September 2021 ▪ Volume 19 Issue 9

ISMP
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Nurse AdviseERR®
Educating the Healthcare Community About Safe Medication Practices

Infection transmission risk with shared glucometers, fingerstick devices, and insulin pens

The Centers for Disease Control and Prevention (CDC) has issued several warnings regarding unsafe practices that might result in the transmission of hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), and other infectious diseases during assisted blood glucose monitoring and insulin administration (www.ismp.org/ext/714). Assisted blood glucose monitoring is when a healthcare worker uses a shared glucometer to assist or perform glucose testing, usually for multiple patients with diabetes (as opposed to self-blood glucose monitoring using the patient's own glucometer). This typically occurs in hospitals or clinics, ambulatory care settings, senior centers, correctional facilities, long-term care settings, health fairs, and schools or camps.

Outbreaks associated with assisted blood glucose monitoring have been identified with increasing regularity in various inpatient and outpatient healthcare settings where blood glucose monitoring equipment is shared. Failure to follow the most basic principles of infection control contributed to most of these outbreaks.

Most frequently, the unsafe practices that have contributed to the transmission of infections include the following:

- Using fingerstick devices, also called lancing devices, for more than one person
- Using a blood glucometer for more than one person without cleaning and disinfecting it after every use
- Failing to change gloves and perform hand hygiene between fingerstick procedures
- Using insulin pens for more than one person risks infection transmission

Fingerstick devices should **never** be used for more than one person. Although some fingerstick devices have been previously approved and marketed for multi-patient use and require the lancet and disposable components to be changed between each patient, CDC recommends **never** using these devices for more than one person due to failures to change the disposable components, difficulties with cleaning and disinfection after use, and their link to multiple HBV infection outbreaks. Single-use fingerstick devices are disposable and prevent reuse through an auto-disabling feature.

Whenever possible, blood glucometers should **not** be shared. If they must be shared, each device should be cleaned and disinfected after every use, per the manufacturer's instructions. The glucometer must be cleaned before it can be disinfected, which might require the repeated application of an approved cleaning agent following the manufacturer's recommendations. If the manufacturer does not specify how the device should be cleaned and disinfected, then the glucometer should not be shared. Organizations have the responsibility to verify with the manufacturer that the glucometers are, in fact, approved to be used for multiple patients.

Using insulin pens for more than one patient is an ongoing medication safety risk we have previously discussed in this newsletter and during consultations and live presentations, starting as early as 2008. Since then, ISMP and others have chronicled large-scale, potential exposures to bloodborne pathogens caused by using insulin pens for multiple

continued on page 2 — Infection transmission >

what's in a Name?

The "-begron" drug stem name

Medications with the suffix "begron" belong to a class of drugs known as beta-3 agonists. These medications are used for the treatment of overactive bladder, primarily in adults. Only two oral medications in this class are approved by the US Food and Drug Administration (FDA) and available in the US, mirabegron (**MYRBETRIQ**, **MYRBETRIQ GRANULES**) and vibegron (**GEMTESA**) (**Table 1**).

Table 1. List of "-begron" medications available in the US

Generic	Brand
mirabegron extended-release	Myrbetriq (tablets)
	Myrbetriq Granules (oral suspension)
vibegron	Gemtesa

Beta-3 agonists work by relaxing the smooth muscle of the bladder (detrusor) and increasing bladder capacity, thus relieving the symptoms of overactive bladder such as urgency, frequency, and incontinence. The risk of developing an overactive bladder increases with age; however, some children have an overactive bladder (neurogenic detrusor overactivity [NDO]) due to a birth defect or spinal cord problem. NDO can increase pressure in the bladder and decrease the volume of urine the bladder can hold. If not treated, this condition can lead to permanent kidney damage. Recently, FDA approved the use of mirabegron for the treatment of NDO in pediatric patients 3 years and older.[1-2]

The most common side effects of mirabegron are increased blood pressure, headache, urinary tract infection, pain or swelling of the nose or throat, diarrhea, and nausea. Vibegron has similar side effects

continued on page 2— what's in a Name ? >

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> **Infection transmission** — continued from page 1

patients even after changing the needle. Insulin pens should **never** be used for more than one patient.

Additionally, The Joint Commission (TJC) has found that knowledge gaps among providers and leaders associated with assisted glucose monitoring and insulin administration via a pen have resulted in unsafe practices and subsequent escalation to an *Immediate Threat to Health or Safety*. TJC has just released an informational video that examines some of the more common mistakes witnessed by surveyors when staff administer insulin via a pen or perform glucose monitoring using a shared glucometer (www.ismp.org/ext/715). Additionally, the May 2021 issue of *Perspectives* details helpful information on compliance with standards related to glucose monitoring and insulin administration (The Joint Commission. Consistent Interpretation. Joint Commission surveyor's observations of staff competency related to blood glucose monitoring and insulin administration. *Perspectives*. 2021;41[5]:38-41).

