

ISMP Canada Safety Bulletin

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Shortage of Epinephrine Prefilled Syringes: System Supports for Use of Epinephrine Ampoules

Shortages of critical medications have become more common during the COVID-19 pandemic.¹ Epinephrine in prefilled syringes is one such critical product that has been in short supply. This bulletin shares a proactive approach that was developed and implemented by a regional paramedicine service to safely introduce the temporary use of epinephrine ampoules and mitigate the risk of medication errors. The example illustrates a growing interest in medication safety and the design of systems to support patient-facing practitioners.

CONCERN IDENTIFIED

Paramedics use standardized algorithms, treatment protocols, and medication kits to facilitate the rapid provision of critical care in a prehospital environment.²⁻⁴ There is an increased potential for error when a product's appearance is different than expected or its intended use changes.

Epinephrine is commonly stocked by paramedicine services in 2 formats: 0.1 mg/mL (1:10,000 or 1 mg/10 mL) in a 10 mL ready-to-use prefilled syringe intended for intravenous (IV) use during resuscitation following cardiac arrest; and 1 mg/mL (1:1,000) in a 1 mL ampoule intended for intramuscular (IM) use to treat patients with anaphylaxis.⁴ During a supply shortage of the prefilled syringes, epinephrine from ampoules can be substituted for use during resuscitation but it must be diluted prior to use (i.e., draw up 1 mL from the

1 mg/mL ampoule and mix with 9 mL of normal saline in a 10 mL syringe to create the 0.1 mg/mL concentration).

Although both formats contain the same total amount of medication (i.e., 1 mg of epinephrine), there may be confusion related to the difference in volume, concentration, and packaging, which may increase the risk of error and delay in treatment.

PROACTIVE SYSTEM RESPONSE CREATED AND SHARED

In response to the recurrent short supply of prefilled syringes of epinephrine, a regional paramedic service created a special operations team to consider strategies to ensure safe medication delivery while still adhering to medication administration guidelines and protocols. The team implemented an innovative approach to out-of-hospital management of cardiac arrest: a dilution kit for restocking purposes whenever the prefilled syringes were not available because of a supply shortage. The dilution kit, packaged in a resealable plastic bag, contained 4 each of the following items: 10 mL syringes, 10 mL vials of normal saline, vial access cannulas, and blunt fill needles (Figure 1). Ideally, the epinephrine ampoules would be bundled together with the dilution components; in this circumstance, and in consultation with end-users, it was decided that the epinephrine ampoules be kept in their usual storage container to protect against breakage.

Figure 1:

Components of a dilution kit for use when epinephrine prefilled syringes are unavailable.



The logistics section of the paramedic service was instructed to stock both the paramedic response bags and the ambulance cabinets with the dilution kit (Figure 2) whenever there was a shortage of the prefilled syringes. The prepared dilution kit was placed in the same location inside the bag or cabinet as the prefilled syringes would have been. In addition, a 1-page information leaflet explaining the shortage of prefilled syringes, describing the dilution kit and its components, and providing instructions on how to use the dilution kit in combination with an epinephrine ampoule in place of a prefilled syringe, was provided to staff as part of the customary daily

Figure 2:

A dilution kit for use when epinephrine prefilled syringes are unavailable.



briefing. These briefing notes were emailed to staff and were posted on a bulletin board in the common area at work.

Bundling the necessary components and storing the dilution kit where staff would typically access prefilled epinephrine syringes served as a visual cue that dose preparation was required. The team later identified a future improvement opportunity to add a label on the bag listing the kit contents and the instructions for use.

CONCLUSION

Throughout the 6 months that the above strategy was in place to address a shortage of epinephrine 0.1 mg/mL (1:10,000) 10 mL prefilled syringes, there were no reports of medication incidents attributable to the improper use of epinephrine 1 mg/mL (1:1,000) 1 mL ampoules for the management of cardiac arrest. The approach to prepare a dilution kit containing the necessary components and to incorporate it into usual restocking procedures minimized workflow disruption while improving medication safety. System-focused solutions like this one are key to managing medication shortages that result from inconsistent delivery or supply.

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Let's Talk with Kids about Their Medicine

5 Questions to Ask About My Medicine is a new pediatric-focused safety resource to help children and youth learn what questions they should ask when they receive medication from their health team. Involving children in their own care helps to give them a voice, so they can speak up when they have concerns.

The handout was co-designed by children, caregivers, and providers to facilitate conversation during an appointment or patient consultation.

Here are some tips for practitioners to help pediatric patients learn about their medications:

- Use the handout as a checklist to review medications with pediatric patients at every visit.
- Help children to create a list of their own medications using a medication app (e.g., MyMedRec) or another documentation method.
- Encourage children to keep a copy of the handout in their room, on the fridge, or somewhere visible in the home.

