

Identifying Knowledge Deficits Related to HYDROmorphone

Earlier this year, ISMP Canada undertook a survey to better understand the extent of healthcare professionals' knowledge deficits or gaps that could contribute to medication incidents with HYDROmorphone. The response to the survey was tremendous, with a total of 4399 respondents completing all or part of the survey, and 3476 respondents completing the knowledge assessment questions. Responses were received from every province and territory and represented healthcare disciplines involved in the prescribing, dispensing, preparation, administration, and/or monitoring of HYDROmorphone. This bulletin describes the context for the HYDROmorphone survey and provides an overview of the key findings.

Why a Survey about HYDROmorphone?

HYDROmorphone is 1 of the top 3 medications involved in incidents associated with harm that have been voluntarily reported to ISMP Canada.¹ As of June 30, 2011, the number of reported incidents involving HYDROmorphone with an outcome of harm or death totalled 160. Although the actual incident rate cannot be determined from voluntary reports, the number of harmful medication incidents involving HYDROmorphone warrants additional focus on this medication.

HYDROmorphone is a potent, centrally acting analgesic drug of the opioid class that is used to relieve moderate to severe pain.^{2,3} Its adverse effects are similar to those of other potent opioid analgesics, such as morphine and fentanyl. Respiratory depression is the primary concern with these medications.

Available in oral and injectable forms, HYDROmorphone is about 4-7 times stronger than morphine;^{2,3} therefore, any confusion between these 2 drugs can have devastating consequences for the patient, including death. A review of

HYDROmorphone incidents that have been reported to ISMP Canada, including mix-ups between HYDROmorphone and morphine, suggested to ISMP Canada analysts that the difference in potency between these 2 drugs may not be well understood by all healthcare professionals.⁴

Background to the Survey

It was determined that an assessment of physicians', nurses', and pharmacists' knowledge related to the use and administration of HYDROmorphone was needed to identify potential knowledge gaps. Furthermore, it was felt that the types and magnitude of any gaps identified would assist in planning future interventions to decrease the potential for harm with this medication. An electronic survey format was selected as the approach that would support the widest dissemination of the survey and hence allow for the broadest reach across disciplines. Several expert advisors guided development of the survey, which was then field-tested by nurses in a regional health authority. The final survey consisted of 10 demographic questions, 19 knowledge assessment questions, and 1 question about how frequently HYDROmorphone was used in the respondent's practice setting. The survey questions covered the pharmacologic properties of HYDROmorphone, indications for use, adverse effects, usual dosage, dosing calculations, and difference in potency between HYDROmorphone and morphine.

The HYDROmorphone Knowledge Assessment Survey was launched via 2 national webinars presented in February 2012, one in English (February 9, 2012) and one in French (February 16, 2012). The online survey was open until March 4, 2012. After the survey closed, a link to the survey questions and answers was posted on the ISMP Canada website (available from http://www.ismp-canada.org/education/webinars/20120209_Hydromorphone/Answers.pdf).

Table 1: HYDROmorphone Knowledge Assessment Survey Results, by Discipline

Discipline	Number (%) of respondents	Average score on knowledge assessment questions (%)
Nursing	2169 (62.4)	72.5
Pharmacy	968 (27.8)	78.8
Medicine	299 (8.6)	81.7
Other	40 (1.2)	65.6
Total	3476 (100)	75

Survey Results: Overview

Of the 4399 respondents, 3476 (79%) provided answers to the knowledge assessment questions. Of these 3476 respondents, 2169 (62.4%) were from nursing, 968 (27.8%) from pharmacy, and 299 (8.6%) from medicine. An additional 40 respondents (1.2%) indicated that their primary role was in some other area (e.g., occupational therapy, social work, paramedic services) (Table 1).

Key Findings

- The majority of healthcare providers in the nursing, pharmacy, and medicine categories (3023 of 3436 or 87.9%), in responding to a question related to the *difference in potency*, correctly identified HYDROmorphone 1 mg as approximately equal to morphine 5 mg. An even larger proportion of respondents (3270 of 3436 or 95.2%) correctly indicated that morphine and HYDROmorphone are “both opioid medications used to treat pain but are dosed differently”.

However, incorrect answers provided by the remaining respondents (166 of 3436 or 4.8%) suggest that the relationship between morphine and HYDROmorphone is not universally understood. Specifically, 147 respondents (4.3%) answered “They are two completely different medications with different uses”, 10 (0.3%) answered that “HYDROmorphone is ‘watered-down’ morphine”, 6 (0.2%) answered that “Morphine is a brand name for HYDROmorphone”, and 3 (0.1%) answered that “HYDROmorphone is a brand name for morphine”. There was no apparent pattern to these incorrect responses in terms of disciplines: all disciplines were represented in these incorrect answers.

