Ambulatory Surgery Facilities: A Comprehensive Review of Medication Error Reports in Pennsylvania

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ABSTRACT

Pennsylvania ambulatory surgery facilities (ASFs) submitted 502 medication error reports to the Pennsylvania Patient Safety Authority from June 28, 2004, through December 31, 2010. The most common types of medication errors reported by ASFs to the Authority included drug omission, wrong drug, and monitoring error/documented allergy. The predominant routes of administration associated with wrong-drug errors were intravenous (IV) and ophthalmic. More than one-third of IV wrong-drug errors involved high-alert medications. Unlike previously reported confusion between eye drops of similar pharmacologic categories, three-quarters of wrong-drug errors involving ophthalmic products were mix-ups between eye drops of different pharmacologic categories. Strategies to prevent wrong-drug errors, especially for high-alert medications in the perioperative area, can be prioritized to prevent harm to patients undergoing procedures in ASFs, such as requiring labels on all medications, medication containers (e.g., syringes, medicine cups, basins), or other solutions on and off the sterile field; differentiating look-alike products by highlighting distinguishing information on the label; and purchasing eye drops within a class from different manufacturers. (Pa Patient Saf Advis 2011 Sep;8[2]:85-93.)

INTRODUCTION

According to the Pennsylvania Department of Health Bureau of Health Statistics and Research, the Commonwealth had licensed 265 ambulatory surgery facilities (ASFs), which performed more than 960,000 procedures between July 1, 2008, and June 30, 2009.[1] ASFs offer services including general surgical, orthopedic, gynecological, urologic, eye, and endoscopic (e.g., colonoscopies, upper gastrointestinal endoscopies) procedures. These were performed by more than 7,000 medical staff with clinical privileges, most commonly in anesthesiology, ophthalmology, and orthopedic surgery. Despite the variety of services provided by ASFs, the types of medications used are usually limited to antibiotics and intravenous (IV) fluids, as well as many high-alert medications such as analgesics, sedatives, local and general anesthetics, and paralytics.

The National Quality Forum (NQF) recently approved for endorsement a list of 29 serious reportable events (SREs) in healthcare, outlined in the forthcoming report, Serious Reportable Events in Healthcare—2011 Update: A Consensus Report. As a part of this update to the original SREs in 2002, NQF has added three new care settings, including ambulatory surgery centers.[2]

There is little in the literature that quantitatively addresses medication errors occurring in ambulatory surgical settings, although a 2005 MedMarx report from the United States Pharmacopeia specifically addresses the outpatient surgery setting.[3] Therefore, this article analyzes events reported to the Pennsylvania Patient Safety Authority to determine the most common types of events, patient populations involved, and medications involved, as well as to comprehensively review event descriptions in reports to determine specific and common issues affecting ASFs.

MEDICATION ERRORS IN PENNSYLVANIA ASFs

Pennsylvania ASFs submitted 502 medication error reports to the Authority from June 28, 2004, through December 31, 2010. Categorization of the reports by harm score, which is adapted from the National Coordinating Council for Medication Error Reporting and Prevention harm index,[4] shows that 91% (n = 457) of the events reached the patient (harm index = C to I). ASFs reported that 3.6% (n = 18) of the events resulted in patient harm (harm index = E to I), which is significantly higher than the overall rate for all medication error reports from reporting acute care facilities (0.6%). The 2005 MedMarx report showed that almost 3% of reported errors resulted in harm, and three events required life-sustaining interventions to preclude death.[3]

Department of Health data shows treatment at ASFs by population as follows: 57.6% adults (ages 18 to 64), 37.7% elderly (65 or older), and 4.7% pediatrics (younger than 18).[1] Nearly half of the events reported to the Authority, 49% (n = 246), involved the adult population, while 40.2% (n = 202) involved the elderly. Almost 11% (n = 54) of reports involved the pediatric population, more than double the percentage treated in ASFs.

