

Patient Safety Tip of the Week

November 19, 2013

Can We Improve

Dilaudid/HYDROmorphone Safety?

One of our all-time most popular columns was our September 21, 2010 Patient Safety Tip of the Week “[Dilaudid Dangers](#)”. Though we have seen patient safety problems with all opioids, HYDROmorphone comes up more often than all the others. The major problem is misperception of the relative potency of HYDROmorphone. All too many healthcare professionals mistake HYDROmorphone as being equivalent to morphine when, in fact, HYDROmorphone is much more potent on a mg basis. While estimates of equipotency vary considerably in the literature, most now agree that 1 mg. of Dilaudid is probably the equivalent of at least 7 mg. of morphine. Chang and colleagues ([Chang 2006](#)) had noted several years ago that emergency room physicians and nurses who were hesitant to administer 7 to 10 mg. of morphine were not reluctant to administer 1 to 1.5 mg. of Dilaudid. They point out this is an illusion that less narcotic is being used with that Dilaudid dose.

ISMP Canada has been a leader in addressing the patient safety issues associated with HYDROmorphone. We’ve highlighted a series of articles from ISMP Canada in our Patient Safety Tips of the Week for September 21, 2010 “[Dilaudid Dangers](#)” and July 3, 2012 “[Recycling an Old Column: Dilaudid Dangers](#)” that have focused on HYDROmorphone safety ([ISMP Canada 2004](#), [ISMP Canada 2006](#), [ISMP Canada 2012a](#), [ISMP Canada 2012b](#)).

Our October 2013 What’s New in the Patient Safety World column “[Opioid Safety Actions and Resources](#)” mentioned a study from ISMP Canada on deaths associated with medication incidents ([ISMP Canada 2013a](#)). The drug most frequently implicated on that list was HYDROmorphone.

Now a new safety bulletin from ISMP Canada ([ISMP Canada 2013b](#)) reports results of a targeted pilot intervention to improve HYDROmorphone safety. The study also highlights many of the difficulties and barriers encountered in implementing such interventions.

They looked at prior recommendations on HYDROmorphine safety and prioritized them according to a hierarchy of effectiveness and came up with 5 actions designed to improve system safety:

1. Preparation by pharmacy of doses less than 1 mg in prefilled syringes
2. Availability of standard-volume chart for usual doses withdrawn from a 2 mg/mL vial or ampoule
3. Creation of an electronic alert in CPOE screens, pharmacy information systems, and ADC (automated dispensing cabinet) screens for initial doses greater than 1 mg IV/IM/SC/PO
4. Performance of a weekly audit to remove high-dose HYDROmorphine (i.e. parenteral dose greater than 2 mg) from patient care areas
5. Distribution of an opioid information sheet to patients and families

Each of the 5 participating hospitals completed at least one of the recommended actions but the average response was less than 50% of the achievable score for each category. The activities undertaken by the participating hospitals tended to be the ones that could be implemented most quickly and easily and those that were directly controlled by the pharmacy department. Workload issues were the most common barriers encountered.

None of the participating hospitals implemented the CPOE alert, with most citing concerns about alert fatigue as a potential barrier. However, including an alert on ADC's about limiting initial doses of HYDROmorphine to 1 mg or less was more accepted.

The audits were generally felt to be quite positive. This was felt to be a valuable and simple intervention. In fact, some felt that doing them daily rather than weekly would be easier to remember. We would also like to emphasize that feedback after audits is usually most productive when such feedback occurs in close proximity to the events rather than being delayed.

Interestingly, system issues often interfered with implementation of some recommendations. These included not only workload issues but also bureaucracy issues (eg. materials for patient education were delayed because they had to be approved by the hospital communication department).

They note that because of concerns about alert fatigue it may be more practical to limit the dose of HYDROmorphine by using standardized order sets. We concur with that. Order sets, whether computerized or paper-based, can help steer away from using HYDROmorphine as well as helping avoid prescription of inappropriately high doses when it is prescribed.

