

Methadone Medication Incidents

A MULTI-INCIDENT ANALYSIS BY ISMP CANADA

Atsushi Kawano, BSc, MSc, BScPhm Candidate
School of Pharmacy, University of Waterloo
Analyst, ISMP Canada

Jim Hanwen Kong, BSc, BScPhm Candidate
School of Pharmacy, University of Waterloo
Analyst, ISMP Canada

Certina Ho, BScPhm, MSt, MEd
Project Manager, ISMP Canada

INTRODUCTION

Methadone, a synthetic opioid, has been successfully used to manage opioid addiction and chronic pain. In Ontario, the methadone maintenance treatment (MMT) program represents the cornerstone approach to manage opioid addiction.¹ Although the benefits and effectiveness of MMT are well-documented in the literature,^{2,3} safety of methadone in the medication-use process (such as prescribing and dispensing) continues to be a challenge to health care practitioners.

The literature contains many references about methadone-related medication incidents.^{4,5} In 2003, an Institute of Safe Medication Practices Canada (ISMP Canada) Safety Bulletin described medication incidents involving methadone that led to patient harm, along with recommendations for system enhancements.⁶ In a community setting, methadone medication incidents can occur during any stage of the medication-use process, including prescribing, order entry, dispensing, administration and/or monitoring. Incident reporting can be used to gain a better understanding of contributing factors or potential causes leading to methadone-related incidents.

The Community Pharmacy Incident Reporting (CPhIR) Program (available at <http://www.cphir.ca>) is designed for community pharmacies to report near misses or medication incidents to ISMP Canada for further

analysis and dissemination of shared learning from incidents.⁷ CPhIR has allowed collection of invaluable information to help identify system-based vulnerable areas in order to prevent medication incidents.⁷ This article provides an overview of a multi-incident analysis of methadone-related incidents reported to the CPhIR program.

MULTI-INCIDENT ANALYSIS OF METHADONE MEDICATION INCIDENTS IN COMMUNITY PHARMACY PRACTICE

Reports of medication incidents involving "Methadone" and/or "Metadol" were extracted from the CPhIR Program from 2010 to 2012. In total, 72 incidents met inclusion criteria and were included in this qualitative, multi-incident analysis. The majority of the incidents were related to oral methadone used for opioid addiction, that is, the methadone maintenance treatment (MMT) program.

The 72 medication incidents were independently reviewed by two ISMP Canada Analysts. The incidents were analyzed and categorized into two major themes: (1) characteristics unique to methadone and (2) medication-use process. The two major themes were further divided into subthemes, as shown in Table 1 and Table 2, respectively. (Note: The "Incident Examples" provided in Tables 1 and 2 were limited by what was inputted by pharmacy practitioners to the "Incident Description" field of the CPhIR program.)

WHY IS METHADONE A PROBLEM?

As seen in Table 1, methadone exhibits unique properties compared to other opioids that are inherently prone to medication incidents. In terms of pharmacokinetics, methadone has variable absorption and metabolism.^{6,9,10} Methadone's half-life can range from 8 to 59 hours.^{6,9,10} The half-life varies depending on past opioid use. Opioid-tolerant patients can experience a methadone half-life of approximately 24 hours.^{6,9,10} However, methadone half-life in opioid naïve

continued on page 41

TABLE 1. THEME 1 – MEDICATION INCIDENTS WITH CHARACTERISTICS UNIQUE TO METHADONE

SUBTHEME	INCIDENT EXAMPLE	COMMENTARY	SAFETY RECOMMENDATIONS
Compounding	<p>A pharmacist was filling a methadone prescription with environmental distractions (e.g. noise, interruptions from staff members, and multiple prescriptions being processed at the same time). The pharmacist prepared a methadone dose by measuring 8 mL instead of 0.8 mL. The patient was given the witnessed dose and left the pharmacy. The pharmacist contacted the patient after the mistake was discovered. The patient was instructed to go to the emergency room if changes in cognition or breathing were noticed. The pharmacist monitored the patient by phone for 4 hours.</p>	<p>Prescribers are encouraged to write all orders in milligrams (mg), instead of milliliters (mL).</p> <p>Pharmacies that commit to dispensing methadone need to implement a linear work-flow that allows for sufficient time and space to safely prepare oral doses.</p> <p>All methadone orders and preparations should be independently double checked and reviewed before the patient receives the dose.</p>	<p>To reduce the incidence of expressing wrong doses on prescriptions, prescribers should never use a zero by itself after a decimal point (i.e. use "X mg").⁸ Also, prescribers should always use a zero before a decimal point (i.e. use "0.X mg").⁸</p>
Confirmation Bias	<p>Patient is on decreasing [or tapering] dose of methadone. [Pharmacist assumed the patient's methadone dose was the same as the previous encounter.] The pharmacist made up a dose of methadone based on the previous dose. [This led to the patient receiving a higher than anticipated methadone dose.] [However,] both the patient and prescriber are fine with decreasing the dose for the next scheduled dose.</p>	<p>Patients on methadone maintenance treatment (MMT) often require frequent dose adjustments. The highly individualized dose of methadone means MMT needs to be continually re-assessed with the patient and dosing requirements needs to be communicated between all healthcare professionals within the circle of care.</p> <p>In preparing any prescriptions, especially with methadone, healthcare professionals must be prepared to prevent preconceived notions (or confirmation bias) from interfering daily practice.</p>	<p>To avoid incidents related to confirmation bias, independent double checks should be performed for each prescription during the order entry and dispensing process.⁶</p>