The medications mentioned in reports are representative of the variety of services provided by ASFs. The most common routes of administration reported were IV (46%, n = 231), ophthalmic (23.9%, n = 120), and oral (14.1%, n = 71). The most common classes of medications (see Table 1) were antibiotics (33.9%, n = 170), local anesthetics (8%, n = 40), and corticosteroids (4.6%, n = 23), while the most common specific medications listed were ceFAZolin (15.3%, n = 77), vancomycin (4%, n = 20), and midazolam (4%, n = 20). Multiple products (e.g., the combination of fentaNYL and midazolam) were also reported (5%, n = 25). The 2005 MedMarx report found that the most common medications

Table 1. Predominant Classes of Medications Mentioned in Events in Ambulatory Surgical Facilities, June 28, 2004, through December 31, 2010 (296 of 502 events)

MEDICATION	NUMBER	% OF TOTAL REPORTS (*N* = 502)
Antibiotics	170	33.9%
Local anesthetics*	40	8.0
Corticosteroids	23	4.6
Opioid analgesic combinations*	23	4.6
Benzodiazepines*	21	4.2
Nonsteroidal anti-inflammatory agents (NSAIDS)	19	3.8

* High-alert medication

involved in errors were ceFAZolin (14.7%, *n* = 488), midazolam (3%, *n* = 100), and morphine (2.9%, *n* = 96).[3]

Drug Omission Errors

Surgical site infections (SSIs) are a major contributor to patient injury, mortality, and healthcare costs. Despite evidence of effectiveness of antimicrobials to prevent SSIs, studies have demonstrated inappropriate timing, selection, and excess duration of administration of antimicrobial prophylaxis. Omitting preprocedural antimicrobial products has been linked to surgical site infections.[5] Antimicrobial prophylaxis, such as ceFAZolin, initiated before a procedure reduces surgical wound infections, especially when administered within one hour before the surgical incision.

A national, retrospective, cohort study with medical record review that measured the proportion of patients who had parenteral antimicrobial prophylaxis initiated within one hour before the surgical incision showed that an antimicrobial dose was administered to only 55.7% of patients.[6]

When looking at the stages of the medication use process for a procedure in an ASF, drug omissions most commonly took place during the preoperative stage (60.4%, *n* = 81) and the postoperative stage (17.9%, *n* =24), according to events reported to the Authority. Overall, antibiotics were the most common class of medications omitted (53.7%, *n* = 72), with ceFAZolin the most commonly omitted within that class (70% of all antibiotics, *n* = 35). Benzodiazepines were the second most frequently omitted class of medications (6%, *n* = 8), with midazolam accounting for 87.5% (*n* = 7) of the omitted benzodiazepines.

Review of the drug omission event details found that 91% (*n* = 122) of the events involved a breakdown in the communication of orders or overlooking the preoperative orders.

> *[An elderly] patient was admitted for [a procedure]. The admitting nurse transcribed the preoperative orders. The physician prescribed a preoperative antibiotic (ceFAZolin) after the orders were transcribed by the nurse. There was no verbal notification to the nurse. The PACU [postanesthesia care unit] nurse discovered that the order was not given. [The nurse] notified the physician and the medication was given in the PACU.*

Wrong-Drug Errors

The routes of administration for medications associated with wrong-drug errors primarily involved ophthalmic (42%, *n* = 47) and IV (40.2%, *n* = 45) products. Based on the description of the events, it appears that most of the wrong-drugs errors involved choosing the wrong product (86.6%, *n* = 97) with no contributing factors mentioned.

When looking solely at the wrong-drug errors involving IV medications, 37.8% (*n* = 17) involved high-alert medications such as fentaNYL, EPINEPHrine, ketamine, meperidine, and morphine.

> *Anesthesia signs out a drug box each morning. The drug box contains fentaNYL 200 mcg/2 mL (10 vials), midazolam 2 mg/2 mL (10 vials), and ketamine 500 mg/5 mL (2 vials). The ketamine was recently added to the drug box. The doctor stated he was not aware that ketamine was in the box. He drew up the ketamine and administered it as if it were fentaNYL. He labeled the syringe "Fentanyl." The patient was not arousing in the recovery area as anticipated and the doctor was informed of this. The error was realized when the drug box was checked back in by two staff nurses; the fentaNYL and the ketamine counts were incorrect.*

> *A nurse was asked to obtain EPINEPHrine 1:10,000 and could not locate the drug in the room. The nurse left the room to procure the medication. Upon opening the medication cabinet, she obtained a vial that was thought to be labeled as "1:10,000." The medication was mixed with normal saline and administered to the patient. After the patient left the room, the nurse manager was in the room assisting the staff to look for EPINEPHrine in the medication drawer. The nurse manager noted that heparin vials were inadvertently placed in the drawer and brought this to the nurse's attention. The nurse looked in the sharps box and discovered that she had handed the scrub nurse heparin instead of EPINEPHrine.*

Decadron® 4 mg was prepared in a syringe to give to patient. A syringe of fentaNYL was at the bedside from a previous pain medication injection. Both syringes were labeled as to the contents. FentaNYL was given in error (meant to give Decadron). The error was realized as soon as the meds were given when the nurse saw "fentanyl" on the syringe. The physician was immediately notified and Narcan® was given.