In our July 3, 2012 Patient Safety Tip of the Week "[Recycling an Old Column: Dilaudid Dangers](#)" we noted knowledge gaps regarding HYDROmorphine uncovered by ISMP Canada in a nationwide survey of healthcare providers ([ISMP Canada 2012a](#), [ISMP Canada 2012b](#)). There were especially knowledge gaps on differences in potencies of HYDROmorphine in various preparations (eg. oral vs. parenteral vs. subcutaneous) and gaps regarding the various slow-release forms. Some gaps in knowledge were also noted

regarding the concepts of patients being either opioid-naive or opioid-tolerant. And the biggest gaps in knowledge about HYDROmorphine appeared to be related to the pharmacological aspects. In particular, knowledge appeared to be limited regarding the duration of action of the various forms of HYDROmorphine and their relationship to the duration of action of naloxone. That, of course, is relevant to the phenomenon of “**renarcotization**” in which the reversal effect of the narcotic antagonist disappears while there is still substantial opioid on board. Also, there were gaps in knowledge regarding dosing of HYDROmorphine in patients with various comorbidities. Many respondents incorrectly thought that higher doses were needed in obese patients. Many also did not understand that lower doses should be used in patients with COPD, obstructive sleep apnea, the elderly, and those taking benzodiazepines. They also identified knowledge gaps related to the HYDROmorphine medication use process, particularly related to the proper steps for verifying orders, doing dose calculations, and programming IV pumps.

Our regular readers know that we strongly recommend that you limit the number of opioids to be used in your PCA pumps. You can standardize PCA on morphine and restrict prescription of other opioids to members of your pain management service or providers who have been specifically credentialed and privileged to order other opioids. The same argument could probably be made for opioids given via other routes.

Keep in mind that there may be legitimate indications for using HYDROmorphine in preference to morphine. For example, you may have a patient who gets pruritis with morphine, in which case HYDROmorphine may be an acceptable alternative.

Look-alike/sound-alike (LASA) issues also continue to occur, in which hydromorphone and morphine are mixed up. In fact, this is said to be one of the most frequent drug pairs involved in LASA errors. Use of tall man lettering (HYDROmorphine) is advised but, frankly, many healthcare workers still mistakenly assume that HYDROmorphine is an equipotent form of morphine. An outstanding published [RCA \(root cause analysis\) done by ISMP Canada](#) on a fatal Dilaudid overdose highlighted not only the fact that hydromorphone sounds like morphine but at that time also came in packaging that looked similar to that for morphine. Even this year ISMP’s Michael Cohen ([Cohen 2013](#)) showed how one manufacturer’s 1 mL vials of HYDROmorphine closely resemble its vials of morphine sulfate 5 mg/mL, especially when the caps are removed. ISMP recommends that the two vials not be used in the same facility, if possible. If they are, pharmacies should consider not dispensing both vials to the same patient-care area.

And, of course, the most important patient safety intervention with all opioids is appropriate patient monitoring (see the list below of all our columns on monitoring patients on opioids).

From today’s column and our previous Patient Safety Tips of the Week for September 21, 2010 “[Dilaudid Dangers](#)” and July 3, 2012 “[Recycling an Old Column: Dilaudid Dangers](#)” here are some strategies you should consider to reduce the risk of Dilaudid (and other opioid) adverse events:

- Education of physicians, nurses, pharmacists, etc. on the different potencies of various opioids (but keep in mind that education and training are relatively weak patient safety interventions so other preventive interventions will be needed)
- Equipotency cards/posters/popups for commonly prescribed opioids
- Consider dose range alerts during CPOE (eg. note a typical dose is 0.2-0.5 mg. IV and limit dose to 1.0 mg for an opioid-naïve patient)
- Other alerts during CPOE (eg. if a patient is already on a sedative/hypnotic drug prompt “Are you aware sedative agents make patient more vulnerable to opioid-induced respiratory depression?”)
- Other decision support tools for ordering (eg. prompts asking about whether the patient is opioid-naïve or opioid-tolerant, then suggest starting dosages)
- Establish criteria for using intravenous opioids
- Patient selection/identify hi risk patients (the very young and the very old, those with obesity, sleep apnea, neuromuscular diseases, COPD, and those in higher ASA classes, those receiving sedative/hypnotic drugs)
- Screening for obstructive sleep apnea (OSA) prior to use of IV opioids with a tool such as STOP or STOP-Bang
- Look for other risk factors (renal function, coadministration of sedative/hypnotic drugs, etc.)
- Continuous pulse oximetry and capnography
- Close monitoring (in an ICU setting if necessary for high-risk patients)
- Pain assessment, RASS or other scale for level of arousal
- Enforce RASS (by requiring input of RASS score at BMV or when taking out of ADC)
- Tie recommended course of action to the RASS score (see above)
- Always have narcotic reversal agents readily available where IV opioids are being used and have protocols that deal with issues like renarcotization
- Standardized order sets
- Different order sets for opioid-naïve and opioid-tolerant patients
- Avoid basal rates for PCA in opioid-naïve patients
- Warnings when taking it out of ADC (eg. “This is DILAUDID. Is this what you wanted?”) or require a witness for overrides when using ADC
- Independent double checks
- Use tall man lettering “HYDROmorphone”
- Consider limiting the number of different opioids you use for acute pain management (eg. use morphine as your “preferred” opioid and reserve Dilaudid for rare patient who gets pruritis from morphine)
- Have pharmacists prepare and dispense the doses in prefilled unit dose syringes
- Stock HYDROmorphone only in lower doses on patient care floors and ADC’s
- Stock HYDROmorphone and morphine in different concentrations and keep them separate in stock
- Add labels to avoid confusion (consider using brand name “HYDROmorphone (DILAUDID)”)
- Involve patients and families in educational efforts about IV opioid therapy

