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# Medication Incidents Involving Insulin: A Multi-Incident Analysis

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CMIRPS Canadian Medication Incident Reporting and Prevention System

SCDPIM Système canadien de déclaration et de prévention des incidents médicamenteux

## INTRODUCTION

- In 2006, ISMP Canada identified insulin as **one of the top 10 medications that is most frequently reported as causing harm** as a consequence of medication error.[1]
- ISMP Canada has also identified insulin as one of the **top three prescription medication classes involved in medication incident related deaths** occurring outside regulated healthcare facilities.[2]
- An excessive dose of insulin may cause life-threatening seizures and coma (via hypoglycemia); conversely an under-dose of insulin may lead to life-threatening ketoacidosis or hyperosmolality (via hyperglycemia).

## OBJECTIVE(S)

- To examine insulin-related medication incidents and determine potential system-based improvements that may be customized in pharmacy practice to enhance medication safety.
- To enhance understanding of factors that may contribute to insulin-related medication incidents.

## METHOD(S)

**Searched ISMP Canada Community Pharmacy Incident Reporting (CPhIR)[3] Database for medication incidents involving Insulin from January 2014 to December 2014**

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**Selected Incidents for final analysis**

226 incidents were retrieved but only 81 incidents met the inclusion criteria and were included in this multi-incident analysis

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**Analyzed and categorized incidents into four mains themes and further divided into subthemes**

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**Identified potential contributing factors**

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**Provided recommendations to fill in patient-safety gaps**

## RESULT(S)

### Theme 1: Product Selection

***Example)*** *The patient noticed his insulin box was different than [what] he had before. He should have received Novolin® ge NPH and had been given Novolin® ge 30/70 in error.*

**Potential Contributing Factors**:
- Various dosage forms (i.e. rapid-acting, short-acting, long-acting, premixed, vials, cartridges, preloaded pens)
- Look-alike, sound-alike names and packaging
- Proximity of storage of look-alike, sound-alike insulin products
- Lack of independent double checks
- Environmental distractions
- Confirmation bias

**Potential System-Based Solutions**:
- Program pharmacy software to include both generic and brand names for insulin and incorporate warning alerts for potential mix-up.[4,5]
- Perform independent double checks.
- When a patient picks up his/her insulin, include a physical review (i.e. packages, labels, insulin product) as they are provided to the patient.[4,5,6]
- Segregate insulin products by storing them according to their onset of action in well-differentiated areas of the refrigerator.[4,6,7]

### Theme 2: Therapeutic Regimen Change

***Example)*** *Prescription had specific instructions for use and was copied over by an old one with just "use as directed" on it.*

**Potential Contributing Factors**:
- Frequent dose changes
- Copying previous prescriptions

**Potential System-Based Solutions**:
- Consider programming the pharmacy software or developing policies to restrict the process of copying from previous prescriptions for all insulin prescriptions.[4]
- Perform independent double checks throughout the entire pharmacy workflow. Encourage patients to actively participate in conversation when providing medication counselling.[4,5,7]
- Consider performing a comprehensive diabetes-focused medication review when a patient has a significant change in insulin usage.

### Theme 3: Dosage Calculations

***Example)*** *Prescription for 4-10 units of insulin a day x 90 days [was] entered as 45 mLs. Only 15 mLs were required.*

**Potential Contributing Factors**:
- Knowledge deficit on how to calculate insulin units to millilitres and days supply

**Potential System-Based Solutions**:
- Develop policies for pharmacy staff to document calculations for insulin quantity at order entry and dispensing as an independent double check to enhance accuracy.[8]
- Highlight information related to insulin dosing calculations (e.g. extra units required for priming insulin pens) as a part of pharmacy staff training.

### Theme 4: Storage Requirements

***Example)*** *When the pharmacist saw the patient walking in, assuming the patient was in to pick up prescription, he prepared the insulin prescription. The patient browsed the store and returned later. The insulin was accidently put in the drawer, not the fridge.*

**Potential Contributing Factors**:
- Environmental distractions
- Confirmation bias

**Potential System-Based Solutions**:
- Develop or reinforce existing policies and procedures with regards to dispensing refrigerated products. Refrigerated products should always be returned to the fridge immediately after filling.

## CONCLUSION(S)

- Medication incidents involving insulin in pharmacy practice are common and have the potential to cause serious patient harm.
- Areas of consideration with respect to safe insulin use include product selection, change of insulin regimens, calculation or conversion of insulin doses, and storage of insulin prescriptions.
- Findings from this analysis are intended to educate health care professionals on the vulnerabilities in the medication-use process that may contribute to insulin-specific medication incidents and offer recommendations to prevent such events from recurring.

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