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ISMP
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Acute Care
ISMP Medication Safety Alert!®
Educating the Healthcare Community About Safe Medication Practices

Controlled substance drug diversion by healthcare workers as a threat to patient safety—Part I

Drug diversion by healthcare workers is a clandestine activity and is certainly underestimated and underreported.[1] Practitioners see firsthand the clinical effects of medications on patients, and many who divert drugs may harbor the false belief that they are in control of the situation and unlikely to harm patients or become addicted themselves.[2] Besides significant legal, financial, and personal risks that healthcare workers take when diverting medications, the true cost of drug diversion includes considerable risk downstream to unknowing bystanders, including healthcare facilities, the public, and especially patients. Pressures related to the coronavirus disease 2019 (COVID-19) pandemic have contributed to increased rates of anxiety in general, and this has certainly impacted healthcare workers. Coupling that with opportunities to access controlled substances, sets the stage for increased potential for diversion, making this a timely issue.

The most commonly diverted medications in healthcare include opioids, particularly **HYDRO**morphone, morphine, fenta**NYL** (including patches), **HYDRO**codone, oxy**CODONE**, methadone, and **SUBOXONE** (buprenorphine/naloxone); propofol; central nervous system depressants such as benzodiazepines (e.g., **ALPRAZ**olam, clonaze**PAM**); sedative hypnotics; and stimulants such as dextroamphetamine and methylphenidate.[3] While these medications are most likely to be associated with substance abuse disorder, and are the most common targets for diversion detection programs, it is important to note that diversion involves all prescription drugs. Other targets include high-value medications that could be sold or used for family members such as antiretroviral agents and certain cancer medications; performance-enhancing agents like erythropoietin and anabolic steroids; and other medications associated with opioid use disorder such as ondansetron (to control opioid withdrawal symptoms) and naloxone (in case of an overdose).[3-5] However, the focus of this article is controlled substance diversion as a risk to patient harm.

In **Part I**, we discuss drug diversion, as it impacts patient safety. In **Part II**, which will be published in an upcoming issue, we will provide recommendations for implementing a proactive approach to prevent, identify, report, and respond to healthcare worker controlled substance diversion.

Definition

According to the National Association of Drug Diversion Investigators, drug diversion is a medical and legal concept involving the illegal movement, adulteration, marketing, or transfer of any legal controlled substance anywhere within the supply chain, from the manufacturer to the end user.[6] Diversion occurs whenever a medication is redirected from its intended destination, for personal use, sale, or redistribution to others.

Scope

One in 10 healthcare workers misuse drugs (or alcohol) during their career, which is similar to the percentage seen in the general population; however, the diversion trend is slightly different in healthcare, as workers in this setting are more likely to misuse prescription drugs rather than illicit drugs.[7] Drug diversion is thought to occur in all facilities that handle controlled substances.[1,8] A 2020 survey of healthcare executives showed that 96% agreed that drug diversion is occurring in US hospitals.[9] Many healthcare workers who divert drugs start with injectables.[4] In fact,

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Misprinted label on sodium chloride bag. An organization that purchased 0.9% sodium chloride injection USP (NDC 0264-5802-00) 1,000 mL bags (lot number 0061852531, expiration 2025-02-28) by B. Braun received product that appeared to be labeled as 9% sodium chloride injection USP (**Figure 1**). Apparently, the left side of the label plate did not make proper contact during the printing process. We are uncertain if other lot numbers are impacted.

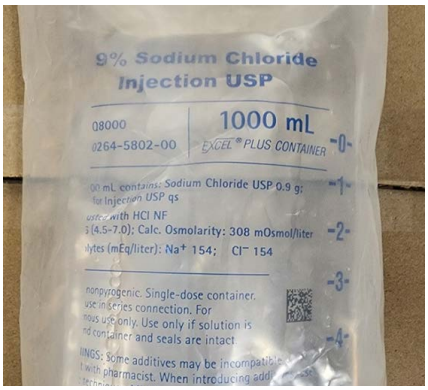

Figure 1. A B. Braun 1,000 mL infusion bag of 0.9% sodium chloride injection USP (NDC 0264-5802-00) appears to be labeled as 9% sodium chloride.

