ISMP Medication Error Report Analysis

Oxycodone IV?

Eliminate Teaspoonfuls

Avoid Vitamin D Products Dosed and Measured in Drops

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These medication errors have occurred in health care facilities at least once. They will happen again—perhaps where you work. Through education and alertness of personnel and procedural safeguards, they can be avoided. You should consider publishing accounts of errors in your newsletters and/or presenting them at your inservice training programs.

Your assistance is required to continue this feature. The reports described here were received through the Institute for Safe Medication Practices (ISMP) Medication Errors Reporting Program. Any reports published by ISMP will be anonymous. Comments are also invited; the writers' names will be published if desired. ISMP may be contacted at the address shown below.

Errors, close calls, or hazardous conditions may be reported directly to ISMP through the ISMP Web site (www.ismp.org), by calling 800-FAIL-SAFE, or via e-mail at ismpinfo@ismp.org. ISMP guarantees the confidentiality and security of the information received and respects reporters' wishes as to the level of detail included in publications.

OXYCODONE IV?

A patient who had a tonsillectomy was prescribed oxycodone hydrochloride to treat pain. He was unable to swallow the tablets, so his nurse asked the surgeon to switch the medication to a liquid form. The surgeon prescribed liquid oxycodone hydrochloride oral solution, but the nurse misunderstood and thought the liquid form was intended for intravenous (IV) administration. When the patient requested pain medication, the nurse opened a VistaPharm brand dose cup containing 5 mg/5 mL of oxycodone hydrochloride and withdrew the 5 mg (5 mL) dose using a 10 mL parenteral syringe. The patient was in a room that did not have a computer at the bedside (other rooms had computers). So the nurse did not double check the route of administration on the electronic medication administration record (eMAR) before administering the medication by slow IV push through a side port of a running IV of lactated Ringer's solution. The patient did not experience distress during administration.

Upon charting the medication outside of the patient's room, the nurse realized the medication was ordered for oral administration. She immediately assessed the patient and reported the error to the patient's surgeon. The patient was monitored for the next few hours but showed no signs of distress or local reaction at the site of administration. Vital signs and laboratory studies were normal, and the patient was discharged the next day.

Several unsafe practices that led to this error are concerning. First, the nurse never verified the pharmacy's transcription of the order into the eMAR before she administered the first dose of oxycodone. Had she done so, she may have noticed that the drug was intended to be administered orally. Next, the computer was not available in the patient's room, so the nurse was unable to verify the medication against the eMAR immediately prior to administration. Not only is this an unsafe practice, but the lack of a computer in the room is an example of a latent error that sits quietly in the system. There were a

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few knowledge deficits evident, too. The nurse failed to recognize that a dose cup typically holds an oral medication and that oxycodone is an oral drug, not a sterile IV medication.

This event draws attention to a global issue. Despite the efforts by the International Organization for Standardization (ISO) to develop small bore connectors for liquids and gases that cannot be misconnected to the wrong application, errors will still occur if the wrong syringe type is used. If nurses are in the habit of using a parenteral syringe to draw up medications to administer by mouth, the syringe can still be connected to an IV access port because they will both remain as Luer connectors. In this case, the nurse thought she was drawing up a parenteral medication in the parenteral syringe. The error is a disappointing reminder that wrong route errors will happen despite the new ISO standards for various connector types if the wrong syringe type is used.

Please discuss this issue with clinical staff and make sure they understand the importance of using the correct connector/adaptor/syringe for the corresponding ISO-compliant device for medical liquids and gases. Also, coach nurses to recognize the risks they are taking when they do not verify the transcribed order against the eMAR before drug administration. Unsafe practice habits are often widespread and require an understanding of the system issues that are driving and perhaps rewarding the at-risk behavior. Knowledge deficits should be addressed when they are uncovered by an error.

ELIMINATE TEASPOONFULS

In an ambulatory pharmacy, a prescription was being refilled for cetirizine 1 mg/mL. When checking the medication, the pharmacist noticed that the directions read, "Take 2.5 mL (1.2 teaspoonfuls) by mouth once daily." The pharmacist looked at the original prescription and corrected it to read, "Take 2.5 mL (1/2 teaspoonful) by mouth once daily." The prescription had been filled previously with the incorrect directions. Fortunately, the mother had been giving her child the correct dose, measuring 2.5 mL for each dose and not using the incorrect teaspoonful designation. Typing a decimal point instead of a slash mark (1.2 instead of 1/2) is easy because the keys are side by side on the keyboard. This longstanding problem would not occur if teaspoonfuls were no longer used in dosing directions.