How will PCA be administered to patients during an MRI?

Problem: A hospital reported two events involving patients receiving patient-controlled analgesia (PCA) who were in radiology for magnetic resonance imaging (MRI). Because the PCA pumps used in the hospital were not compatible with an MRI (would be attracted to the MRI magnet), a procedure was in place for the MRI professional staff to add several feet of extension sets to the PCA tubing so the pump could be left outside of the room.

For one patient, morphine in the PCA pump drug reservoir was used to prime the PCA extension tubing. After the PCA setup was verified by a nurse and another practitioner, the intravenous (IV) tubing (with the extension tubing) was connected to the patient's IV site and the patient's maintenance IV infusion was initiated at an undisclosed rate. While a nurse was still in the MRI room, and before any PCA doses had been initiated, the patient's oxygen saturation dropped below 90 percent and the patient became somnolent. The nurse suspected that the patient had just received a bolus of morphine that was in the extension sets. The patient was given supplemental oxygen, attempts were made to arouse the patient, and the charge nurse and anesthesia resident were immediately notified. One dose of IV naloxone was administered to the patient. The patient's mentation remained labile, and his respiratory rate varied from 4 to 8 breaths per minute; he eventually required additional doses of naloxone and became more responsive but still sleepy after each dose of naloxone wore off. Based on the morphine concentration and the volume of drug-containing fluid used to prime the tubing, it was discovered that the patient had received a bolus of approximately 56 mg of morphine.

A second hospitalized patient who had been receiving **HYDRO**morphone PCA experienced a similar event. The patient had been awake, alert, and oriented when assessed on the nursing unit prior to transfer to the MRI suite. Once in radiology, extension tubing was attached to the patient's PCA and primed with **HYDRO**morphone. During the MRI, the patient was placed on 3 liters of oxygen and was reported to be sleeping throughout the scan. When the patient was brought back to the nursing unit, his respirations were minimal and shallow, and the patient was barely conscious. The patient required multiple doses of IV naloxone before returning to his baseline status. Upon investigation, it was determined that the patient, as with the first patient, had received an inadvertent bolus of the opioid related to how the PCA and extension tubing had been set up.

Safe Practice Recommendations: Both patients received a large, unintended bolus of an opioid, resulting in respiratory depression that required use of a reversal agent. As a result, the hospital reported they are now removing PCA pumps from patients before going to radiology for an MRI. However, this requires coordination with providers to ensure adequate pain management while the PCA is disconnected. In addition to the time required to transport the patient to radiology, an MRI might take anywhere from 15 to 90

continued on page 3 — **PCA during an MRI** >

what's in a Name?

continued from page 1

but a study has shown it has no impact on blood pressure, even in patients with pre-existing hypertension.[3] Both drugs carry warnings to monitor for urinary retention, especially in patients with bladder outlet obstruction and taking cholenergic antagonist medications (e.g., trospium, oxybutynin, solifenacin), other medications used to treat overactive bladder.

Mirabegron is available in two different formulations, tablets and granules, which are not interchangeable. The specific formulation should be selected and prescribed based on the indication and patient's weight. Myrbetriq tablets should not be crushed, chewed, or split. They should be taken whole with water, and with or without food. Myrbetriq Granules should be prepared as an oral suspension and taken with food. Gemtesa tablets may be crushed and mixed with approximately 15 mL of applesauce, immediately before administration, and followed with a glass of water.

It is important to educate patients regarding how to take the medication and monitor for signs and symptoms of bladder infection (e.g., painful urination, blood in the urine, odor change, color change) or change in urine output.

References

1) US Food and Drug Administration (FDA). FDA approves new indication for drug to treat neurogenic detrusor overactivity in pediatric patients. www.ismp.org/ext/762. Published March 25, 2021. Accessed August 25, 2021.
2) Ellsworth P, Cone EB. Neurogenic detrusor overactivity: an update on management options. *R I Med J*. 2013;96(4):38-40.
3) Gemtesa [package insert]. Irvine, CA: Urovant Sciences, Inc. 2020.

SAFETY wire

Risks with leaving discontinued infusions connected to the patient. Recent error reports sent to us included two incidents in which discontinued high-alert medication infusions were turned off, but not physically disconnected from patients. In one case, norepinephrine was discontinued, but the bag was left hanging on the intravenous (IV) pole. The tubing was also left in the pump and connected to the patient.

continued on page 3 — **SAFETY wire** >

> **PCA during an MRI** — continued from page 2

minutes to complete, depending on the area of the body examined. So, if the PCA pump is disconnected, a process is needed to ensure that patients with pain are adequately treated and monitored during the procedure and until they return to their room.