An at-risk behavior that contributes to wrong-drug medication errors in the perioperative setting involves the failure to label stainless steel bowls that hold medications before they are drawn up into a syringe and injected into the patient. Data from the 2004 Institute for Safe Medication Practices (ISMP) Medication Safety Self -Assessment® for Hospitals indicated that only 41% of hospitals always labeled medications and solutions used in operating room (OR) settings.[7] An alarming 18% of hospitals did not label containers at all, and another 42% applied labels inconsistently. Also in 2004, a 69-year-old Seattle woman died largely because of unlabeled basins of solution in the interventional radiology procedure room. During coil placement under cerebral angiography to repair a brain aneurysm, the patient was accidentally injected with a topical antiseptic solution, chlorhexidine, instead of contrast media. Both solutions were clear and available on the sterile field in unlabeled basins. The hospital's decision to switch antiseptics from a brown povidone-iodine solution to a clear chlorhexidine solution resulted in a latent failure—two look-alike clear solutions previously distinguished by color on the sterile field. This latent failure was revealed when the unlabeled solution basins were mixed up.[8,9] In another example, an event was reported to ISMP in which an unlabeled basin contained lidocaine and another unlabeled basin contained ethyl alcohol. Although both solutions were clear, which increased the risk for confusion, staff relied on location in the sterile field to identify the substances. This time, ethyl alcohol was mistakenly drawn into a syringe and injected into the patient's face instead of lidocaine. The patient suffered from partial facial paralysis and unknown long-term consequences.[7] In 2006, The Joint Commission established a National Patient Safety Goal that required organizations to label all medications, medication containers (e.g., syringes, medicine cups, basins), and other solutions on and off the sterile field in perioperative and procedural areas.[10]

Similar events reported to the Authority include the following:

During fracture nasal procedure, the surgeon requested bupivacaine 0.25% with EPINEPHrine. The surgical technician drew up the medication from the OR table into a syringe. The surgeon administered the medication intranasally. When preparing to soak the Cottonoids® in a [nasal vasoconstrictor] solution, the surgical technician discovered she had only a small amount of [that solution] left in the medication container. The bupivacaine medication container was still full. The surgeon was notified that the [nasal vasoconstrictor] was possibly administered instead of the bupivacaine as requested and the anesthesiologist was notified. Later, the patient was transferred to the critical care unit at the acute care facility.

Wrong-Drug Errors Involving Ophthalmic Products

There is a long, documented history of confusion between eye drop containers due to similarity in product packaging. In 1996, the American Academy of Ophthalmology urged manufacturers to convert to a uniform color-coding system, based on therapeutic class, for eye solutions and ointments; the U.S. Food and Drug Administration and manufacturers of these products later agreed to this.[11] For example, the caps and carton labels for anti-infective ophthalmic medications are tan. Mydriatics and cycloplegics are coded red, miotics are green, beta-blockers are yellow or blue, and so forth. The proponents of the color-coding system argue it helps ophthalmologists and patients quickly differentiate medications. Although it is intended to be an actual color-code system as defined above, in reality it is more likely that practitioners use the colors to differentiate products rather than to identify products by pharmacologic class. However, this color-coding system may contribute to errors if healthcare practitioners confuse similar-appearing products in the same class. Color-coding may work well in an office setting or in the patient's home, but when similar corporate logos, fonts, and package sizes are factored in (see Figure), color-coding may not be safe in pharmacies, patient care areas, or procedure areas where greater numbers of medications are stored.[12] Errors have happened when dispensing and administering these products on nursing units, in ophthalmology clinics, and in hospital and ambulatory care pharmacies.[13] The following is an example reported to the Authority:

Preoperatively, the physician prescribed eye drops for cataract surgery. The bottle of Cyclogyl® 15 mL has a red top. Tropicacyl® has same size bottle and color lid. The Cyclogyl drops were inadvertently placed into the eye instead of Tropicacyl.