Since 2011, ISMP has been calling for the use of mL-only doses for all liquid medications (www.ismp.org/sc?id=535); it has also been one of ISMP's 2014–2015 Targeted Medication Safety Best Practices for Hospitals (www.ismp.org/sc?id=536). It looks like complete transition to a metric-only measurement system is coming soon; other groups are working toward that goal, including the Centers for Disease Control and Prevention, the National Council for Prescription Drug Programs, and the US Food and Drug Administration (FDA). More recently, the American Academy of Pediatrics called for only mL to be used when prescribing and administering liquid medications to children. This was supported by the Consumer Healthcare Products Association (CHPA), which represents the over-the-counter (OTC) drug industry. CHPA formatting guidelines recommend using only mL for children's liquid medicines (see Standard Terminology and Format for Labeling of Volumetric Measures on OTC Pediatric Orally Ingested Liquid Drug Products at: <http://www.chpa.org/VolCodesGuidelines.aspx>). Already one can see mL-only dosing in the drug facts panel on some OTC liquids.

Perhaps the most important impetus for change can be seen in the 2015 certification criteria for health information technology (IT) systems published in the *Federal Register* by the Office of the National Coordinator for Health Information Technology (ONC). ONC calls for IT systems to limit prescribers to use the metric system for all electronic medication orders (<http://www.gpo.gov/fdsys/pkg/FR-2015-03-30/pdf/2015-06612.pdf>). Electronically transmitted prescriptions from doctors' offices will be in mL only, enabling prescription directions to read the same way.

The time has come for lasting change. To prevent confusion, all hospitals, ambulatory care, and community pharmacies should work toward (or have already accomplished) designating oral liquid doses metrically by only using mL in the patient directions. Patients will need an oral dosing device, such as an oral syringe or dosing cup that measures in mL only. Baxter, NeoMed, and Becton Dickinson have already stated that they will be providing oral syringes with mL-only scales. The array of devices with combination markings in dessert spoonfuls, ounces, teaspoonfuls, drams, and so on should become a thing of the past.

AVOID VITAMIN D PRODUCTS DOSED AND MEASURED IN DROPS

Breastfeeding is the recommended method of feeding infants to provide them with the nutrients and immune factors needed in early life. However, breastfeeding alone does not provide the recommended

dose of vitamin D, because there are low average levels of this vitamin in breast milk. Breastfed infants can synthesize additional vitamin D through routine sunlight exposure, but skin cancer concerns have led parents to protect infants from the sun with clothing, hats, and sunblock.

In 2008, the American Academy of Pediatrics (AAP) doubled the recommended daily dose of vitamin D for infants and children to 400 units a day. Parents may easily be confused, given the various vitamin D products on the market with a wide variety of concentrations, such as 400 units in a single drop, 400 units per mL (eg, *Enfamil D-Vi-Sol*), 2,000 units per drop, and between 1,000 units to 10,000 units per mL.

Recently, a 2-month-old infant was admitted to the hospital with generalized dystonia and cachexia, with prominent skin folds and loose skin reflective of a failure to thrive. The baby was found to have a total serum calcium level of 24.3 mg/dL and an ionized calcium level greater than 3.3 mmol/L, the highest value that could be measured by the laboratory used by the hospital. During the course of the investigation, it was discovered that the infant's mother had been giving her baby a vitamin D supplement in a concentration of 400 units per drop. The mother misinterpreted the dosing instructions and gave 1 dropperful per day for weeks prior to the infant's hospitalization.

The product was Vitamin D3 Drops for Kids, manufactured by Natural Factors Canada (Figure 1). In addition to the very high concentration of vitamin D, the dropper included with the product could deliver an excessive amount of vitamin D, as happened in this case. This has been a factor in previous dosing errors and has been addressed as a potentially dangerous practice by multiple organizations, including the FDA (<http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm214343.htm>).

The concentrated drops are problematic if “drop” is confused with “dropperful,” and/or if the prescriber specifies the dose by volume alone. This has happened in other cases. ISMP's consumer Web site reported a case in which a mother bought a 2,000

Figure 1. Dropperful of vitamin D3 given to baby rather than 1 drop.

units per drop instead of a 400 units per drop concentration and gave her child 1 mL doses as the doctor recommended instead of 1 drop (www.ismp.org/sc?id=533). It is also hard to ensure that only 1 drop comes out of a dropper.

Practitioners should never assume that parents know which vitamin D product to purchase, how many units to give, or how it should be administered. For infants, errors are less likely to occur if a vitamin D product that contains 400 units per mL is sold, dispensed, or administered, not 400 units per drop. ISMP has notified the FDA about the latest infant overdose of vitamin D. ■