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USP Patient Safety CAPSLink™

April 2007

PROVIDED BY THE USP CENTER FOR THE ADVANCEMENT OF PATIENT SAFETY

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This message has been sent to you as a service of the U.S. Pharmacopeia, Center for the Advancement of Patient Safety (CAPS). USP is a not-for-profit, non-governmental organization that promotes the public health by establishing state-of-the-art standards to ensure the quality of medicines and other health care technologies. CAPS is a component of USP's Patient Safety public health program. The USP Center for the Advancement of Patient Safety was created to encourage medication error reporting, conduct data analysis and research, develop educational programs, and propose standards, recommendations, and guidelines that ultimately improve the safety and quality of patient care.

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USP Medication Error Analysis

Examining Medication Errors in Outpatient Surgery – Focus on Adult Population[a]

The United States Pharmacopeia (USP) Center for the Advancement of Patient Safety recently published its seventh report to the nation on medication errors reported to MEDMARX. This year's report, entitled *MEDMARX® Data Report: A Chartbook of Medication Error Findings from the Perioperative Settings from 1998-2005*[1] provides analyses of 7 years of medication errors across the perioperative continuum—outpatient surgery, preoperative holding area, operating room, and the postanesthesia care unit. (See http://www.usp.org/products/medMarx/ to obtain a copy of the full report).

This issue of CAPSLink focuses on one portion of the recently released MEDMARX Data Report — medication errors occurring in the outpatient surgery environment involving adult patients.

Background Information Related to the Outpatient Surgery Department

In 1980, Congress changed the Medicare reimbursement policies to favor ambulatory surgery clinics and the provision of patient care in non-inpatient settings.[2] These policies, along with innovations in surgical technology, improved anesthesia and pain management, and increased pressure to control costs through shortened hospital stays, have caused the volume of procedures performed in ambulatory settings to grow steadily; more than three-quarters of all medical procedures are now performed as outpatient surgeries.[3]

The Outpatient Surgery (OPS) department is a specialized setting within a hospital that focuses on the patient's registration and preprocedural/preoperative screening processes. For MEDMARX reporters, "Outpatient Surgery" is synonymous with same-day surgery, day surgery, or ambulatory surgery centers associated with acute care facilities; and it designates the clinical location where the error originates. The current report does not examine outpatient errors from free-standing surgical centers, nor does it examine errors originating in endoscopy/GI (gastroenterology) labs; those areas would be fall under *Endoscopy/GI Laboratory* as the location of the error.

Severity and Origin of Medication Errors Reported in Adults (ages 17-64) Receiving Care in Outpatient Surgery (OPS)

Between September 1, 1998, and August 31, 2005, a total of 422 facilities reported errors in OPS to MEDMARX. Collectively, these facilities submitted 3,427 records, of which 2.9% (n=99) were reported as harmful. There were no reports of either permanent harm or death (Category G or Category I). Of the 3,427 records, 1,081 cases involved adult patients. As a percentage, more harmful errors (Categories E–I) were seen in 5% of medication errors in adult patients, with temporary harm (Category E) comprising a majority of cases that resulted in harmful outcomes.

Based on the number of actual medication errors (Categories B–I; n=3,138), the largest percentage of all OPS errors (49.8%) originated in the Administering node (phase) of the medication use process. For adult patients, however, nearly 70% of the errors originated during drug administration activities while only 11.7% originated in prescribing. These differences indicate that errors that originate in the Prescribing phase are often intercepted before reaching the patient. Errors originating in the Dispensing phase were present in less than 9% of the events reported.

Errors occurring during the Administering phase may result from the fact that many OPS drugs are not being prepared or reviewed by the pharmacy; rather they are prepared by a nurse on the unit, which bypasses an important safety check. Computerized prescriber order entry (CPOE) technology has been effective in reducing errors[4] in the inpatient setting and in integrated outpatient settings. The OPS setting may present a challenge to fully recognizing the potential of CPOE, given that physicians often see outpatients in a private setting that may not be connected to the hospital's CPOE system. Further, some patients may arrive just prior to the scheduled procedure, and their histories may not be immediately available for review. Together, these common issues in outpatient care hinder the ability of the technology to work effectively in this environment.

Types of Medication Errors

Four types of errors (*Omission error, Unauthorized/wrong drug, Improper dose/quantity,* and *Wrong time*) comprised 75% of all errors in the adult population (Table 1). Other studies have also shown that errors most often involve an *Improper dose/quantity* (wrong amount) or an *Omission*.[5,6] Omitting preprocedural antimicrobial products has been linked to surgical site infections.[7] In the adult population, the proportion of errors associated with harm was 5%; six types of errors exceeded this threshold. *Wrong dosage form* and *Prescribing error* were the two types with the highest percentage of harmful events (14.3% and 10.5% respectively).