Contrary to the previously reported confusion between eye drops of similar pharmacologic categories, 74.5% (n = 35) of the wrong-drug errors involving ophthalmic products submitted to the Authority involved mix-ups between eye drops of *different* pharmacologic categories; 82.9% (n = 29) of these reports specifically mention situations of product selection errors, although additional contributing factors may have led to the error.

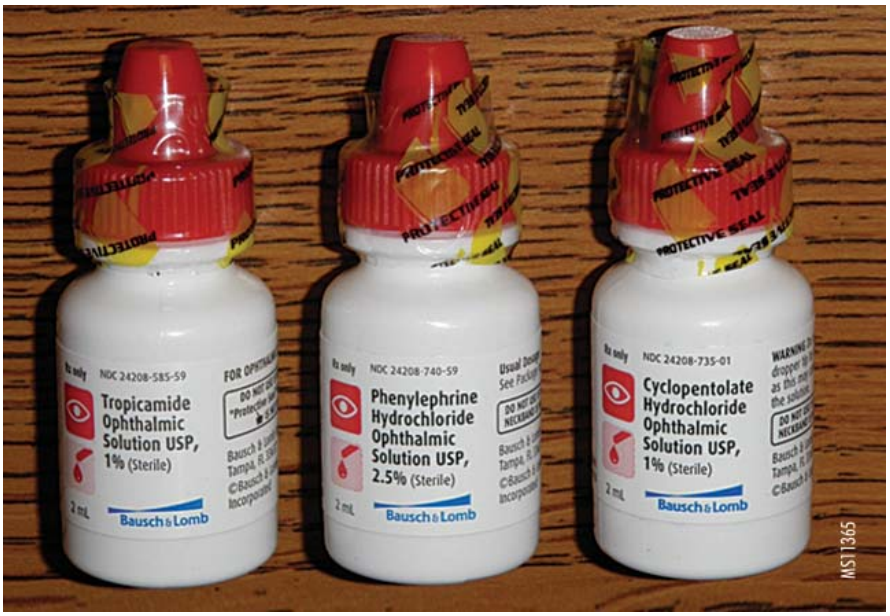
A patient was scheduled for a YAG laser peripheral iridotomy. A nurse administering eye drops was preparing more than one patient for YAG laser procedures at the same time. The nurse did not check the written medication order immediately prior to administering the eye drops and thought the patient was [scheduled] for YAG laser capsulotomy (phenylephrine 2.5% and tropicamide 1%) instead of YAG laser peripheral iridotomy. The nurse accidentally administered the routine eye drops for the capsulotomy procedure. The doctor was notified immediately and the patient was ordered that the left eye should be irrigated and 3 drops of 2% pilocarpine, followed by 1 drop of 2% pilocarpine and 1 drop of 0.5% Iopidine® to left eye in 5 minutes.

Proparacaine drops were to be placed into the operative eye prior to eye preparation. Instead, the pilocarpine eye drop was instilled after surgery. Both eye drop bottles were sitting on the eye cart. The nurse picked up pilocarpine instead of proparacaine and did not register the mistake until after the eye drop was instilled. Both [bottles] were sitting in close proximity of each other for the case and both bottles are quite similar looking (but not alike).

Errors Involving Documented Drug Allergies

When reviewing event descriptions for event reports classified as "other" (n = 107), analysts found that 33.6% (n = 36) indicated that a patient received a medication to which he or she had a documented allergy, similar to what was reported by the Authority in September 2008.[14] In addition, a review of the wrong-drug events revealed another 14 events in which a patient almost or actually received a medication to which he or she had a history of allergies. Facilities also reported 36 events with the event type "monitoring error/documented allergy," for a total of 86 events that described errors involving documented drug allergies (see Table 2). These 86 events account for 17.1% of all medication errors reported by ASFs. The most common drug classes involved in these events were antibiotics (46.5%, n = 40), contrast media (8.1%, n = 7), and antiseptics (7%, n = 6).

Figure. Look-Alike Eye Drop Bottles



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A patient was interviewed prior to the procedure by the circulating nurse. The patient denied any allergies when asked, but had a red medication allergy bracelet on. The bracelet said "powdered gloves," and the patient said that she did indeed have an allergy after denying it previously. The OR nurse then asked if the patient had any allergies to betadine, iodine, or shellfish. The patient stated "no." The patient was taken back to the OR and the nurse started prepping the operative site with betadine. The patient then stated that the nurse should stop because she is allergic to the prep.