Download the **5 Questions to Ask About My Medicine** handout:

English:

https://safemedicationuse.ca/tools_resources/downloads/5QuestionsKids-EN.pdf

French:

https://safemedicationuse.ca/tools_resources/downloads/5QuestionsKids-FR.pdf

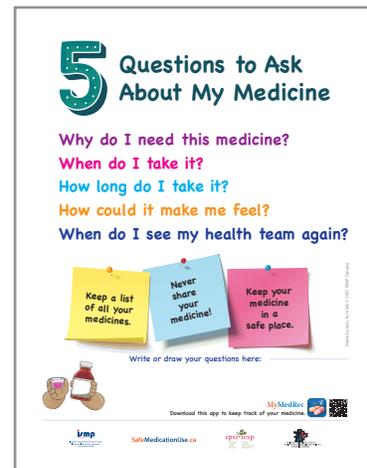
Implementation guide:

English:

<https://www.ismp-canada.org/download/MedRec/5questions/5-Questions-Implementation-Guide.pdf>

French:

<https://www.ismp-canada.org/download/MedRec/5questions/5-Questions-Implementation-Guide-FR.pdf>



Hospital to Home: Know Your Medications before You Leave

ISMP Canada’s consumer reporting program, SafeMedicationUse.ca, received a report from a patient whose blood pressure medications were changed while she was in the hospital. These changes including stopping some medications that she was previously taking at home. However, neither she nor her community pharmacist were made aware of the changes. After returning home and taking both the new and old medications for a few days, she felt very weak and had to be taken back to the hospital in an ambulance.



Tips for Practitioners

- Always provide the patient with an updated medication list upon discharge including the medication name and its purpose, as well as the dose and instructions for use.
- Include a list of medication changes (i.e., new, continued, changed, and stopped) with the discharge prescription(s) to enable the community pharmacist to update the patient profile.
- Conduct a medication review in the community after discharge, together with the patient, to identify and clarify ambiguous information. If a discrepancy is found, communicate directly with the prescriber or the pharmacist from the hospital, if possible.

Read the full newsletter here: <https://safemedicationuse.ca/newsletter/hospital-to-home.html>



Structured Opioid Therapy

Structured Opioid Therapy is a team-based approach to opioid therapy that involves patients, prescribers (physicians and nurse practitioners), and pharmacists. It can be useful when the current opioid therapy is out of sync with the goals for function and pain control.

A new Structured Opioid Therapy infographic has been designed by a collaborative team of researchers and health care providers from Sinai Health, the Centre for Addiction and Mental Health, the Saskatchewan Health Authority, and the Institute for Safe Medication Practices Canada, working alongside people with lived experiences.

Practitioners are encouraged to post the infographic in their office, clinic, or pharmacy. The main goal of the infographic is to raise awareness of Structured Opioid Therapy. An additional goal is to facilitate communication between health care providers (physicians, nurse practitioners, and pharmacists) and patients on how to achieve the best possible outcomes from their opioid therapy in terms of both function and pain control.

An 11" × 17" (28 cm x 43 cm) poster is available in both official languages:

English: <https://www.ismp-canada.org/download/OpioidStewardship/SOT-poster-EN-tabloid.pdf>

French: <https://www.ismp-canada.org/download/OpioidStewardship/SOT-poster-FR-tabloid.pdf>

Magnesium Sulfate 50% (500 mg/mL) Injection: Shortage of Supply

As of the date of publication, magnesium sulfate 50% (500 mg/mL) injection in 10 mL and 50 mL vials, manufactured by Fresenius Kabi Canada (the sole supplier of this concentration in Canada), are in short supply. The 50 mL vial is back-ordered, and the 10 mL vial is on partial allocation, with additional supply expected in early June.¹⁻³

HealthPRO Procurement Services recently conducted a market assessment and determined that the available products in Canada are insufficient to meet demands. Health Canada has issued Letters of No Objection to allow the importation and distribution of several foreign products, including the following:

- UK-labelled Magnesium Sulfate Injection 50% (500 mg/mL) 10 mL ampoules and 50 mL vials, by SteriMax
- US-labelled Magnesium Sulfate in Sterile Water for Injection, concentrations 4% (40 mg/mL) and 8% (80 mg/mL), by Fresenius Kabi
- US-labelled Magnesium Sulfate in 5% Dextrose Injection, concentration 1% (10 mg/mL), by Fresenius Kabi

In the interim, hospitals are managing the shortage in various ways, including recommending the use of oral magnesium whenever possible. Intravenous magnesium should be prioritized for patients who cannot take an oral or enteral formulation and those for whom an oral or enteral formulation is not clinically appropriate (e.g., obstetrical patients experiencing preeclampsia or eclampsia, symptomatic patients with severe hypomagnesemia, and patients experiencing torsades de pointes).

System supports for product prioritization include formulary restrictions, auto-substitutions, and alerts (e.g., to consider alternatives) built into computerized medication systems, such as the prescriber order entry and pharmacy computer systems.

It is expected that the foreign-labelled products for exceptional importation and sale will be available in the next several weeks. Hospitals will need to proactively implement safeguards in anticipation of these alternative products being introduced into their medication use systems. The following ISMP Canada Safety Bulletins discuss considerations related to managing drug shortages:

- [Propofol 2% \(20 mg/mL\): Safety Considerations for Introducing a Novel Product into Hospitals](#)
- [Drug Shortages and Medication Safety Concerns](#)
- [Recall of Morphine 2 mg/mL \(1 mL Ampoules\) and Medication Safety Strategies in a Drug Shortage Situation](#)

References

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3. Drug shortage report for magnesium sulfate injection [10 mL]. Drug Shortages Canada; updated 2021 Apr 23 [cited 2021 May 28]. Available from: <https://www.drugshortagescanada.ca/shortage/136555>



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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