We reached out to the manufacturer to notify them of this issue. They told us they are still investigating this, but it appears that the ink did not properly adhere to the bag. For now, inspect your supply of 1,000 mL B. Braun 0.9% sodium chloride injection USP bags and notify the manufacturer if you have or receive impacted product.

Safety issue with probiotic packaging. Healthcare practitioners have reported concerns with the packaging for **EVIVO** (activated *Bifidobacterium infantis [B. infantis]* EVC001), a probiotic manufactured by Infinant Health. The product contains 8 billion colony-forming units (CFU) suspended in medium-chain triglycerides (MCT) oil per 0.5 mL, the labeled serving size. It is available in a vial that contains a total of

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tampering with an injectable medication, or removing the medication from a syringe or vial and replacing or diluting it with saline, water, or another substance, is the most serious type of drug diversion because it likely results in patient harm and is a desperate sign of a worker struggling with addiction.[8] The COVID-19 pandemic though has made the detection of diversion more difficult. In 2020, almost half (47%) of surveyed healthcare executives reported that staff turnover due to COVID-19 made it more difficult to track drug diversion, and more than one out of three (38%) had to cut their budget allocated to diversion investigations during the pandemic.[9]

Methods of Diversion

Medication-use processes in acute care settings are complex and involve many handoffs as medications move through the facility. Therefore, the methods used for drug diversion are often numerous, creative, and varied, and may occur during receipt, storage, compounding, dispensing, retrieval from storage locations, administration, and disposal to name a few.[4]

For example, in the main article, *Partially filled vials and syringes in sharps containers are a key source of drugs for diversion* (www.ismp.org/node/259), in our March 10, 2016 newsletter, a 36-year-old nursing assistant who had been diverting discarded drugs died after self-administering what they likely thought might be an opioid but was actually a neuromuscular blocking agent.

Readers may also recall an incident we described in our January 29, 2004, newsletter involving Carpuject syringe tampering. Some controlled substances and other medications are provided in boxes of 10 tamper-resistant Carpujects, with syringes in two bundles of five, held together by a clear, wide plastic band. Unless they are properly inventoried, they can also facilitate drug diversion, and possibly even contribute to medication errors. A pharmacist reported that they noticed three instances in which someone had slipped an opioid syringe out of a bundle and swapped it with a promethazine syringe. In another case, someone replaced morphine 8 mg Carpuject syringes with 2 mg and 4 mg syringes. Nurses may overlook the swaps when they count controlled substances, observing the sealed syringes without looking at the labels. It is also possible to turn the Carpuject so the drug name is towards the middle of the bundle, making identification more difficult. Pharmacists have also missed swapped syringes when products were returned to the pharmacy. Unless you take the time to inspect the drug name on each syringe, you could easily assume that the count is correct if the number of syringes matches the expected quantity.

Aside from the obvious drug diversion problem, storing a medication in the wrong box may lead to an error. A nurse, for example, may unknowingly remove a syringe from the **HYDRO**morphone box without closely reading the label, assume that it is indeed **HYDRO**morphone, and then mistakenly give the wrong drug to the patient. Keep in mind, that the syringe packaging is tamper resistant, not tamper proof. People have always found ways to defeat safeguards (e.g., prying off seals, slitting plastic containers). An informed clinician who understands this risk, and why the syringe labels need to be read during controlled substances counts, can vastly reduce the risk of diversion and medication errors.

Outcomes

As previously stated, drug diversion is not a victimless crime; it not only causes harm to healthcare workers who divert drugs, but also to coworkers, employers, and patients. Healthcare workers who divert medications risk criminal prosecution, medical malpractice lawsuits, loss of professional license/career, substance use disorder, overdose, and death. Coworkers may be forced to pick up an impaired colleague's workload or may feel guilty for not identifying the signs or speaking up. Employers bear the burden of fines, loss of Medicare and Medicaid reimbursement eligibility, civil and regulatory liability, and compromised public trust.[1] But the risks of drug diversion for unsuspecting patients are especially daunting. These risks include outright theft of medications

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0.7 mL. Although it is intended for resolving gut dysbiosis when given to patients via enteral feeding tubes in neonatal intensive care units (NICUs), the packaging resembles vials used for parenteral injection (**Figure 1**).

