

ISMP Canada Safety Bulletin

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Decimal Point in New Strength of HYDROmorph Contin Leads to an Opioid Overdose

ISMP Canada received a report of a critical incident involving the high-alert medication HYDROmorph Contin (HYDROmorphone hydrochloride controlled-release capsules). In this incident, a patient newly admitted to a residential hospice was given an inadvertent opioid overdose, as a result of several contributing factors, including availability of a relatively new strength (4.5 mg) of the drug.

Incident Example

A patient was admitted to a residential hospice from home care. The home care nurse sent the patient's medication profile to the hospice by fax. The hospice nurse called the physician for medication orders, according to the profile received, including an order for regularly scheduled HYDROmorphone. The entry on the faxed list for "HYDROmorph Contin 4.5 mg q12h orally" was interpreted as "HYDROmorph Contin 45 mg q12h orally", partly because of the poor quality of the fax received, but also because staff members were not familiar with the existence of a 4.5 mg dose for this drug.

The hospice received the medication orders from the physician by telephone, including HYDROmorph Contin 45 mg q12h orally, with HYDROmorphone 9 mg q1h subcutaneously (SC) as needed for breakthrough pain. The SC dose was calculated as 10% of the presumed total daily dose of 90 mg (i.e., $45 \text{ mg} \times 2$). A missed calculation step (which would

have reduced the SC dose by 50%) further compounded the error. Before the first scheduled regular (q12h) dose was administered, the patient received a SC dose of 9 mg for breakthrough pain. Within the hour, the patient was observed to be very drowsy, with reduced respiratory rate.

The care team identified the potential for an opioid overdose and initiated the established naloxone protocol for palliative care patients. Multiple doses of naloxone were required, and the patient was successfully resuscitated. It was later discovered that before admission to the hospice, the patient was not consistently taking her regular HYDROmorphone as prescribed, and on some days, she took none at all.

Background

HYDROmorphone is a potent centrally acting analgesic of the opioid class. At the time of incident described here, this drug was indicated for relief of moderate to severe pain.^{1,2} 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 and is the common pathway to a further depressed level of consciousness and eventual death. Opioids consistently present in the top 10 medications associated with harmful medication incidents voluntarily reported to ISMP Canada.³⁻⁵

Discussion

Analysis of this incident identified several potential contributing factors, including recent introduction of the 4.5 mg strength of HYDROmorph Contin, the lack of a timely, systematic process for medication reconciliation, and a breakdown in communication between key individuals.

HYDROmorph Contin has long been available in 3 mg, 6 mg, 12 mg, 18 mg, 24 mg, and 30 mg controlled-release capsules.⁶ In 2011, HYDROmorph Contin 4.5 mg capsules became available in Canada.⁷ This new strength was developed to provide an exact midstep option between the 3 mg and the 6 mg doses. However, the decimal point inherent to this strength was a contributing factor to the incident described here. In fact, the presence of a decimal point in a prescribed medication dose can lead to a 10-fold error.⁸ In an analogous situation, several fatal incidents were reported that described a prescribed dose of Duragesic (fentanyl transdermal) 12.5 mcg/h interpreted as 125 mcg/h. The manufacturer of Duragesic (fentanyl transdermal) changed the labelling of the 12.5 mcg/h patch to read “12 mcg/h”. The Duragesic patch labelled “12 mcg/h” still releases 12.5 mcg/h, but removal of the decimal point has lowered the risk of a 10-fold error.⁸ In this case, the 10-fold error led to the patient receiving a higher dose of SC HYDROmorphone than she should have because the calculated break-through dose was based on the assumption that she was taking 90 mg of oral HYDROmorphone daily.

Confirmation bias likely contributed to this incident as well. A dose of 45 mg is relatively common in hospice palliative care and the 4.5 mg capsule of HYDROmorph Contin was relatively new on the market. The hospice staff members were unaware of the existence of the 4.5 mg capsule and, were familiar with using a 45 mg dose in the palliative care setting; as such, they might have understood that the intended dose was actually 45 mg, even if the decimal point was apparent in the faxed medication profile.

Another contributing factor was the miscommunication of critical information between staff. While there was a discussion about the patient’s medication prior to admission between the home care

nurse and a hospice nurse, the conversation did not include the patient’s primary residential hospice nurse. The information about inconsistent use of HYDROmorphone at home was not conveyed in a timely manner, and the patient and family were unable or unavailable to confirm the HYDROmorphone use before the first SC dose of HYDROmorphone was given.

