ISMP Canada is an independent Canadian nonprofit agency established for the collection and analysis of medication error reports and the development of recommendations for the enhancement of patient safety.

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

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Report of Incorrect Administration of Epinephrine

A Canadian hospital has advised us of an incident where epinephrine was administered IV for the treatment of a hypersensitivity reaction. One mL of epinephrine 1:1000 (1 mg/mL) product was diluted with sodium chloride for injection and then administered, IV push over 2 minutes, by a physician. As a result of receiving 1 mg epinephrine IV, the adult patient experienced adverse effects requiring transfer from a nursing unit to an intensive care unit. The patient was later transferred back to the nursing unit with no long-term effects.

An initial adult epinephrine dose for treatment of severe hypersensitivity reactions is generally in the range of 0.3 to 0.5 mg (0.3 to 0.5 mL of the 1mg/mL product) and given subcutaneously or intramuscularly [1,2]. If the IV route is chosen then the initial suggested dose is 0.1 mg to 0.25 mg, using 1 to 2.5 mL of a 1:10,000 concentration, given by slow injection over 5 to 10 minutes. The IV route is generally reserved for profound, immediately life-threatening situations.[3]

In response to the error, the hospital pharmacy is considering supplying EPIPEN® to patient care areas that do not routinely use this medication, as an alternative to the epinephrine ampoules.

Possible contributing factors to the error:

According to the results of a study by Leape et al [4], the most common proximal cause of medication errors in the physician ordering stage was "lack of knowledge of the drug" and accounted for 36% of medication errors made during the physician ordering stage. Overall, the most common systems failure identified was the "dissemination of drug knowledge", particularly to physicians, accounting for 29% of all 334 medication errors. One of the proposed 'system remedies' is to make information about drugs available to physicians, nurses and pharmacists at the time of use.

Epinephrine ampoules* are supplied by the manufacturer in cardboard packages of 10 ampoules, with one 'package insert' provided for 50 ampoules. Once received by a hospital, the packages are often divided so that small quantities of product (e.g. 2 to 5 ampoules) can be provided to various patient care areas. The consequence of this practice is that the dosing information on the cardboard package, and the information in the package insert are not distributed with the drug, and therefore, unavailable at the point of care.

Recommendations:

- Consider providing drug information, such as an emergency drug treatment chart, a treatment manual, or a current CPS wherever emergency treatment medications are stored.
- The ISMP bulletin[5] dated October 16, 2002 describes several other recent errors in the U.S. involving epinephrine. The bulletin also outlines recommendations for safeguards with these products. Although, a top recommendation is directed to the manufacturer to improve the way the drug strength is designated on the label (using mg/mL instead of a dilution ratio), other recommendations are directed to the hospital and include addition of auxiliary labels with dosing information.
- Bring this error to the attention of the hospital's Pharmacy and Therapeutics Committee. Evaluate initiatives which help to ensure that drug information is readily available and accessible where emergency treatment medications are stored and used. Evaluate the option of supplying EPIPEN®, as an alternative to the epinephrine ampoules, to selected patient care areas.

If you have experienced similar incidents or have additional suggestions for error prevention with epinephrine products please write to us at www.ismp-canada.org.

* Abbott Laboratories Limited has been advised of the error with the 1:1000 (1mg/mL) ampoule product.

References:

1. Drug Safety "Preventing and Managing Drug-Induced Anaphylaxis" 2001;24 (11): 843-853.

2. Pharmacist's Drug Handbook. American Society of Health Systems Pharmacists. Bethesda Maryland, 2001: 444-446.

3. ACLS guidelines published in Circulation 2000; 102 (suppl I): I-241 to I-243.

4. Leape L, et al. Systems Analysis of Adverse Drug Events. JAMA, 1995: 274 (1):35-43

5. Smetzer J, Cohen M. Eds. ISMP Medication Safety Alert! Institute for Safe Medication Practices. Vol. 7, Issue 21 October 16, 2002.

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) email us at info@ismp-canada.org or (iii) phone us at 416-480-4099. 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.