Figure 1. Evivo is provided in a vial (left) that resembles those used for parenteral injection and comes in boxes of 12 vials (right).

The manufacturer's website provides written instructions (www.ismp.org/ext/1055) and a video (www.ismp.org/ext/1056) on how to remove the cap, the foil ferrule, and the rubber stopper (**Figures 2a** and **2b**) to access the vial's contents with an ENFit syringe. However, if practitioners are not familiar with the instructions, they may withdraw the dose using a parenteral syringe and needle as the product looks like a parenteral medication vial.

Figure 2a. After the cap is removed, the metal ferrule needs to be peeled away from the rubber stopper.

Figure 2b. The last step for accessing the contents is to remove the rubber stopper from the vial.

In addition, the vial label warning "For Enteral or Oral Use" is not well positioned as it is only visible when the vial is turned to read the back edge of the label (**Figure 3**, on page 3). Whenever a substance meant for one route is placed in packaging more typically used for another route,

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charged to the patient; unrelieved pain or anxiety from receiving a substituted or diluted dose; substandard care and reckless endangerment from impaired healthcare workers; bloodstream infections from adulterated products or contaminated syringes;[10,11] adverse drug or hypersensitivity reactions if patients have been unknowingly provided with medications they should not receive; and inaccurate or falsified documentation in the patient's medical record.

Lack of Recognition

Because of the covert nature of diversion, it may be overlooked and may not be suspected or identified at all if detection systems are not in place.[4] Studies have shown that, while healthcare executives acknowledge that substance abuse is an issue in healthcare, only 17% believed the problem existed in their facility.[12] Healthcare workers may fail to report drug diversion out of fear of repercussions, acceptance of diversion as a part of the culture, or lack of education on its impact or knowledge of the resources available for reporting.[4] Drug diversion may not be identified until many patients have been harmed, and even when diversion is suspected, the risk of patient harm may be overlooked.[4,12]

Signs of Diversion

Possible signs of diversion can manifest in a worker's physical appearance, behavior, or work habits and performance.[13-15] These may be the only clues of diversion, so personal observation is vital.[4] Physical signs may include wearing long-sleeved clothing even in warm environments, shakiness, tremors, slurred speech, sweating, bloodshot eyes, appearing visibly intoxicated, or deterioration in one's personal appearance.[15] Behaviors of an employee who may be diverting drugs include increased isolation and social avoidance at work, frequent illnesses or absences from work, frequent trips to the restroom or locker room and other unexplained absences, increased accidents or injuries, refusing drug testing, being unreliable, taking greater effort or more time to complete ordinary tasks, or providing elaborate excuses.[15] Suspicious work habits and performance indicators of a worker who may be diverting drugs include consistently arriving early, staying late, volunteering for overtime, "wasting" controlled substances more often than peers, or transporting/storing controlled substances in their pockets.[13,15] Additional at-risk behaviors worth investigating include unnecessary dilution practices; access to the automated dispensing cabinet (ADC) more than 30 minutes prior to the administration time; removal of larger than required doses, resulting in the need for wasting; removal for a patient not assigned to them; and wasting of complete doses.

Other patterns or trends that may be identified within the organization's medication-use system include frequent incorrect controlled substance counts and discrepancies, increases in usage of controlled substances outside of normal levels, missing medications, signs of tampering with medication packaging, improper storage of controlled substances, frequent overrides in drug dispensing technologies, waste not being appropriately witnessed or large and inconsistent amounts of waste, controlled substances being removed from an unsecured waste container, or expired controlled substances being removed from their holding area.[14,15] Other signs include poor documentation of the chain of custody of controlled substances, which could include late documentation, coworkers habitually helping each other in completing documentation, or inappropriate documentation "batching."[13,15] Additional potential warning signs include leaking intravenous (IV) infusions containing controlled substances, complaints of poor pain management by patients, medical records that demonstrate erratic pain relief, and unexplained transmission of infection.[16]

Up next

Be on the lookout for **Part II** on this topic in an upcoming newsletter, which will discuss tools for preventing, identifying, reporting, and responding to diversion. For further information, please

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Figure 3. The "For Enteral or Oral Use" warning printed on the Evivo vial is not visible unless practitioners turn the vial to read the back edge of the label.

the chance of administering the substance by the wrong route is increased.