TABLE 2. THEME 2 – MEDICATION INCIDENTS RELATED TO MEDICATION - USE PROCESS

SUBTHEME	INCIDENT EXAMPLE	COMMENTARY	SAFETY RECOMMENDATIONS ⁶
Prescribing	Physician wrote 3 different strengths for one patient. [It was] unclear as to what the actual strength was [for the patient].	If prescriber intentions are not clearly communicated with pharmacists, confusion can arise about the correct dose to prepare for patients. Safe and effective delivery of methadone maintenance treatment (MMT) involves a well-informed multi-disciplinary team.	To encourage accurate communication of intended therapeutic interventions, prescribers should consider using standardized pre-printed order forms for methadone.
Order Entry	Student looked at a previous prescription when preparing maintenance methadone. Prepared as previous dose of 112 mg, current dose is 116 mg. Error discovered when pharmacist was labeling for dispensing. When we looked at patient's drug file, the previous dose had not been discontinued.	Methadone calculations need to be independently double checked in order to reduce order entry errors. The process of copying from previous prescriptions should be restricted or eliminated to prevent confirmation bias. Inactive methadone orders should be hidden or deactivated from patient profiles. This minimizes, or potentially eliminates, confirmation bias.	
Dispensing	[Pharmacy] should have [filled] 3 bottles [for the patient]. Only one [bottle was] put through. Patient [was] allowed different [number] of bottles on various days [prior to discovering incident]. [Note: The incident reporter did not describe the exact order entry and/or dispensing process that led to this patient having different number of carries on different days.]	Methadone dispensing represents a complex process that requires a safe environment to ensure proper preparation. Hence, methadone dispensing should be separated from regular workflow. Pharmacies should avoid the practice of pre-pouring doses, except for take-home doses or "carries"; in order to reduce unnecessary bottles being stored in the fridge, which may lead to giving the wrong dose to the wrong patient.	These medication-uses processes are directly related to daily pharmacy activities. Pharmacies should be encouraged to adopt a workflow that allows independent double checks to verify proper order entry, dispensing, and administration.
Administration	[The] pharmacist poured orange juice in [the] cup [without methadone]. Patient was dispensed 100 ml of orange juice only. [The] pharmacist noticed within 5 minutes after [the patient] left and called the methadone clinic immediately. Methadone nurse said he would call [the patient] and if he could not get [a hold of the patient] by phone, [he] would go and get [the patient] at his apartment. [The methadone nurse] tried and could not contact [the patient]. [The patient] showed up the next day and was told that he had no methadone the day before. [The patient] did not notice any symptoms.	Methadone stock solutions are usually clear solutions. Pharmacy staff preparing oral methadone doses cannot estimate appropriate concentration by physical appearance. Oral methadone doses should be verified independently by at least two pharmacy staff members to ensure accuracy of dose preparation. Prior to administering a methadone dose, pharmacy staff must check when the last dose was received by the patient. If a dose has not been taken by the patient for 3 consecutive days, the patient may lose tolerance to the usual methadone dose; contact the prescriber for a dose adjustment in order to prevent a potential overdose. ^{6,9}	

patients can be as high as 55 hours.^{6,9,10} Methadone's long half-life means that there will be a delayed peak analgesic effect and presentation of respiratory depression may be slower compared to other opioids.^{6,9,10} Therefore, in order to optimize therapeutic outcomes, methadone use requires a highly individualized approach by healthcare professionals.

WHY IS A PATIENT-FOCUSED MULTI-DISCIPLINARY APPROACH AN INTEGRAL PART OF SAFE METHADONE USE?