Two aspects of this case scenario stand out as crucial in preventing the patient’s death. First, staff members were aware of and attentive to the signs and symptoms of an opioid overdose (e.g., severe drowsiness and depression of the respiratory rate) in this patient, and they acted on these clinical findings by instituting the organization’s existing naloxone protocol.

Recommendations

This case illustrates multiple opportunities to prevent overdosing errors with opioids and to mitigate risk. The following multipronged strategies are suggested for manufacturers and practitioners.

For Manufacturers

- Whenever possible, drug product strengths are whole numbers.
- For high-alert medications with a decimal point in an existing product strength, a proactive evaluation of the safety of the product is recommended.

ISMP Canada has shared this information with the manufacturer of HYDROmorph Contin.

For Practitioners

- At the time of admission or transfer to a new care setting, interview the patient (or a family member), using a systematic process, to elicit independent confirmation of the patient’s medication regimen. This independent review is especially crucial for those on high doses of opioids and other high-alert medications. Compare information from the interview with documented information on file, and resolve any discrepancies that are identified.

- Additional confirmation of the patient’s medications can also be obtained through a review of all prescription medication vials and nonprescription products, referring healthcare facility documentation (e.g., medication administration records), and/or community pharmacy records.
- Standardize admission and discharge processes to ensure that all pertinent information, including details of the current medication regimen, is available at the time a patient is transferred from one care setting to another and to address any information gaps. Ensure that the primary caregivers on both sides of the information transfer are involved. Use of a checklist may be helpful.⁹
- If any patient documentation must be conveyed by fax from one setting to another, ensure that the original is printed on white paper, to optimize the clarity of the fax received. Documents printed on coloured paper typically generate poor-quality faxes.
- Create a forum within your care setting to share and disseminate information about new drugs and dosage forms relevant to your area of practice.
- Create guidelines for dosing opioids and for the monitoring of patients who are taking these drugs.
- Ensure that all staff members know the signs and symptoms of opioid toxicity, which can occur with or without an overdose (see <http://youtu.be/9tfgw3W6ZnQ>).
- Create protocols and medication order sets for administering naloxone to patients who exhibit the signs and symptoms of opioid toxicity. Ensure that the protocol is readily accessible, and that staff members are aware of its existence.
- Educate patients and families about the signs and symptoms of opioid toxicity. For example, print copies of ISMP Canada’s 2-page handout (http://www.ismp-canada.org/download/HYDROMORPHONE/ISMPCanada_OpioidInformationForPatientsAndFamilies.pdf), to be given to patients and their families whenever a prescription for an opioid is started.
- Report concerns and incidents related to the presence of a decimal place in a product strength to ISMP Canada.

Acknowledgement

ISMP Canada gratefully acknowledges the expert review provided by (in alphabetical order):

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Deaths Associated with Opioids - Highlights of a Multi-Incident Analysis

Opioid medications continue to be among the top medication classes associated with harmful incidents voluntarily reported to ISMP Canada. As a priority focus of a collaborative project between ISMP Canada and 4 provincial Offices of the Chief Coroner or Chief Medical Examiner,¹ an interdisciplinary team conducted a multi-incident analysis on 32 medication incidents associated with deaths involving opioids.

Findings

Two main themes arose from the analysis: (1) identification of contributing factors related to prescribing and administering opioids and (2) considerations that could have mitigated harm or prevented death.

Prescribing and Administering Opioids

Opioid overdoses, overlapping drug toxicities, and intentional or accidental administration of opioids to patients who should not have been receiving them were identified as subthemes of incidents related to prescribing and administering opioids. The following underlying factors were among those contributing to these errors:

- opioid initiation at an inappropriately high dose
- failure to discontinue previous opioid orders
- incorrect pump programming
- inappropriate manipulation of available dosage forms (e.g., crushing long-acting formulations)
- routine administration of “as needed” doses intended to be used intermittently
- administration of multiple medications (both opioid and non-opioid) with similar toxicity profiles
- potentiation of toxicities by patient’s comorbidities (e.g., kidney or liver insufficiency)
- mix-ups between morphine and HYDROMORPHONE related to similarities in drug names and commonly used doses
- use of high-concentration, high-dose formats of HYDROMORPHONE for administration of small doses

Mitigation of Harm and Prevention of Death

Review of these cases identified several factors contributing to poor outcomes:

- health care providers and other caregivers not recognizing the presentation of opioid toxicity
- naloxone not being administered in cases where it might have been beneficial
- suboptimal naloxone administration and inadequate monitoring of patient after rescue

Key opportunities to reduce the likelihood of harm and death from opioid overdose involve initial recognition of the signs and symptoms of toxicity, followed by timely administration of the antidote naloxone and subsequent appropriate supportive management.

