



Double key bounce and double keying errors

In our December 2005 newsletter, we reported an error that resulted from pressing a number key once on an infusion pump and getting an unintended repeat of that same number (i.e., pump recorded 366 mL per hour, not 36 as intended). The reporting facility had uncovered 11 similar *double key bounce* events within the past 2 years—all involving different nurses working in various patient care units who felt certain that they had pressed the number key just **once**. This problem differs from an accidental *double keying* error in which a number or letter key is accidentally pressed **twice**.

To further investigate *double key bounces* and *double keying* errors, we asked you to send us examples of similar problems. One nurse reported that she had programmed a propofol infusion to run at 25 mL per hour. Fortunately, before she left the patient's room, she noticed that the pump was actually delivering 225 mL per hour. She thought she had pressed the number "2" key too long, causing a *double key bounce* in the same manner that a depressed computer key might run a string of numbers. Unfortunately, when she tested the pump by holding the key down longer than usual, she had difficulty recreating the error.

The hospital staff who first reported the problem to ISMP uncovered why it was so difficult to recreate this error. They were able to duplicate the *double key bounce* error only by pressing softly, or partially, on the key for a time, as one might do if hurried or programming the pump from an odd angle rather than standing directly in front of it. Another reporter was also

able to replicate *double key bounce* errors by partially depressing the number keys to a shallow depth. Pumps involved in the reports so far include: **Alaris SE** pump (formerly **Signature Edition GOLD Infusion System**), **SIGMA 8000**, and **SIGMA 6000+** infusion pumps (from Sigma International).

Some nurses also reported that distracting background noise prevented them from hearing the *two* audible beeps, one for *each* digit registered on the pump, when any keying error occurred.

Hospitals may be experiencing keying errors without recognizing them as hazards.

Some hospitals may be experiencing keying errors without recognizing them as hazards. Nurses may notice the programming discrepancy and simply correct it without reporting the event, believing they caused the error by inadvertently pressing the key twice. If nurses recognize that the pump itself contributed to the mistake, they may still just "accept" the phenomenon as typical for high-tech medical devices. Nurses also may not notice an error if the higher infusion rate did not result in patient harm.

ECRI, an impartial health services research company, has begun testing various pumps for *double key bounce* and *double keying* capability. Thanks to your additional reports about this problem, FDA is also now investigating the problem. So please continue to report events to ISMP at ismpinfo@ismp.org so we can help ECRI and FDA fully examine the issue. Until we know more, be alert to this risk and take action to detect and manage keying errors as suggested in **check it out!**

check it out! ✓✓✓✓

The following recommendations may help prevent or quickly detect *double key bounce* or *double keying* errors.

- ✓ **Proper stance.** When programming pumps, stand squarely in front of the keypad (ideally with the pump at eye level for best visibility) to facilitate proper depth of depressing each key.
- ✓ **Verify screen displays.** When programming pumps or changing settings, always compare the patient's prescribed therapy on the medication administration record, original order, or bar code device, to the displayed pump settings for verification before starting or restarting an infusion.
- ✓ **Independent double check.** Require an independent double check of pump settings by another practitioner before starting or changing infusions with hospital-selected high-alert drugs.
- ✓ **Listen and look.** Keep pump tones functional on all pumps and focus on listening to the number of beeps while programming IV pumps; each beep should correspond to a single digit entry. Before leaving the patient's room, actually look at the IV tubing drip chamber to see if the observed rate of infusion looks faster or slower than expected.
- ✓ **Dose alerts.** Use smart infusion pumps with activated dosage error reduction software that will alert when safe doses and infusion rates have been exceeded. This will help detect most *double key bounces* and *double keying* errors before the infusion begins. Keep in mind, some hospitals may not have added alerts to the pump library for IV solutions that are dosed by infusion rate alone (e.g., TPN), or nurses may not always use the dose alert features.