- For all disciplines, the lowest scores were obtained for questions related to the *pharmacologic properties* of HYDROmorphone, specifically, onset, peak effect, and duration of action of the various sustained-release and immediate-release formulations, as well as the relationship of these properties to patient monitoring and the use of rescue agents.
- The second lowest scores were obtained for a question involving *dosing calculations*. This knowledge deficit was greatest among respondents from nursing. Respondents were asked to calculate the volume of HYDROmorphone to be administered IV to a pediatric patient from the lowest-concentration parenteral formulation available in Canada (HYDROmorphone 2 mg/mL, 1 mL ampoule). This is an important question because the starting dose for an opioid-naïve individual, even an adult, is less than a full 2 mg ampoule. Interestingly, some respondents commented that they could not answer the question because they did not work with pediatric patients.
- Other areas where scoring was lower were related to:

- ability to identify opioid tolerance (all disciplines);
- recognition that obese patients do *not* require higher doses of HYDROmorphone (all disciplines);
- recognition that patients with chronic obstructive pulmonary disease require lower doses of HYDROmorphone (all disciplines);
- recognition that patients who are taking a benzodiazepine require lower doses of HYDROmorphone (nursing and pharmacy);
- recognition that elderly patients require lower doses of HYDROmorphone (nursing and pharmacy);
- conversion factor for changing an oral dose of HYDROmorphone to an equianalgesic parenteral dose of HYDROmorphone (nursing);
- distinction between side effects and allergies (e.g., understanding that a side effect does not preclude the use of morphine) (all disciplines); and
- recognition of the signs and symptoms of an overdose (medicine).

The responses to several of the questions were analyzed further to determine if there was any relationship between selection of the correct answer and a respondent’s years of experience or area of practice. For most questions, no clear relationship could be established with either factor. For example, the number of incorrect responses was slightly higher for respondents working in long-term care, a group that might be anticipated to use HYDROmorphone less frequently than healthcare professionals working in acute care. However, the majority of respondents working in long-term care reported using HYDROmorphone more frequently than morphine or using it exclusively.

Next Steps

The level of participation in both the HYDROmorphone Knowledge Assessment Survey and the webinars used to introduce the project reflects strong interest in the safe management of HYDROmorphone across healthcare disciplines and settings. ISMP Canada has received many positive comments about the project. Several organizations have indicated their desire to incorporate use of the survey and resulting local findings into educational programs.

ISMP Canada is committed to working on strategies to enhance the safe use of HYDROmorphone and other opioid medications. An aggregate analysis of voluntarily reported incidents involving HYDROmorphone in which knowledge deficits were identified as contributing factors is in progress. Planning is also under way for a demonstration project to support and evaluate the implementation of specific strategies to enhance the safe management of HYDROmorphone.

Conclusion

It is hoped that sharing the key survey findings will assist Canadian healthcare facilities and individual practitioners to

examine processes in their organizations where knowledge gaps related to HYDRomorphone could increase the potential for error. ISMP Canada would be pleased to hear from individuals and organizations with ideas or results of work already done to further the understanding of identified issues and to enhance the safe use of HYDRomorphone and other opioids (by email at

cmirps@ismp-canada.org or by telephone at 1-866-54-ISMPC [1-866-544-7672]).

The **complete survey report**, including a discussion of limitations, is available from: http://www.ismp-canada.org/download/miscpub/ISMPCanada_HYDRomorphoneKnowledgeAssessmentSurveyReport_2012June.pdf.

Acknowledgements

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- Linda Poloway BScPharm FCSHP, Project Lead for this initiative; Lori Taylor RN BScN, Master of Nursing (MN) candidate and Project Manager, Corporate Nursing, University Health Network, Toronto, ON, and Ian Trimble BScPhm ACPR, Doctor of Pharmacy (PharmD) candidate, Vancouver Island Health Authority, Victoria, BC, both of whom worked on this initiative as part of their postgraduate studies.
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Knowledge is the Best Medicine: New Options Available to Help Patients Keep Track of Their Medications

The Canadian Medical Association, Canadian Nurses Association, Canadian Pharmacists Association, Victorian Order of Nurses, and Best Medicines Coalition have worked in partnership with Canada's Research-Based Pharmaceutical Companies (Rx&D) and ISMP Canada to create a new electronic version of the Rx&D product *Knowledge is the Best Medicine*. In recognition of the importance of engaging patients in their own healthcare, the new website provides innovative tools to help consumers and patients to keep track of information about their medications and vaccinations. For patients who prefer to use a portable electronic device, an iPhone software application called MyMedRec is available free of charge. Patients can choose how they store and carry their medication information and can easily communicate this information to their healthcare providers whenever they receive care. Communicating information about medications during transitions of care facilitates the process of medication reconciliation, and this innovation supports the National Medication Reconciliation Strategy. For more information on these tools, please visit www.KnowledgeIsTheBestMedicine.org

References

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ISMP Canada is a national voluntary medication incident and 'near miss' reporting program founded for the purpose of sharing the learning experiences from medication errors. Implementation of preventative strategies and system safeguards to decrease the risk for error-induced injury and thereby promote medication safety in healthcare is our collaborative goal.

Medication Incidents (including near misses) can be reported to ISMP Canada:

(i) through the website: http://www.ismp-canada.org/err_report.htm or (ii) by phone: 416-733-3131 or toll free: 1-866-544-7672.

ISMP Canada can also be contacted by e-mail: cmirps@ismp-canada.org. ISMP Canada guarantees confidentiality and security of information received, and respects the wishes of the reporter as to the level of detail to be included in publications.

A Key Partner in the Canadian Medication Incident Reporting and Prevention System