Patient had a documented allergy to IV dye on the chart. The patient also had an allergy band on her wrist which was placed by preoperative staff. The OR nurse confirmed the allergy with the patient during preoperative questioning. During the procedure, the medication was dispensed to the physician by the OR nurse and the medication was administered to the patient by the physician. The OR nurse realized the error immediately after the procedure. The patient was taken to the PACU and monitored. She was given Benadryl® and Decadron in the PACU.

A surgeon's postoperative instructions included "Diamox Sequel® 500 mg for one dose" to be administered except in the case if patient was allergic to sulfa. Patient received a one-time dose of Diamox 500 mg [a sulfa derivative] and there was documentation indicating that patient was allergic to "sulfa" drugs. Patient also had an allergy bracelet indicating sulfa allergy. After a follow-up phone call to the patient and family, it was found that the patient did present with a delayed

Table 2. Predominant Medication Error Event Types Associated with Ambulatory Surgery Facilities, June 28, 2004, through December 31, 2010 (453 of 502 events)

EVENT TYPE	NUMBER	% OF TOTAL REPORTS (*N* = 502)
Drug omission	134	26.7%
Wrong drug	112	22.3
Monitoring error/documented allergy	86	17.1
Extra dose	21	4.2
Wrong dose/overdosage	18	3.6
Wrong dose/underdosage	11	2.2
Other	71	14.1

allergic reaction to the medication given (Diamox) in which the patient/family reported facial swelling, which is now subsiding.

The analysts note that it is the responsibility of the prescriber to check for allergies and not write an order to administer a medication "unless the patient is allergic."

RISK-REDUCTION STRATEGIES

ASFs can strive to identify system-based causes of the medication errors that occur and implement effective risk-reduction strategies to prevent harm to patients. Although many of the events reported to the Authority were not explicit in revealing all the causes and contributing factors of drug omissions, wrong–drug errors, and documented allergies, healthcare facilities may consider the strategies described below, which are based on a review of events reported to the Authority, observations from ISMP, and recommendations in the literature.

Antibiotic Omission

Strategies designed to improve compliance with prophylactic antibiotic administration within 60 minutes of initial incision include the following:[15]

— Use prompts in the electronic documentation of perioperative care regarding prophylactic antibiotics that include antibiotic selection and time of administration. The electronic chart may include a question asking if antibiotics had been ordered.

— Review preoperative standing order forms for select surgical diagnoses to ensure they include preoperative antibiotic administration, as well as the specified antibiotic and timing for surgical procedures for which preoperative antibiotics are recommended.

— In the preoperative holding area, introduce a process to screen preoperative antibiotic orders according to national guidelines and immediately notifying physicians of problems. Assign responsibility to the preoperative holding-area staff for ensuring that patients have orders for preoperative antibiotics. Incorporate a check by anesthesia and OR staff to verify appropriate preoperative antibiotic therapy has been initiated or completed.

— Change the preoperative processes for antibiotic administration. One organization determined the average time from when the patient enters the OR to when the initial incision was made, which for all procedures ranged from 20 to 30 minutes. Based on this information, the organization's SSI improvement team determined that the anesthesia care provider should administer the antibiotics immediately before the patient leaves the preoperative holding area. This process change enabled healthcare practitioners to consistently administer antibiotics within 60 minutes of the initial incision.

Wrong-Drug Errors

Although there were few reported cases of unlabeled bowls or syringes, organizations should have policies and procedures for the safe labeling of medications and solutions used on a sterile field. The Joint Commission National Patient Safety Goal NPSG.03.04.01 mandates such labeling in both inpatient and outpatient settings and requires the following in perioperative and other procedural settings both on and off the sterile field:[16]

— Label medications and solutions that are not immediately administered.

— Label any medication or solution that is transferred from the original packaging to another container.

— Verify all medication or solution labels both verbally and visually. Verification is done by two individuals qualified to participate in the procedure whenever the person preparing the medication or solution is not the person who will be administering it.

Strategies to improve the labeling of medications on a sterile field as well as to prevent wrong-drug errors include the following:[17,18]

Provide labels. Make labeling easy by using sterile markers, blank labels, and preprinted labels (prepared by the facility or commercially available) that can be opened onto the sterile field during all procedures.