We reached out to the company to share the concerns we have about the product. If your organization purchases this product, ensure staff are aware of the correct preparation and administration instructions. All doses should be prepared in the pharmacy in an ENFit/oral syringe to prevent the use of a parenteral syringe and administering the drug via the wrong route.

Worth repeating...

Never prepare oral or topical medications in a parenteral syringe!

A nurse preceptor withdrew a dose of oral liquid acetaminophen from a unit dose cup using a parenteral syringe. A student nurse was distracted and connected the parenteral syringe to a patient's intravenous (IV) line. Fortunately, the preceptor identified the error and intervened prior to administration.

In another case, a nurse crushed an oxy**CODONE** tablet and used a 0.9% sodium chloride prefilled flush syringe to disperse and draw up the medication that was ordered to be given via the patient's jejunostomy tube (J-tube). The nurse inadvertently administered the oxy**CODONE** into the patient's peripherally inserted central catheter (PICC) line. No harm was reported after the event. Although the organization had converted to ENFit products for the administration of enteral medications, practitioners did not understand the reason for using ENFit

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join us or listen to the recording of the following drug diversion webinars: ***Part I: The Pursuit of Prevention—Confronting Drug Diversion*** (www.ismp.org/node/61019) and ***Part II: Reducing the Risk and Infection Outbreaks from Drug Diversion*** (www.ismp.org/node/61022).

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Smudged IV bag label and a proxy scan set up a patient for a cardiac arrest

Problem: A nurse administered heparin instead of norepinephrine to a critical, septic elderly patient. The omission of norepinephrine resulted in severe hypotension and cardiac arrest. The patient had been admitted to the hospital for evaluation of ulceration to their right lower extremity. Throughout their admission, the patient's renal function, blood pressure, and overall clinical status declined, eventually warranting intubation and continuous renal replacement therapy (CRRT). The patient was also receiving high doses of three vasopressors, including norepinephrine, to maintain an adequate blood pressure, as well as a heparin infusion for new-onset atrial fibrillation with a rapid ventricular response.

A smart infusion pump alerted a nurse that the patient's norepinephrine infusion was running low. The nurse requested an infusion of norepinephrine (16 mg/250 mL) as well as heparin (25,000 units/250 mL) from the pharmacy since the heparin infusion was also running low. The pharmacy dispensed both infusions via the pneumatic tube system. The nurse mistakenly brought the heparin infusion bag instead of the norepinephrine bag into the patient's room and hung it on the intravenous (IV)

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syringes, which were supplied inconsistently on patient care units.

Practitioners also notified us that Fagron (a 503B outsourcing facility) prepares topical lidocaine, **EPINEPH**rine, and tetracaine (referred to as L.E.T.—an abbreviation we do not recommend using) gel in a parenteral syringe (**Figure 1**). While it has a warning in small font on the syringe barrel, "TOPICAL USE ONLY," and a larger warning on the cap, "FOR EXTERNAL USE ONLY," practitioners may miss these warnings after removing the cap prior to administration. In case you think a wrong route error won't happen, in May 2022, we described an error in which a nurse administered a topical medication into a patient's gastrostomy tube (G-tube) (www.ismp.org/node/31478).

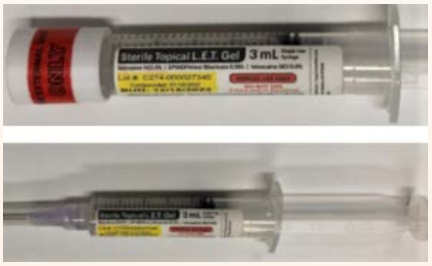

Figure 1. When practitioners remove the cap (top) from the topical lidocaine, **EPINEPH**rine, and tetracaine gel by Fagron, they can attach a needle to the parenteral syringe (bottom) or connect the syringe to an IV set.