Table 1. Types of Errors (Non-Harmful and Harmful) in Adult Patients[a]

Type of Error	Non-Harmful		Harmful	
	n	%	n	%
Wrong Dosage Form	6	85.7	1	14.3
Prescribing error	85	89.5	10	10.5
Improper dose/ quantity	120	93.0	9	7.0
Wrong administration technique	29	93.5	2	6.5
Unauthorized /wrong drug	173	94.5	10	5.5
Wrong route	35	94.6	2	5.4
Wrong time	87	95.6	4	4.4
Wrong patient	35	97.2	1	2.8
Drug prepared incorrectly	41	97.6	1	2.4
Extra dose	55	98.2	1	1.8
Omission error	356	98.6	5	1.4

a. This table was adapted from Table 1-7 from MEDMARX® Data Report 2006.

Case Examples:

1. A nurse gave a dose of cefazolin to the wrong adult patient while preparing the patient for surgery. The patient did not have an ID bracelet on, but verbalized an allergy to penicillin. Observation was initiated/increased.

2. While admitting an adult patient to the outpatient surgery department, a relatively new nurse copied the patient's list of medications from the physician's history and physical, but did not review the list with the patient. The nurse administered two medications (Atenolol and Metoprolol) that had been discontinued, resulting in a lowering of the blood pressure and a decreased heart rate. As a result of the error, education was provided by the pharmacy department about duplication of therapy and policies and procedures were reviewed. The patient's hospitalization, was prolonged 1 to 5 days due to increased observation and monitoring of vital signs.

3. On a busy outpatient surgery department unit, a surgeon wrote an order for hydroxyzine and specified the route as intravenous, rather than intramuscular. The nurse did not catch the error and administered the drug intravenously to an adult patient. This error was attributed to staff distractions.

4. An order was received from a surgeon to initiate the preprinted protocol for mitral valve prolapse. The adult patient received two medications (Ampicillin and Gentamicin) per protocol while in the department. During the final preoperative visit just prior to surgery, the physician, while reviewing the orders, indicated a preference for a different antibiotic and scratched out the orders on the protocol (after the medications had already been given).

Products Involved in Medication Errors in Outpatient Surgery

In all adult OPS records, cefazolin was identified as the product most often involved in a medication error (n=198), and it represented 17.6% of all selections (Table 2). Other antimicrobial products included vancomycin, levofloxacin, gentamicin, ampicillin, and cefotetan. Other agents commonly involved in errors included central nervous system (CNS) medications such as the opioids (i.e., morphine, meperidine, and midazolam). Antimicrobials play a significant role in the recovery of surgical patients. Developing check lists and performing chart reviews for use prior to the patient leaving the OPS may help to eliminate omission errors

Table 2. Most Commonly Reported Products Associated with Medication Errors in Adults in Outpatient Surgery[a]

Products-Generic Name	Adult Patient Product Error Reports	
	n	%
Cefazolin	198	17.6
Oxycodone and Acetaminophen	47	4.2
Hydrocodone and Acetaminophen	45	4.0
Morphine[b,c]	35	3.1
Meperidine[b]	33	2.9

Midazolam[b]	31	2.8
Vancomycin	30	2.7
Metoclopramide[b]	28	2.5
Levofloxacin	26	2.3
Ketorolac	24	2.1
Heparin[b,c]	23	2.0
Gentamicin	18	1.6
Ampicillin	17	1.5
Cefotetan	16	1.4
Phenylephrine[b,c]	16	1.4

a. This table was adapted from Table 1-12 from MEDMARX® Data Report 2006, based on 1,006 records, 1,123 MEDMARX selections and 204 unique products.
b. Denotes high-alert medication.
c. Includes all dosage forms and formulations.

Recommendations to Prevent Outpatient Surgery Medication Errors in Adults:

- Develop checklists that are accurately completed prior to patients leaving the area in order to minimize the loss of information through hand-offs;
- Devise strategies around medications (such as midazolam or other controlled substances) that have a high risk for harm by understanding the causes of these errors;
- Expand the use of bar-code medication administration systems;
- Empower patients to participate in pre-procedure safety activities such as pre-registration; providing history and physical information, including current medications and allergies; and participating in medication reconciliation;
- Ensure that patients and their corresponding chart forms are properly identified;
- Develop strategies to ensure that medications, especially antimicrobial agents, are administered at the correct time;
- Implement strategies that adequately identify and communicate allergy information and other clinical information to all members of the perioperative team;
- Resolve duplicate or conflicting medication orders;
- Ensure that calculations are accurate throughout the medication use process by using an independent or technological double-check system.