Require labels. Require labels on all medications, medication containers (e.g., syringes, medicine cups, basins),

or other solutions on and off the sterile field, even if only one medication or solution is involved. Also require labels on all solutions, chemicals, and reagents (e.g., formalin, saline, Lugol's solution, radiocontrast media) that are used in perioperative units.

Differentiate look-alike drug names and products. If drug or solution names or packaging are similar, use tall man lettering (e.g., EPINEPHrine) on the labels to differentiate them, or highlight or circle the distinguishing information on the label. For example, consider purchasing skin antiseptic products in prepackaged swabs or sponges to clearly differentiate them from medications or other solutions and eliminate the risk of accidental injection.

Confirm medications and labels. Require the scrub person and the circulating nurse to concurrently verify all medications and solutions visually and verbally by reading the product name, strength, and dosage from the labels. (If there is no scrub person, the circulating nurse can verify the medication or solution with the licensed professional performing the procedure.) When passing a medication to the licensed professional performing the procedure, visually and verbally verify the medication, strength, and dose by reading the label aloud. The healthcare practitioner administering the medication also can read the product label to verify that it is the correct medication.

Standardize medications. Standardize and limit the variety of strengths and concentrations of medications as much as possible. Communicate any changes in available strengths and concentrations to front-line staff.

Storage of medications. Store medications safely with consideration given to separate look-alike products. This includes separating by generic name and packaging to the extent possible.

Perhaps the best way to prevent mix-ups of ophthalmic products is to avoid purchasing all eye drops from one manufacturer and to purchase drugs within a class from different manufacturers.[13]

Documented Allergies

As mentioned in the September 2008 *Pennsylvania Patient Safety Advisory* article, "Medication Errors Associated with Documented Allergies," specific strategies to prevent the prescribing and administration of medications to patients with documented allergies include the following:[14]

- Review all paper and online data collection forms to determine the current location in which practitioners will document and retrieve complete allergy information, including descriptions of any reaction (e.g., front of medical record, on top of order forms, computer screens, assessment forms). This location can be standardized and used by all staff in the facility. Alert staff to always refer to these areas for reliable information.
- Consider adding prompts in consistent locations to document allergy information, and include clearly visible and prominently placed allergy prompts at the top of every page of all prescriber order forms (including blank, preprinted, and verbal order forms).
- On a patient's admission to the facility, list allergies, describe the reaction to the allergen, and, if possible, record the date that the reaction took place on all admission forms. Have appropriate staff consistently transfer this information to subsequent forms and place the completed forms into the charts so that they are readily accessible. This process can help visually remind physicians and nurses about the patient's allergies when prescribing medications or transcribing a verbal order for a medication.
- Educate prescribers and nurses about medication allergies. These efforts can include organization-specific procedures such as where to document or find patient allergy information, as well as how to access important drug information that includes common allergies, cross allergies, and multi-ingredient drug products that may have implications for common drug allergies.
- Use information published by the Authority to identify problem areas, processes, or medications and to determine the types of events that occur within the facility.
- Measure the use of trigger drugs used to treat allergic reactions (e.g., diphenhydrAMINE, methylPREDNISolone, EPINEPHrine) to increase detection of possible preventable adverse drug events and determine whether patients with documented allergies are erroneously receiving medications. Collection of trigger data could be incorporated into the order-screening processes or accomplished by those who routinely review patient records, such as quality managers or case managers.

CONCLUSION

In Pennsylvania ASFs, 502 medication errors have been reported. The predominant types of medication errors are drug omissions, wrong-drug errors with IV and ophthalmic products, and prescribing and administering of medications to patients with documented allergies. Use of strategies to prevent wrong drug errors, especially with high-alert medications in the perioperative area, can help prevent harm to patients undergoing procedures in ASFs.

NOTES

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LEARNING OBJECTIVES

— Recognize the predominant types of medication errors associated with ambulatory surgery facilities (ASFs), according to reports submitted to the Pennsylvania Patient Safety Authority.

— Recall the most common classes of drugs involved in medication errors in ASFs.

— Identify factors frequently involved in wrong-drug medication errors in ASFs.

— Distinguish between effective and ineffective risk reduction strategies for ASF practitioners to promote the safe use of medications.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education and assessment. You may use the following examples or develop your own questions.