As seen in Table 2, preventing methadone-related medication incidents requires a strong relationship between the prescriber, the pharmacist, and the patient. Since 1996, the College of Physicians and Surgeons of Ontario (CPSO) has administered Ontario's MMT program on behalf of the Ministry of Health and Long-Term Care.¹¹ As of July 2012, approximately 360 physicians in Ontario were prescribing methadone to approximately 38,025 patients in the MMT program.¹¹ Interprofessional collaboration and regular communication between physicians and pharmacists are key to patient care and safe methadone use.¹² The 2011 CPSO MMT Program Standards and Clinical Guidelines emphasize that in order to facilitate collaborative communication, 3-way treatment agreements between the physician-patient-pharmacist are encouraged.¹² Similarly, the Ontario College of Pharmacists (OCP) Methadone Maintenance Treatment and Dispensing Policy (available at <http://www.ocpinfo.com>), which provides guidance to OCP members who dispense methadone for the treatment of opioid dependence in Ontario pharmacies, supports the principle that the ideal model for MMT is one which allows the 3-way integration of patient, pharmacist, and physician within


the community to ensure availability and accessibility of MMT for patients requiring such care. Patients are often the liaison between prescribers and pharmacists. If possible, patients should be included in the discussions to facilitate communication of methadone dose changes or therapy adjustments.

CONCLUSION

Methadone-related medication incidents continue to cause undesired patient outcomes in community pharmacy practice. Learning from medication incidents is a fundamental step to medication system improvement. The results of this multi-incident analysis are intended to educate health care professionals about the vulnerabilities within our healthcare system.

ACKNOWLEDGMENT

The authors would like to acknowledge Roger Cheng, Project Leader, ISMP Canada, and Dilpreet Bhatral, BScPhm, School of Pharmacy, University of Waterloo; Analyst, ISMP Canada, for their assistance in conducting the incident analysis of this report.

ISMP Canada would like to acknowledge support from the Ontario Ministry of Health and Long-Term Care for the development of the Community Pharmacy Incident Reporting (CPhIR) Program (<http://www.cphir.ca>). The CPhIR Program also contributes to the Canadian Medication Incident Reporting and Prevention System (CMIRPS) (<http://www.ismpcanada.org/cmirms.htm>). A goal of CMIRPS is to analyze medication incident reports and develop recommendations for enhancing medication safety in all healthcare settings. The incidents anonymously reported by community pharmacy practitioners to CPhIR were extremely helpful in the preparation of this article. 

REFERENCES

- Hart WA. Report of the methadone maintenance treatment practices task force. 2007. Available at: http://www.health.gov.on.ca/en/common/ministry/publications/reports/methadone_taskforce/methadone_taskforce.pdf. Accessed July 10, 2013.
- World Health Organization, United Nations Office on Drugs and Crime. WHO/UNODC/UNAIDS Position Paper: Substitution maintenance therapy in the management of opioid dependence and HIV/AIDS prevention. 2004. Available at: http://www.unodc.org/docs/treatment/Brochure_E.pdf. Accessed July 10, 2013.
- Health Canada Office of Canada's Drug Strategy. Literature review: Methadone maintenance treatment. 2002. Available at: http://www.hc-sc.gc.ca/hc-ps/alt_formats/hecs-sesc/pdf/pubs/adp-apd/methadone/litreview_methadone_maint_treat.pdf. Accessed July 10, 2013.
- Lalkin A, Kapur BM, Koren G. Contamination of antibiotics resulting in severe pediatric methadone poisoning. *Ann Pharmacother* 1999; 33(3):314-7.
- Kupiec TC, Kemp P, Raj V, Kemp J. A fatality due to an accidental methadone substitution in a dental cocktail. *J Anal Toxicol* 2011; 35(7):512-5.
- ISMP Canada. Methadone: not your typical narcotic! ISMP Canada Safety Bulletin 2003; 3(12):1-2.
- Ho C, Hung P, Lee G, Kadija M. Community pharmacy incident reporting: a new tool for community pharmacies in Canada. *Healthc Q* 2010; 13:16-24.
- ISMP Canada. Eliminate use of dangerous abbreviations, symbols, and dose designations. ISMP Canada Safety Bulletin 2006; 6(4):1-4.
- Grissinger M. Keeping patients safe from methadone overdoses. *P&T* 2011; 36(8):462-466.
- Lugo RA, Satterfield KL, Kern SE. Pharmacokinetics of methadone. *J Pain Palliat Care Pharmacother* 2005; 19(4):13-24.
- College of Physicians and Surgeons of Ontario (CPSO). Methadone Maintenance Treatment Program: Answers to Frequently Asked Questions. 2012. Available at: <http://www.cpso.on.ca/uploadedFiles/homepage/homepage-headlines/MethadoneFactSheet%281%29.pdf>. Accessed July 10, 2013.
- College of Physicians and Surgeons of Ontario (CPSO). MMT program standards and clinical guidelines. 2011. Available at: <http://www.cpso.on.ca/policies/guidelines/default.aspx?id=1984>. Accessed July 10, 2013.