The Institute for Safe Medication Practices Canada (ISMP Canada) is an independent national nonprofit agency established for the collection and analysis of medication error reports and the development of recommendations for the enhancement of patient safety.



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Epidural Medications Given Intravenously May Result in Death

Previous reports of mix-ups between intravenous (IV) and epidural products have often focused on the risk for harm if an IV product is inadvertently given epidurally (or intrathecally). 1,2,3,4 A recent event in the United States, described below, demonstrates the *high risk of harm if medications intended for epidural administration are inadvertently administered intravenously*.

A 16-year-old girl died during labour after an epidural analgesic (presumably with bupivacaine) was inadvertently infused intravenously. The nurse had intended to administer a minibag containing penicillin.⁵ Five minutes after the start of the infusion the patient was observed to experience "seizures, clenched jaw and gasping respirations." Efforts to resuscitate the patient were unsuccessful.

This case highlights and emphasizes the need to ensure adequate segregation and differentiation between intravenous and epidural products and the need to ensure distinctive processes in the medication use system for handling and administering these products.

In the interests of providing a timely alert and sharing pertinent information, we summarize here a number of recommendations related to the *prevention of substitution errors* between parenteral and epidural medications, which have appeared previously in various publications of ISMP Canada^{7,8} and ISMP (US)^{9,10}:

- Keep premixed epidural solutions separate from IV solutions during all phases of the medication use process, including preparation, delivery, retrieval, and administration. Although we promote the increased availability of premixed solutions, we are mindful that these premixed solutions can look alike and potentially increase the risk of substitution errors.
- Ensure that all medication labels *prominently* identify the route of administration.
- Require distinct labelling that readily distinguishes epidural solutions from IV solutions. Use brightly coloured auxiliary labels to distinguish epidural solutions (e.g., "for EPIDURAL use"). Actions reportedly taken by

the hospital in response to the incident described above included changing the labels on solutions for epidural infusion to enhance differentiation from all other types of solutions intended for infusion.¹¹

- Restrict the stock of epidural solutions to patient care areas that require them, based on drug use evaluation.
- Store epidural solutions in a separate storage area. Keep them sequestered until needed for administration.
- Retrieve and administer epidural medications at a separate time from the administration of IV solutions.
- Share this bulletin with front-line staff to heighten awareness of the risk for mix-ups between epidural and IV medications.

The following additional general recommendations are designed to *ensure distinctive processes for administration* of epidural medications:

- Use distinctly coloured epidural tubing to differentiate it from other tubing.
- Use tubing without injection ports for epidural administration to prevent the administration of other medications via the epidural line.
- Use brightly coloured labels to identify epidural lines.
 Labelling lines at the distal connection site has been recommended.
- Use single-channel pumps for epidural infusions.
- Consider using dedicated infusion pumps for epidural use and have the biomedical engineering department preprogram the maximum infusion rate to a predetermined level (e.g., 20 mL/h). Add a large, visible label marked "Epidural Pump" on any pump being used to administer an epidural infusion.
- Physically separate epidural pumps from other pumps.
 Some hospitals encourage the practice of placing the epidural pump and the IV pump on opposite sides of the bed when patients are not ambulating, to better distinguish the two infusions.

- Consider an independent double-check policy and documentation for epidural infusions to verify patient identification, the medication and its concentration, and the route of administration upon initial programming and upon any changes in programming.
- Ensure training and competency assessment of all staff before they are required to work with patients receiving epidural infusions.

Bar-coding technology is designed to help prevent substitution errors. According to media reports at the time, a contributing factor to the incident described above was a failure to use bar-coding technology that had been implemented and was "policy but not practice" in the hospital. This incident serves to remind us all of the need to (i) identify the barriers to successful implementation of new technologies and (ii) provide ongoing training, monitoring, and evaluation when there has been investment in new technologies designed to enhance patient safety.

In addition to the steps that health care providers and health care organizations can take to prevent misidentification of infusion products, ultimately, the ideal safeguard is a "lock and key" redesign of bags, tubing, and catheters so that medications intended for epidural use *cannot* be connected to intravenous lines and vice versa.

Updated information and additional recommendations may be provided when more details of the incident and an analysis of the contributing factors are available.

Note: Several anesthesiologists strongly advised ISMP Canada to mention that there are two case reports in which 20% lipid emulsion (administered intravenously) was used for successful resuscitation after cardiac arrest likely caused by systemic toxicity of local anesthetic products. ^{12,13} Although these reports are anecdotal, lipid emulsion has been shown to increase the cardiotoxic threshold of bupivacaine in animal studies. ^{14,15} A recent editorial of bupivacaine in animal studies. ^{14,15} A recent editorial noted thaving 20% lipid emulsion available where regional anesthesia is performed. The author of the editorial noted that use of 20% lipid emulsion should be considered only after standard resuscitative measures have proven ineffective for cardiac arrest induced by a local anesthetic agent. ¹⁶ Readers are encouraged to consult the cited references and other documents in the medical literature.

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Look-alike/Sound-alike Drug Name Alert

Trosec looks and sounds like **Losec** and **Prozac**.

ISMP Canada has received three reports of concerns with the newly marketed product trospium chloride (Trosec) 20 mg, an antispasmodic marketed by Oryx Pharmaceuticals Inc. The registered brand name for trospium chloride in the United States is Sanctura. ISMP Canada has notified Health Canada and Oryx Pharmaceuticals, who are following up on the reported concerns.

A Picture Can Be Worth a Thousand Words

ISMP Canada has upgraded the web-based medication incident reporting program for individual practitioners (https://www.ismp-canada.org/err_report.htm). Practitioners can now upload and submit pictures (e.g., photographs of product packaging or labelling) when reporting a medication incident. The individual practitioner reporting program is a component of the Canadian Medication Incident Reporting and Prevention System (CMIRPS).

Collaboration between CSHP and ISMP Canada

The Canadian Society of Hospital Pharmacists (CSHP) and ISMP Canada have signed a Memorandum of Understanding to formally recognize their close working relationship and their mutual commitment to collaborate for the advancement of patient safety. CSHP has a lengthy history of leadership in the advancement of safe medication practices, including the promotion of safe drug distribution systems, the advancement of pharmacists' involvement in direct patient care, and active membership in the Canadian Coalition on Medication Incident Reporting and Prevention. CSHP has also played a major role in the development of standards for drug labelling and packaging. The development of the Canadian Medication Incident Reporting and Prevention System places ISMP Canada in a unique position to assume a lead role in the area of enhanced drug labelling and packaging. CSHP will concentrate on the direct patient care role of hospital pharmacists — a key component in patient safety. The complete text of the memorandum is available at http://www.ismp-canada.org/partners.htm.

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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.

To report a medication error to ISMP Canada: (i) visit our website www.ismp-canada.org, or (ii) e-mail us at info@ismp-canada.org, or (iii) phone us at 416-733-3131. ISMP Canada guarantees confidentiality and security of information received. ISMP Canada respects the wishes of the reporter as to the level of detail to be included in our publications.

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