1. The most frequently reported type of medication errors occurring in ASFs is _____.
   a. extra dose
   b. drug omission
   c. wrong drug
   d. other
   e. monitoring error/documented allergy
2. All of the following are true about wrong-drug errors in ASFs EXCEPT:
   a. More than 40% of wrong-drug error reports mention ophthalmic products.
   b. An at-risk behavior that contributes to wrong-drug medication errors in the perioperative setting involves the failure to label stainless steel bowls that hold medications.
   c. High-alert medications were involved in more than 37% of wrong-drug errors involving intravenous products.
   d. Analysis of Authority reports involving wrong-drug errors found that nearly 90% of reports did not indicate contributing factors.
   e. More than 74% of wrong-drug error reports involving ophthalmic products involved mix-ups with products of similar pharmacologic categories.
3. All of the following are effective strategies to reduce the risk of wrong-drug medication errors in ASFs EXCEPT:
   a. Purchase sterile markers, blank labels, and preprinted labels prepared by the facility or commercially available that can be opened onto the sterile field during all procedures.
   b. Avoid purchasing all eye drops from one manufacturer, especially drugs within the same pharmacologic class.
   c. Require labels on all medications, medication containers (e.g., syringes, medicine cups, basins), or other solutions on and off the sterile field.
   d. Verification of medication labels should be done by an individual qualified to participate in the procedure.
   e. Differentiate look-alike drug names and products by using tall man lettering (e.g., EPINEPHrine) or highlighting or circling the distinguishing information on the label.
4. Which of the following is the predominant class of medications mentioned in medication errors reported by ASFs?
   a. Opioid analgesic combinations
   b. Neuromuscular blocking agents
   c. Corticosteroids
   d. Antibiotics
   e. Benzodiazepines

SELF-ASSESSMENT QUESTIONS (CONTINUED)

Case Scenario 1

A surgeon's postoperative instructions included "Diamox Sequel® 500 mg for one dose" to be administered except in the case if patient was allergic to sulfa. Patient received a one-time dose of Diamox 500 mg (a sulfa derivative) and there was documentation indicating that patient was allergic to "sulfa" drugs. Patient also had an allergy bracelet indicating sulfa allergy. After a follow-up phone call to the patient and family, it was found that the patient did present with a delayed allergic reaction to the medication given (Diamox) in which the patient/family reported facial swelling, which is now subsiding.

5. Which of the following strategies would *not* help prevent the above scenario from occurring?
   a. Avoid writing an order to administer a medication with a conditional statement such as "unless the patient is allergic."
   b. Standardize the location where a patient's complete allergy information, including descriptions of the reaction, appears (e.g., front of medical record, on the top of order forms, computer screens, assessment forms).
   c. Measure the use of trigger drugs used to treat allergic reactions (e.g., diphenhydrAMINE, methylPREDNISolone, EPINEPHrine) to increase detection of possible preventable adverse drug events.
   d. Have appropriate staff consistently transfer allergy information obtained on admission to subsequent forms and place the completed forms into the charts so that they are readily accessible.
   e. Provide prescribers and nurses access to important drug information that includes common allergies, cross allergies, and combination drug products that may have implications with common drug allergies.

Case Scenario 2

An elderly patient was admitted for a procedure. The admitting nurse transcribed the preoperative orders. The physician prescribed a preoperative antibiotic (ceFAZolin) after *the orders were transcribed by the nurse. There was no verbal notification to the nurse. The postanesthesia care unit (PACU) nurse discovered that the order was not given. The nurse notified the physician and the medication was given in the PACU.*

6. Which of the following strategies would *not* help prevent the above scenario from occurring?
   a. Use prompts in the documentation of perioperative care regarding prophylactic antibiotics that include antibiotic selection and time of administration.
   b. Use verbal orders to communicate preoperative antibiotic orders between prescribers and nurses.
   c. Incorporate a check by anesthesia and operating room staff to verify appropriate preoperative antibiotic therapy has been initiated and/or completed.
   d. Review preoperative standing order forms for select surgical diagnoses to include preoperative antibiotic administration as well as the specified antibiotic and timing for surgical procedures for which preoperative antibiotics were recommended.
   e. Assign responsibility to the preoperative holding area staff for ensuring that patients have orders for preoperative antibiotics.

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THE PENNSYLVANIA PATIENT SAFETY AUTHORITY AND ITS CONTRACTORS

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