- Review preprinted orders to ensure appropriate clinical alternatives (e.g., in the case of allergies) and the appropriate use of abbreviations;
- Reduce reliance on verbal orders;
- Evaluate the influence of Contributing Factors, such as Distractions, that play a role in medication errors;
- Expand the pharmacy department's role in perioperative care by having dedicated staff who participate in the medication use process, including medication reconciliation and standardizing (or limiting) the products routinely available.

a. This story is an adaptation of USP's *MEDMARX Data Report*: *A Chartbook of Medication Error Findings from the Perioperative Settings from 1998*-2005 published in March, 2007. To obatin a copy of the full report, go to http://www.usp.org/products/medMarx/

References

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2. Winter A. Comparing the mix of patients in various outpatient surgery settings. *Health Affairs*. 2003;22 (6):68-75.
3. Hammons T, Piland NF, Small SD, Hatlie MJ, Burstin HR. Ambulatory patient safety. What we know and need to know. *Journal Ambulatory Care Management*. Jan-Mar 2003;26(1):63-82.
4. Bates DW. Using information technology to reduce rates of medication errors in hospitals. *British Medical Journal.* Mar 18 2000:320(7237):788-791.
5. Hicks RW, Cousins DD, Williams RL. *Summary of information submitted to MEDMARX in the year 2002. The quest for quality*. Rockville, MD: United States Pharmacopeia; 2003.
6. Hicks RW, Santell JP, Cousins DD, Williams RL. *MEDMARX 5th anniversary data report. A chartbook of 2003 findings and trends 1999-2003*. Rockville, MD: The United States Pharmacopeia Center for the Advancement of Patient Safety; 2004.
7. Mangram AJ, Horna TC, Pearson ML, Silver LC, Jarvis WR, The Hospital Infection Control Practices Advisory Committee. Guideline for prevention of surgical site infection, 1999. *Infection Control andHospital Epidemiology*. 1999;20:247-278.

1. USP Webinars: Examining Errors in the Perioperative Setting

USP will be hosting two Webinars in June to discuss data findings on medication errors reported in the preoperative area, operating room, and post anesthesia care unit. Expert faculty speakers will relate the data findings to a series of recommendations designed to improve medication safety in these areas.

These 90-minute Webinars will:

- Highlight key data findings reported to USP's MEDMARX program
- Offer insights into the severity, types, and causes of medication errors that occur in these specialty clinical areas

- Provide a series of recommendations to help hospitals and health systems improve medication safety in the perioperative environment
- Provide a forum to pose questions about error events and possible systems' solutions to improving patient safety

Cost: $149/connection (Note; you may have multiple people participate at a single location/conference room)

REGISTRATION INFORMATION:

To register via Web: http://www.usp.org/eventsEducation/education/pe/calendar.html
To Register via Phone: USP Customer Service at 1-800-227-8772

DATES and TIMES:
Tuesday June 19 7:00pm – 8:30pm (EST): Medication Errors in the Operating Room [Rodney W. Hicks, PhD, ARNP and Linda J. Wanzer, MSN, RN, CNOR] Continuing Education Units: (provided by AORN)

Wednesday June 20 7:30pm- 9:00pm (EST): Medication Errors in the Postanesthesia Care Unit [Rodney W. Hicks, PhD, ARNP and Linda Wilson, PhD, RN, CPAN] Continuing Education Units: (provided by ASPAN)

WHO SHOULD PARTICIPATE: Nurses, physicians, pharmacists, medication safety officers, patient safety officers, quality improvement staff, and risk managers.

2. Smart Pumps Provide Opportunity for Quality Improvement:

Patient Safety and Quality Healthcare News™ recently published information related to the use of computerized infusion safety systems, (e.g. smart pumps), as being one of the technologies, identified in the recent IOM report (2006), that hospitals can implement to help reduce the frequency and severity of medication errors. Since the initial introduction of smart pumps in 2001, both the actual pump devices and safety software have continued to evolve. In selecting and implementing smart pump technology, it is recommended that hospitals should evaluate advanced capabilities, CQI data reports, and the training and support programs to help hospitals realize both the immediate and long-term safety, clinical, operational, and financial benefits resulting from the investment in and implementation of smart pumps. For complete article information go to http://www.psqh.com/janfeb07/smartpumps.html

3. ISMP Focuses on Anticoagulation Medication Errors

The Institute for Safe Medication Practices (ISMP) recently announced an initiative that targets the reduction of medication errors related to anticoagulation drug therapy. The error reduction strategy employs the failure mode effect analysis (FMEA) tool in evaluating potential causes of the errors in addition to the development of process improvemenst to prevent these often harmful errors form occurring. For more complete information, go to Click here.

