Methotrexate medication incidents in the community

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Objective

- Methotrexate is a folate analogue indicated in both oncologic and non-oncologic conditions.

- Potential side effects involve multiple organ systems, relating to the interference of DNA synthesis, replication and repair.

- Due to the heightened risk of patient harm when used in error, methotrexate is classified as a high-alert drug.

- The objective of this study was to examine medication incidents involving methotrexate within the community.

Methods

- Reports of medication incidents were extracted from ISMP Canada Community Pharmacy Incident Reporting (CPhIR) Program (https://www.cphir.ca) between April 2010 and August 2014.

- Search terms included "Methotrexate" and/or "MTX" and/or "Metoject".

- Two ISMP Canada analysts independently reviewed all medication incidents.

Results

- 161 medication incidents were retrieved, with 137 eligible for inclusion in the qualitative, multi-incident analysis.

- Majority of incidents resulted in no error (i.e. near misses).

- Two incidents resulted in mild harm (i.e. symptoms were mild, temporary and short-term, with no treatment or minor treatment required).

- Medication incidents were categorized into three main themes (Table 1):
  1. Associated Medications
  2. Dosing Complexities
  3. Medication-Use Process

- Main themes were further divided into subthemes (Table 1). Sample cases are provided in Tables 2, 3, and 4.

Table 1: Main Themes and Subthemes

Themes	Subthemes
Associated Medications	1. Drug Interactions
	2. Look-alike/Sound-alike Drug Names
	3. Concomitant Drugs
Dosing Complexities	1. Calculation Error
	2. Frequency Error
	3. Parenteral Route
	4. Multi-Medication Compliance Aids
Medication-Use Process	1. Prescribing
	2. Order Entry
	3. Preparation/Dispensing

Table 2: Theme 1 – Associated Medications

Sample Case

Subtheme: Look-alike/Sound-alike Drug Names
A prescription for methotrexate was entered as methotrimeprazine. The error was found when the physician was contacted to clarify dosing.

Potential contributing factors: confirmation bias (definition: seeing what one wants to see)
Potential systems solution: independent double-checks (e.g. computerized bar-coding technology)

Table 3: Theme 2 – Dosing Complexities

Sample Case

Subtheme: Frequency Error
A prescription for methotrexate 2.5 mg tablets instructed the patient to take 5 tablets once weekly. It was instead entered as 5 tablets once daily.

Potential contributing factors: uncommon dosage schedules, lack of standardized prescribing templates
Potential systems solution: pre-printed order sets (i.e. indication for methotrexate is clearly defined)

Table 4: Theme 3 – Medication-Use Process

Sample Case

Subtheme: Preparation/Dispensing
A methotrexate prescription was dispensed to a patient who had the same last name as the intended patient.

Potential contributing factors: multiple prescriptions and/or patients, lack of verification
Potential systems solution: patient-practitioner communication

Discussion

- As a high-alert drug, methotrexate confers serious risk to patient safety if handled in error at any stage of the medication-use process.

- The risk is compounded by certain characteristics that may increase the probability of error, including the:
  1. Prescribing of associated medications
  2. Complexity of methotrexate dosing

- Three key areas may benefit from the implementation of system-based solutions, including the:
  1. Standardization of prescribing practices
  2. Implementation of safeguards in the community pharmacy
  3. Fostering a culture of patient-centered care

- System strategies can mitigate the risk of potential patient harm, and should be actively implemented in the workplace.

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