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ISMP Urges Caution with Basal Opioid Infusions

Horsham, Pa.— A recent error has led the Institute for Safe Medication Practices (ISMP) to issue safe practice recommendations for basal opioid infusions given through patient-controlled analgesia (PCA). Studies have shown that patients with basal opioid infusions are at least five times more likely to experience respiratory depression. There also may be a greater risk of pump programming errors with basal infusions.

ERROR: A 63-year-old, 109 kg, opioid naïve patient was admitted to a hospital with fractures. She was given two doses of morphine 4 mg and one dose of HYDROmorphone 1 mg in the emergency department. Upon arrival to the inpatient unit, she was started on HYDROmorphone PCA, which included a basal infusion of 0.5 mg per hour, a demand dose of 0.2 mg with a lockout interval of 10 minutes, and a 4 hour limit of 6 mg. Continuous pulse oximetry was not in use.

Five hours later, the patient was found unresponsive. Her respirations were six per minute, and oxygen saturation was 44%. The rapid response team was called, oxygen started, and two doses of naloxone administered. In 15 minutes, the patient was alert and talking. It was discovered that the patient had sleep apnea and previously used a continuous positive airway pressure machine at home. The patient's body mass index (BMI) was 38.6 (40 or more is considered morbid obesity), placing her at risk for sleep apnea and hypoxemia during PCA therapy.

Three of the most prominent root causes of the event that were identified include:

- Dosing guidance. The PCA standard order form did not help guide prescribers to appropriate doses; instead, it provided a broad range of doses.
- Patient screening. The patient was not sufficiently screened for obstructive sleep apnea (OSA) and other risk factors for PCA-induced respiratory depression. The facility had an OSA screening process for pre-operative patients, but this patient was not a surgical candidate.
- Patient monitoring. No process was in place to trigger an evaluation of the need for continuous pulse oximetry monitoring (or capnography for appropriate patients) during PCA.

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SAFE PRACTICE RECOMMENDATIONS: ISMP recommends avoiding basal infusions unless the patient is opioid-tolerant. Unfortunately, the term "opioid-tolerant" is not well understood--it is defined as patients who have received opioids regularly for approximately 7 days or more. Opioid naïve patients who present with high opioid requirements may be an exception and require a basal infusion, but additional safety steps should be instituted under these conditions.

After the error described earlier, the hospital's medication safety team addressed the root causes by standardizing the PCA dosing process and revising the standard PCA order form. Prescribers now are guided to an appropriate dose based on age and opioid tolerance by providing default doses for three types of patients: *most patients, patients over 64 years or with sleep apnea,* and *opioid-tolerant patients.*

Basal infusions were eliminated except in opioid-tolerant patients, and prohibited in patients with sleep apnea. Opioid orders were rearranged to match the sequence in which the medications appear on the facility's smart IV pumps. A registered nurse is required to screen for OSA before PCA initiation, with further assessment by a respiratory therapist if the screening shows two or more risk factors. Continuous pulse oximetry or capnography is required while on PCA if the patient has a continuous opioid infusion or sleep apnea, or if the patient is morbidly obese or older than 64 years.

For a copy of the complete article on this issue that appears in the March 12, 2009 *ISMP Medication Safety Alert!* newsletter, visit: www.ismp.org/newsletters/acutecare/articles/20090312. In addition, the July 24, 2003 issue of the newsletter (www.ismp.org/Newsletters/acutecare/articles/20030724) offers more recommendations to improve PCA safety, including:

- Evaluate the patient's level of pain, alertness, and vital signs, including rate and quality of respirations, every 2-4 hours.
- Evaluate patients with minimal verbal and tactile stimulation to obtain an accurate assessment of their level of sedation.
- Monitor patients more frequently during the first 24 hours and at night, when hypoventilation and nocturnal hypoxia may occur.
- Employ early warning devices such as apnea alarms at night and pulse oximetry or capnography, which can alert practitioners to respiratory insufficiency.

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