4. USP Pharmacy Compounding Expert Committee Survey

USP will be conducting a survey regarding compounded preparations used in pediatric and geriatric patients to determine the most frequently compounded preparations and how often these preparations are requested. USP is interested in providing quality standards for compounded preparations in order to assist those practitioners, who provide this service to patients, and to ensure that the medications compounded are safe for patients and consumers. Compounding monographs are published in the *USP Pharmacists' Pharmacopeia* *http://www.usp.org/products/pharmacistsPharm/* and *USP-NF* compendium to ensure quality preparations. These monographs contain valid beyond use dates to help provide length of time for stability when dispensing these medications and storage conditions determined by stability data. Every respondent, who completes the survey and provides their name, address, and e-mail, will receive a $5.00 gift certificate to Starbucks. As a further incentive, the *first 10 respondents* will receive a free *USP Pharmacists' Pharmacopeia* (a $225.00 value). For additional information and instructions on downloading and completing the survey, please visit the USP website: http://www.usp.org/hqi/pharmInfo/compoundingPharmSurvey.html

5. FDA Expects Medication Guides for ADHD Drugs

Manufacturers of drugs that are used to treat attention-deficit/hyperactivity disorder (ADHD) must develop medication guides that inform patients and their families or caregivers about the specific cardiovascular and psychiatric risks associated with these medications, the FDA announced on February 21, 2007. The FDA would also require pharmacists to distribute the patient-friendly guides when dispensing the drugs. For additional information go to: Click here.

6. USP Medication Safety Survey on Tall Man Lettering

The United States Pharmacopeia (USP) is interested in better understanding how the use of "Tall Man" lettering has affected your practice and medication safety in general. "Tall Man" lettering is the practice of highlighting sections of drug names using uppercase letters. Examples include: DOBUTamine and DOPamine, HydrALAZINE and HydrOXYzine, and VinBLAStine and VinCRIStine.

You can participate in this important survey, which should take no more than 5 minutes of your time by clicking here.

You may also copy and paste the link into your web browser exactly as it appears, as it is case sensitive. Please complete this survey by May 11, 2007. As a thank you for your participation in the survey, you will have the opportunity to enter a drawing for an 80GB Apple® Video iPod™, a $349 value. All responses are anonymous and confidential, and the survey results will be reported in the aggregate, which will be used by USP in developing and implementing initiatives that will improve the safe use of medications.

If you have any questions about the survey, please contact Elizabeth Cowley Miller, Pharm.D., Staff Liaison, USP Safe Medication Use Expert Committee, epc@usp.org or (301)816.8217.

7. USP Chapter 797 Proposed Revisions Update

The Sterile Compounding Expert Committee EC) is currently in the process of reviewing and considering all comments that were received on or before the August 15, 2006 public commentary deadline. There were approximately 2500 pages of comments from over 300 participants that included hospitals, professional associations, vendors, stakeholders, individual practitioners including pharmacists, nurses, and physicians, and others. Due to the volume and criticality of these comments, it is not known when the review of comments to the proposed revisions will be completed, nor when the proposed revisions will be finalized. USP will post the Expert Committee's responses with a complete summary of comments on the website. For additional updates on the status of the proposed USP Chapter 797 revisions, continue to check the USP website: http://www.usp.org/USPNF/pf/generalChapter797.html

8. FDA Issues Guidelines for Dosage and Administration Labeling

On April 9, 2007, the FDA announced new draft guidelines for the pharmaceutical industry that are designed to help ensure that the "Dosage and Administration" section in labeling for drug and biological products contains complete, clear, and accessible information for healthcare providers. For complete information on the draft guidelines go to http://www.fda.gov/cder/guidance/7634dft.pdf

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USP Medication Error Reporting Programs:

MEDMARX®—USP's comprehensive, Internet-accessible, anonymous medication errors reporting program, and quality improvement tool. The program facilitates productive and efficient documentation, tracking, trending, and prevention of medication errors.

Medication Errors Reporting (MER) Program—presented in cooperation with the Institute for Safe Medication Practices, this nationwide program makes it possible for health professionals to report medication errors confidentially and anonymously to USP.

Other USP patient safety resources:

- MEDMARX Annual Data Summary reports—provides readers with a wealth of information on reported error events including patterns in the types, causes, and level of harm associated with medication errors.
- *Understanding and Preventing Medication Errors: A Resource for Healthcare Practitioners*—a CD toolkit with practical guidelines, forms, and templates to help healthcare facilities improve error-reduction initiatives.
- *Advancing Patient Safety in U.S. Hospitals: Basic Strategies for Success*—a book in which hospitals share stories about how they reduced medication errors and promoted safer patient care.
- Medication Safety Pocket Reference—a pocket-sized reference booklet containing listings of similar

drug names and dangerous abbreviations that could cause medication errors. Contact custsvc@usp.org and ask for item #3227702.

- Similar Drug Names Poster—a wall poster for easy reference listing look-alike and sound-alike drug names known to cause confusion and potential medication errors when handwritten or communicated verbally. Posters are packaged in quantities of 1(item # 3728251) 10 (item # 3728252) and 50 (item # 3728253). Contact custsvc@usp.org and ask for the appropriate item number.

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