for cardiovascular disease prevention

■ Data was disseminated to individual facilities regarding patients with specific diagnoses who are administered high-dose vitamin E

■ Discontinue use in patients prescribed high-dose vitamin E outside of Alzheimer's disease or neuroleptic-induced tardive dyskinesia

Conclusion

We're excited about our mission and pleased that our work has led to tangible action to benefit our patients.

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The chart above indicates the downward trend in cardiovascular use of Vitamin E.

Possible Solutions to Problems with Bar Code Scanning Technology

Managing Multi-dose Vials and Large Volume Containers Including IVs

1. Apply bar code so that it is oriented from top to bottom.
2. Use plasticized labels.
3. Ensure label placement on small items such as ampules, vials and ointment tubes can be scanned at the point-of-care.
4. Ensure that pharmacy has a process in place to scan new manufacturer bar codes into the synonym field of the drug file and validate the ability of bar code to be accurately read by a scanner at the point-of-care.
5. Affix bar code label for multi-dose containers, such as those for insulin, directly to the container.
6. Use laptops in the intensive care unit to improve IV scanning.
7. Run a computer printout of all discontinued infusing IVs for IVs not charted as completed.

Wristbands

1. Make access to print patient wristbands available in patient care areas to facilitate reapplication in the event the band is removed or unreadable.[1]
2. Ensure wristband printers are readily accessible to all staff that may need to reprint unscannable or missing wristbands.
3. Proactively print new wristbands every 14 days for all patients on the unit. Must include process for patient verification. Test the last wristband before placing the wristbands on patients.
4. Send problematic wristbands to the PMO.

Correctly Finishing Orders

1. Ensure nurse verifies medications, to include review of the following information: schedule type, schedule, and administration times (if applicable); start and stop date/time; drug dispensed and accuracy of units per dose.
2. Ensure a mechanism exists to communicate STAT or NOW orders to the pharmacy.
3. Ensure turnaround time to finish and verify medication orders by pharmacy is consistent with the established time frames for emergent, urgent, and routine medication orders.[2]

Non-Readable Bar Codes

1. Ensure that pharmacy and patient care areas have similar scanning equipment.
2. Standardize equipment between departments (i.e., inpatient and outpatient) to increase compatibility.
3. Verify bar codes before being dispensed.
4. Report and return all bar codes that do not scan to pharmacy in a timely fashion.

Manufacturer Bar Code Issues

1. Ensure manufacturers' bar codes in the pharmacy drug file are machine-readable.
2. Ensure pharmacy confirms, upon receipt, that manufacturers' bar codes for medications are correct, consistent and machine-readable.
3. Ensure that barcodes produced by pharmacy are correct and machine-readable.
4. Send to the PMO non-scannable manufacturers' bar codes.
5. Ensure unit dose medications are purchased with manufacturer bar code labels.[1]
6. Ensure large volumes of IV fluids have manufacturer-generated scannable bar code labels.
7. Ensure that the pharmacy computer system prints bar code labels with descriptions of the IV admixture contents.[1]

Medications Dispensed with No Bar Code

1. Have pharmacy print labels with bar codes for pharmacy-prepared, patient-specific medications.[1]
2. Have pharmacy verify scannability of bar code labels.
3. Ensure bar code labels for multi-dose containers are placed on the container nearest to the medication.

Hardware/Software Issues

1. Recondition batteries to give them a longer life. Buy extra sets of batteries so that one set is always charging on the unit.
2. Implement a proactive 24-hour battery switching plan to prevent dead batteries in wireless scanners.
3. Have a corded scanner as a back up.
4. Implement a scanner troubleshooting flow sheet for nurses.
5. Conduct daily equipment checks.
6. Analyze equipment needs of different units based on the nursing care delivery model.
7. Encourage staff to report scanning issues: create logs; create a special help desk; create a "bar code doesn't scan" request.
8. Ensure replacement equipment is easily accessible when devices fail.
9. Ensure BCMA-dedicated equipment undergoes routine preventive maintenance by computer staff.
10. Ensure resource allocation plans for BCMA factor in costs associated with hardware replacement.[1]
11. Ensure information management has a defined life cycle replacement for BCMA hardware.

References

[1] Pathways for medication safety: Assessing bedside bar-coding readiness. Retrieved from *www.*ismp.org/PDF/PathwaySection3.pdf (Accessed 6/27/05)
[2] ISMP Medication Safety Self- Assessment for Hospitals. Retrieved from *www.ismp.org* (Accessed 6/27/05)