Avoid inadvertent IV administration of nimodipine

NIMOTOP (nimodipine) is a calcium channel blocker indicated primarily for patients with subarachnoid hemorrhage. The drug is available in a soft gelatin oral capsule. For patients who are unable to swallow, the manufacturer's (Bayer) package labeling suggests drawing the medication into a syringe with an 18-gauge needle, administering the drug via a nasogastric (NG) tube, and flushing with 30 mL of saline. However, this procedure is potentially dangerous, as the drug has occasionally been drawn into a parenteral syringe and accidentally given IV, resulting in severe hypotension, cardiovascular collapse, and cardiac arrest.

In one instance, a nurse softened the capsule in hot water and withdrew the medication into a parenteral syringe. In the chaos of the day, the nurse administered the dose IV instead of via the feeding tube. She immediately noticed the error and tried unsuccessfully to withdraw the drug from the IV tubing. Unfortunately, the patient decompensated almost immediately and subsequently expired.

Consider the following suggestions to reduce the risk of fatal errors with this drug:

- ✓ **Use an oral syringe.** If patients can't swallow the nimodipine capsules, ask pharmacy to prepare the drug using a parenteral syringe to extract the gel, dilute the medication, and then transfer it to an oral syringe clearly labeled "For Oral Use Only." (If kept in amber oral syringes and placed in light-protected bags, the drug is stable at room temperature for 31 days.¹)
- ✓ **Verify tube compatibility.** Check the NG tubes you use to verify that they can be connected to an oral syringe so nurses will not be required to transfer the medication back into a parenteral syringe before administration via the NG tube.
- ✓ **Educate staff.** Download (for free) and show staff the video, *Caution on Accidentally Giving Nimodipine (NIMOTOP) Intravenously*, produced by FDA in cooperation with ISMP (www.ismp.org/Pages/FDAVideos.htm).

Thanks to the many reports we received about this problem, FDA has recently asked Bayer to add a boxed warning to Nimotop labeling to make healthcare practitioners aware of the risk of this type of administration error. FDA has also asked Bayer to develop an oral solution of nimodipine so that the error-prone process of drawing the contents of a capsule into a parenteral syringe is no longer necessary.²

References: 1) Green AE, et al. Stability of nimodipine solution in oral syringes. *Am J Health-Syst Pharm* 2004; 61:1493-6. 2) FDA. Nimodipine (marketed as Nimotop). *FDA Alert for Healthcare Professionals* January 20, 2006. Available: www.fda.gov/cder/drug/InfoSheets/HCP/nimodipineHCP.htm.

► Special Announcement

Free Webinar for nurse leaders. On **February 20**, ISMP, along with the American Organization of Nurse Executives, Joint Commission Resources, and the National Patient Safety Foundation will be presenting the second in a 4-part series of free Webinars, sponsored by McKesson and Intel. The session, **Improved Communication**, will cover ways that nurse leaders can facilitate effective communication between nurses and other healthcare professionals to help keep patients safe. To register, visit <http://mpt.mckesson.com/nursingcongress/webinars.asp>.

nicecatch



Yes, no Coumadin. The person who wrote the order below probably had no idea that anyone would misinterpret the handwritten universal "do not" symbol (⊘), or a circle with a line through it, as the number 4, and transcribe the evening dose of **COUMADIN** (warfarin) as 4 mg instead of zero mg. But that's exactly what a unit clerk did. The patient's INR was already at the upper end of the therapeutic range. Fortunately, a nurse

Coumadin 4 mg po tonight

checked the patient's lab results before giving the drug and subsequently had the order clarified when she realized that the 4 mg dose did not make sense. This is a good example of the perils of using symbols rather than clear language and instructions when transcribing medication orders. "No Coumadin tonight" would have been a much safer alternative.

Your Reports at Work



Tylenol packaging returns to yellow.

McNeil Consumer and Specialty Pharmaceuticals recently let us know that 500 mg Extra Strength **TYLENOL** (acetaminophen) hospital pouches will be returning to the familiar yellow packaging. In the fall, ISMP began receiving reports from concerned practitioners when McNeil switched the 500 mg to a white packet (similar to the 325 mg) to accommodate a bar code and maximize scanning capability. This made the 325 mg and the 500 mg packets nearly indistinguishable. They have returned to the familiar yellow pouches with a bar code and are still exploring ways to improve scanning capability while differentiating the products.

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