- Perform regular audits with feedback for doses of HYDROmorphone exceeding 1 mg

Our prior columns on patient safety issues related to Dilaudid/HYDROmorphone:

- September 21, 2010 [“Dilaudid Dangers”](#)
- November 2011 [“FDA Changes on Dilaudid/HYDROmorphone”](#)
- July 3, 2012 [“Recycling an Old Column: Dilaudid Dangers”](#)

Our prior articles pertaining to long-acting and/or extended release preparations of opioids:

- April 2010 [“RCA: Epidural Solution Infused Intravenously”](#)
- July 13, 2010 [“Postoperative Opioid-Induced Respiratory Depression”](#)
- January 18, 2011 [“More on Medication Errors in Long Term Care”](#)
- April 12, 2011 [“Medication Issues in the Ambulatory Setting”](#)
- June 28, 2011 [“Long-Acting and Extended-Release Opioid Dangers”](#)
- September 13, 2011 [“Do You Use Fentanyl Transdermal Patches Safely?”](#)
- November 8, 2011 [“WHO’s Multi-Professional Patient Safety Curriculum Guide”](#)
- May 2012 [“Another Fentanyl Patch Warning from FDA”](#)
- July 24, 2012 [“FDA and Extended-Release/Long-Acting Opioids”](#)
- September 2012 [“Joint Commission Sentinel Event Alert on Opioids”](#)
- March 2013 [“Try Googling Fentanyl Accidents”](#)
- September 2013 [“ISMP Outreach on Fentanyl Patch Safety”](#)
- October 2013 [“Opioid Safety Actions and Resources”](#)

Other Patient Safety Tips of the Week pertaining to opioid-induced respiratory depression and PCA safety:

- January 4, 2011 [“Safer Use of PCA”](#)
- July 13, 2010 [“Postoperative Opioid-Induced Respiratory Depression”](#)
- May 12, 2009 [“Errors With PCA Pumps”](#)
- September 21, 2010 [“Dilaudid Dangers”](#)
- November 2010 [“More on Preoperative Screening for Obstructive Sleep Apnea”](#)
- February 22, 2011 [“Rethinking Alarms”](#)
- May 17, 2011 [“Opioid-Induced Respiratory Depression – Again!”](#)
- September 6, 2011 [“More Tips on PCA Safety”](#)
- December 6, 2011 [“Why You Need to Beware of Oxygen Therapy”](#)
- February 21, 2012 [“Improving PCA Safety with Capnography”](#)
- September 2012 [“Joint Commission Sentinel Event Alert on Opioids”](#)
- September 2012 [“FDA Warning on Codeine Use in Children Following Tonsillectomy”](#)

- July 3, 2012 “[Recycling an Old Column: Dilaudid Dangers](#)”
- February 12, 2013 “[CDPH: Lessons Learned from PCA Incident](#)”
- February 19, 2013 “[Practical Postoperative Pain Management](#)”
- October 2013 “[Opioid Safety Actions and Resources](#)”

- Tools: [PCA Pump Audit Tool](#) and the [PCA Pump Criteria](#)

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