Conclusion

The findings of this multi-incident analysis support previously recommended opioid safety strategies, such as use of order sets for prescribing; availability of dosage forms appropriate to the dose ordered; independent double checks for dose calculations, pump programming, and medication administration; predetermined parameters for monitoring with defined triggers for intervention; and clear guidelines for appropriate use of naloxone. In addition, ongoing education of healthcare providers and of patients and their families^{2,3} about the early signs of opioid toxicity is required.

Healthcare practitioners and organizational leaders in all care settings where opioids are used are encouraged to review the full report, which includes detailed case examples, and to use this information to assess and address vulnerabilities in their own settings. The full report with case examples is available here: www.ismp-canada.org/download/OpioidStewardship/Opioid-Related_Deaths_Associated_with_Medication_Incidents_Nov2014.pdf

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This segment of the bulletin describes a recent SafeMedicationUse.ca publication from ISMP Canada's Consumer Program.

September 2014 - Newsletter:

Sharing Opioid Medicines Can Be Deadly

Sharing any prescription medication can be dangerous, but even a single dose of an opioid can cause death in someone who has never taken it before. Through recent work with Offices of Chief Coroners and Chief Medical Examiners, ISMP Canada has learned of a case in which sharing opioid medicines resulted in someone's death. The case involved a man who died unexpectedly at home as a result of using a fentanyl patch in combination with alcohol. The fentanyl patch had not been prescribed for the man who died; it had been given to him by a friend.

This case and its implications are described in a recent issue of the SafeMedicationUse.ca newsletter. The newsletter provides tips for consumers and emphasizes the importance of never sharing opioids or any other prescription medication with friends or family members. It also highlights the importance of following the directions provided with every medicine. In addition, the newsletter includes tips for practitioners, advising them to inform patients of the importance of not taking more than the prescribed dose of an opioid. Practitioners should also ensure that patients understand that opioid medicines in particular, cannot be shared with others.

For additional recommendations about the safe use of opioid medications, read the complete newsletter at: www.safemedicationuse.ca/newsletter/newsletter_SharingOpioidMedicines.html



Consumers Can Help Prevent
Harmful Medication Incidents

SafeMedicationUse.ca

Drug Shortage Safety and Tenecteplase (TNKase®)

ISMP Canada has developed a Drug Shortage Safety Knowledge Exchange site (Drugshortagesafety.ca) to assist healthcare practitioners and organizations to prepare for and manage select medication shortages.

Various factors and circumstances have the potential to increase the risk of harmful medication incidents during drug shortages. Of particular concern are drug shortages that affect high alert drugs. By supporting proactive preparation for drug shortages, and aligning with national initiatives, we aim to mitigate risks associated with drug shortages and reduce the potential for medication errors.

The Knowledge Exchange was developed for the purpose of sharing learning experiences to help mitigate risks associated with drug shortages. Our collaborative goal is to support implementation of protocols, preventative strategies and system safeguards to decrease the risk for medication errors and to promote medication safety. To contribute documents and change management-related information to this site, email us at info@ismp-canada.org or phone us at 416-733-3131, or 1-866-54-ISMP (toll free).

Tenecteplase (TNKase®)

The ideal option for Canadian patients is to have continued availability of tenecteplase. If tenecteplase is not available, the necessity of using an alternative medication and protocol introduces complexity. Several documents are shared in the Knowledge Exchange including example protocols from external organizations.



The Canadian Medication Incident Reporting and Prevention System (CMIRPS) is a collaborative pan-Canadian program of Health Canada, the Canadian Institute for Health Information (CIHI), the Institute for Safe Medication Practices Canada (ISMP Canada) and the Canadian Patient Safety Institute (CPSI). The goal of CMIRPS is to reduce and prevent harmful medication incidents in Canada.



The Healthcare Insurance Reciprocal of Canada (HIROC) provides support for the bulletin and is a member owned expert provider of professional and general liability coverage and risk management support.



The Institute for Safe Medication Practices Canada (ISMP Canada) is an independent national not-for-profit organization committed to the advancement of medication safety in all healthcare settings. ISMP Canada's mandate includes analyzing medication incidents, making recommendations for the prevention of harmful medication incidents, and facilitating quality improvement initiatives.

Report Medication Incidents

(Including near misses)

Online: www.ismp-canada.org/err_index.htm

Phone: 1-866- 544-7672

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