In some cases, this may mean that it will be necessary to infuse an opioid at a basal rate during an MRI. There are MRI-compatible infusion pumps, such as the IRadimed MRidium pump (www.ismp.org/ext/717), as well as a shielded PCA pump system from B. Braun, the SpaceStation MRI Perfusor PCA syringe pump (www.ismp.org/ext/718), which is compatible with their infusion pumps. Or the hospital may elect to send the PCA pump with the patient and utilize extension sets for a basal rate, supplemented by a nurse injecting the patient with a prescribed bolus dose of pain medication, as necessary.

In any event, ensure that a process exists to address the pain control needs of patients receiving PCA when they undergo an MRI. This entails managing ongoing medication therapy during an MRI, training staff, providing alternative pain management therapy, using MRI-compatible equipment, and determining where to connect the PCA line if the patient has a primary line for infusions, and/or if bolus doses of contrast media during the MRI are needed. Also, develop guidelines for monitoring MRI patients who are receiving an IV opioid. The challenges and potential risks involved with the use of extension tubing, priming, and line tracing in the MRI setting are not unique to PCA therapy. These risks pose a safety concern for all IV drug therapy, such as an anticoagulant, insulin, or a vasopressor, during an MRI.

great catch

Praxbind label information needs repositioning. A pharmacist misunderstood the **PRAXBIND** (idaru**CIZU**mab) carton label and dispensed two cartons of the product for a 5 g intravenous (IV) dose, although each carton contained the full 5 g dose divided into two 2.5 g vials. Praxbind is used to reverse the anticoagulant effects of the direct thrombin inhibitor dabigatran. The recommended dose of 5 g should be administered as two separate 2.5 g IV doses no more than 15 minutes apart. Thus, the manufacturer, Boehringer Ingelheim, packages two 2.5 g (50 mL) vials in each carton. The Praxbind carton label states, "2.5 g/50 mL," which the pharmacist misunderstood to mean that each carton contained only 2.5 g. Below that, the carton label states, "Administer 2 vials for a complete dose of 5 g." However, the pharmacist did not notice that the label also states, "Contains 2 single-dose vials each containing 2.5 g/50 mL," at the very bottom of the principal display panel (**Figure 1**). The dispensing error was caught by a nurse who called to clarify the number of cartons needed for the 5 g dose prior to administration.

Because practitioners may not handle this product often, they might not be familiar with the carton contents. Although it seems clear that 2 vials are needed for the complete dose of 5 g, less clear is that the 2 vials are contained within a single carton. This important information should be more prominent on the label. Perhaps the best way to label the carton would be to state the full 5 g contents, with "2 x 2.5 g/50 mL single-dose vials" immediately following the full contents in parentheses. Because the prescribing information recommends administering the medication as an infusion by hanging the vials (each infusing over 5-10 minutes), or as an IV bolus dose via syringe immediately after the medication has been removed from the vials, it may not be feasible for pharmacy to dispense the product ahead of time in ready-to-administer syringes.

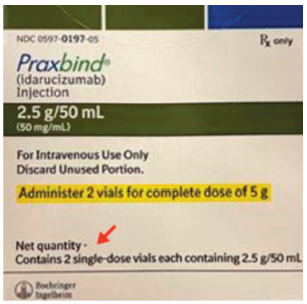

Figure 1. On the current Praxbind carton label, information that two vials are contained within each carton may be missed.

> **SAFETY**wire continued from page 2

Later, a nurse utilizing interoperability to infuse an antibiotic inadvertently scanned the channel that had the discontinued norepinephrine. This restarted the norepinephrine infusion. The patient experienced supraventricular tachycardia, which required medical treatment to resolve.

In the other case, a woman in labor was receiving an oxytocin infusion which was stopped. The tubing was removed from the Baxter SIGMA Spectrum pump, but the infusion was left connected to the patient. For some reason, oxytocin infused via free-flow. Once realized, the infusion was stopped, but the patient required an emergent cesarean section, and her baby had a low Apgar score. Fortunately, both mother and baby recovered without any effects. The hospital is investigating to determine why free-flow protection failed when the tubing was removed from the pump.

While a discontinued medication infusion may be needed again later, and keeping the same medication bag may save time and resources needed to prepare a new bag, safety comes first. Discontinued infusions should be immediately disconnected from the patient, removed from the pump, and discarded. Stopped or paused infusions also should be immediately disconnected from the patient, removed from the pump, and discarded within a reasonable timeframe if not restarted. Trace tubing from the solution to the pump, and then to the patient to verify pump/channel and route immediately *prior* to starting or changing the rate of the infusion.

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ISMP Nurse AdviseERR (ISSN 1550-6304)

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