We reached out to Fagron to recommend packaging the topical lidocaine, **EPINEPH**rine, and tetracaine gel in a container that practitioners would expect, such as a tube or jar, to prevent the inadvertent administration of the medication via the parenteral route. If your hospital must use an ENFit or oral syringe to package a topical product, affix a prominent auxiliary label stating, "For External Use Only," over the syringe cap, as well as on the immediate container, to cover any incorrect route-specific instructions. Ensure that all oral liquid medications prepared and dispensed by the pharmacy are packaged in an oral or ENFit syringe (***ISMP Targeted Medication Safety Best Practices for Hospitals***, *Best Practice* #4: www.ismp.org/ext/986); never prepare oral or topical medications in a parenteral syringe. Do not use prefilled 0.9% sodium chloride flush syringes to dilute or prepare

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pole directly behind the currently running norepinephrine bag in anticipation of needing to change the bag. The nurse then attempted to scan the barcode on the pharmacy's thermal label affixed to the bag of heparin, thinking it was norepinephrine, but the barcode would not scan because it had been smudged with alcohol-based hand sanitizer. As a workaround, the nurse scanned the bag of norepinephrine currently infusing. The nurse did not further examine the heparin label and administered it at the rate the norepinephrine infusion had been running. Given the patient's critical status along with the omission of norepinephrine, the patient did not have adequate blood pressure support and experienced a cardiac arrest. Return of spontaneous circulation was achieved, and the erroneous heparin administration was discovered once the patient was stabilized. However, the patient's clinical status continued to decline and they died 2 days later.

Investigation of the error led to the identification of several contributing factors, including recognition that the heparin infusion with the smudged label and barcode should not have been used; it should have been returned to the pharmacy. Also, when the barcode on the infusion bag would not scan, instead of following a standard process to escalate the concern, the nurse used a proxy scan of the barcode on the previously administered norepinephrine infusion bag to confirm what was thought to be a replacement norepinephrine infusion but was actually a heparin infusion. Similar errors with proxy barcode scanning have been reported, including a case in which a nurse scanned an empty heparin bag that was hanging on a patient's pole instead of the replacement bag, which unknowingly contained **ROP**ivacaine (www.ismp.org/node/17931).

Safe Practice Recommendations: The organization where the event occurred has taken several actions to prevent this from occurring again, including sharing this event with others. Please consider the following recommendations when reviewing your systems:

Purchase premixed infusions. Use premixed heparin and norepinephrine infusions, when possible, and require barcode scanning of the manufacturer's barcode.

Test labels for smudging. Test medication labels to see whether smudging of label and barcode information is possible, especially since practitioners frequently use alcohol-based sanitizers when handling medications. You may also consider testing new commercially available products since ISMP has received similar reports of commercially printed label information getting smudged or erased when wiped with alcohol-containing cleaners used prior to sterile compounding. If smudging is possible, consider alternative labels or printing technology. If this can't be rectified, alert practitioners to the risk.

Never use a medication with a smudged label or barcode. Educate practitioners during orientation and annually thereafter, not to dispense or administer a medication with a label that is smudged and unreadable, or if the barcode is smudged, which would render it unscannable.

Establish a process for barcodes that will not scan. Develop an escalation process for what to do if a medication barcode will not scan (e.g., contact the pharmacy for immediate help).

Never rely on a proxy scan. If a barcode will not scan, never use a proxy scan, such as scanning the barcode on an empty infusion or alternative label that is not on the medication being administered.

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medications. Make ENFit syringes readily available to staff and have pharmacists check that there is a sufficient supply for nurses during floor stock inspections. Educate staff during orientation and provide annual competency assessments to make sure they understand the rationale behind using ENFit devices as a forcing function to prevent wrong route misconnections. In most cases, if a medication provided in a syringe cannot connect to the patient's access device, you are likely trying to administer it via the incorrect route.

Quarterly ISMP Resources and Services Highlights

What does ISMP have to offer you? Check out our quarterly highlighted educational webinars and workshops, professional development opportunities, and free medication safety tools. The winter edition is now available as a convenient webpage: www.ismp.org/node/61994.

Special Announcement

Reminder to take our survey

ISMP and the California Society of Health-System Pharmacists (CSHP) would like to learn from those working in acute care hospitals in California and Arkansas about the **Medication Error Reduction Plan (MERP)** that is required in your states. We would also like to hear from others around the country about your thoughts on the MERP requirement. Please take our short survey by submitting your responses by **March 23, 2023**. To take the survey, go to: www.ismp.org/ext/1086.

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