



PATIENT CARE ASSESSMENT DIVISION

ADVISORY — MAY 2007

HYDROMORPHONE

Patient Safety Concerns with Hydromorphone versus Morphine

The Massachusetts Board of Registration in Medicine Patient Care Assessment Committee issues the following Advisory, in response to concerns noted after PCA Committee review of Major Incident Reports describing adverse patient outcomes associated with the administration of hydromorphone and morphine.ⁱ

Morphine and hydromorphone, a semi-synthetic analog of morphine, have been on the market for many years, both being indicated for relief of moderate to severe pain. Their potency, onset and duration of action differ significantly. Dosing is at a 1:8 ratio, hydromorphone to morphine and both are available in similar strengths, (i.e. 2 mg/ml IV solution and 4 mg/ml IV solution.)

The PCA Committee noted the following specific concerns following review of the Major Incident Reports: (1) hospital staff did not always have available information on the dosing and pharmacokinetics of morphine and hydromorphone; and (2) respiratory depression often went unrecognized following both single bolus dosing and patient controlled analgesia. Four deaths occurred after bolus dosing of 2-4 mg of hydromorphone, with repeat doses of 1-4 mg; one death occurred after a patient receiving hydromorphone via epidural was given Ativan for restlessness; and one death occurred when both hydromorphone and morphine were given to a patient within a short time period.

In one reported case, the patient was treated for pain with morphine (2 mg IV x3) over 10 hours, followed by hydromorphone (3 mg IV x2) over 5.5 hrs. In addition, the patient was given Phenergan (12.5 mg IV) after the second dose of hydromorphone. This patient was found in respiratory arrest 15 minutes later and successfully resuscitated. After reviewing this case, the health care facility noted a lack of staff appreciation for the difference in potency of hydromorphone and morphine, and responded to this event by distributing a Pain Pocket Guide to medical, nursing and pharmacy staff that contains an equianalgesic table that shows the potencies of various opioids.

In addition to the Major Incident Reports, the PCA Committee received feedback via medication event analysis in recent Semi-Annual Reports that show concern for “near misses” as a result of opioid oversedation.ⁱⁱ Medical leadership at one Massachusetts hospital expressed concern that the national JCAHO efforts to control pain as the fifth vital sign and get the pain scores to zero, when taken too far, can lead to “overzealous efforts to use opioids by dedicated providers who think they are doing what is being asked of them.” In response to the findings from medication event review of “near misses” in patients on hydromorphone patient controlled analgesia, this facility has lowered the maximal dosing bolus to 1.5 mg. Approval is required from the facility’s Department of Anesthesia for an override of the maximum dose. One of the findings from a “near miss” analysis performed by this facility was an especially high-risk for respiratory arrest when hydromorphone was ordered in the lower dose range for the obese patient with sleep apnea and in patients with concomitant sedative medication.

Monitoring guidelines and protocols for the administration of morphine and hydromorphone are essential and should be developed and utilized to avoid preventable, unwarranted outcomes.

PCA Committee Recommendations

- 1. Develop protocols of use for both morphine and hydromorphone.** The proper utilization of hydromorphone and morphine is separate and distinct to each narcotic. These two sound-alike narcotics can be mistaken for each other, resulting in hydromorphone being dosed at morphine's recommended amount. Hydromorphone is also often prescribed at upper limits with little reference to the patient's opiate tolerance level. A complete and thorough review by the appropriate committee is advised, either by a Pharmacy and Therapeutics Committee or by a Drug Utilization Committee, to evaluate, educate and disseminate information regarding proper utilization of both medications, within a specific practice setting. All individual practice settings and disciplines should be represented for medication protocol development to ensure that proper monitoring parameters unique to the individual practice settings are addressed. Equianalgesic dosing information should be readily available to all staff members to address the dosing differences between these two narcotics. Particular emphasis should be placed on safe dosing within the upper limits of IV hydromorphone administration.
- 2. Prudent storage of hydromorphone and morphine.** Develop guidelines for the proper storage and placement of each medication, according to the practice setting that they are to be utilized as outlined above. The storage of both medications should be unique enough to avoid dispensing or administration errors due to their similarities in indication, name, dosage and packaging. The guidelines should be focused on the prevention of product selection errors when access to both drugs is necessary. Attempts to limit access to both drugs in any one practice setting should be considered. The *Institute for Safe Medication Practices* issued a Medication Safety Alert in July 2004ⁱⁱⁱ addressing medication errors from such mix-ups and recommended that each drug be stocked in a different strength, (e.g. IV hydromorphone 2 mg/ml and IV morphine 4mg/ml), with no duplication in strengths. ISMP also recommended the use of tall man lettering when possible to emphasize the "hydro" part of hydromorphone on prescription labels. Separate the two drugs by dividers or by placing them on separate shelves in the pharmacy department narcotic cabinet; and signal the two drugs as look-alike and high alert medications. This will prevent mishaps at point of selection. It is also advised that entries of hydromorphone in your hospital's pharmacy computer system and the automated systems (Pyxis/Omniceil) also state the brand name "Dilaudid." This may avoid the generic mix-up.
- 3. Dispensing and administration guidelines.** We recommend a review by an appropriate committee to develop standards of administration practices to avoid and prevent medication errors. The guidelines should consider a double-checking system or a force function procedure to prevent such an error from occurring. Computer programs can be implemented to flag the two drugs as high alert medications to ensure the dispensing of the correct medication and to review the dosage of each medication. Advise pharmacists to double check the dosage of the drugs before dispensing to the patient. Develop counseling guidelines for all morphine and hydromorphone prescriptions.
- 4. Quality Improvement Efforts.** We recommend careful review of the root causes of events and "near misses" from oversedation with hydromorphone, morphine or other narcotics, with a goal toward implementing change wherever an opportunity for remediation is identified.

ⁱ Major Incident Reports are reports of serious, unexpected patient outcomes filed by health care facilities with the Board's PCA Division, in accordance with Massachusetts regulations, 243 CMR 3.08. The 15 reported cases involved the following patient outcomes that were all or in part related to hydromorphone or morphine administration: falls with injury (3); resuscitation with neurological impairment (2); successful resuscitated with no apparent neurological deficit (2); and death related to respiratory depression and cardiac arrest (8).

ⁱⁱ Semi-Annual Reports are summaries of quality improvement activities filed by health care facilities with the Board's PCA Division, in accordance with Massachusetts regulations, 243 CMR 3.07.

ⁱⁱⁱ Institute for Safe Medication Practice Medication Safety Alert on An Omnipresent Risk of Morphine-Hydromorphone Mix-ups July 1, 2004