The Institute for Safe Medication Practices Canada (ISMP Canada) is an independent national not-for-profit 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.

Volume 10, Number 6

ISMP Canada Safety Bulletin

August 31, 2010

Inadvertent Administration of Insulin to a Nondiabetic Patient

This bulletin describes a reported incident in which a patient died as a result of receiving insulin that had not been prescribed. The patient's family and the administration and staff of the hospital where the incident took place hope that sharing the learning from analysis of this incident will help to prevent similar incidents in the future. The system vulnerabilities that were identified in the analysis of this tragic event also exist in other hospitals and healthcare institutions.

Incident Report

An older adult underwent surgery for a gastrointestinal problem. The postoperative recovery proceeded normally, and the patient had clear fluids on the evening of the second postoperative day. Early the next morning, the patient was found unresponsive, having apparently vomited and aspirated. Initial assessment identified 2 findings of concern: a glucometer reading of less than 2 mmol/L (normal range 4–6 mmol/L) and oxygen saturation of about 60%. Dextrose 50% was immediately administered intravenously, and the patient's glucose level increased. However, the oxygen saturation level did not respond to resuscitation efforts, and intubation and ventilation were required. The patient was transferred to the intensive care unit and died the next morning. The patient did not have diabetes, so the finding of hypoglycemia was unexpected, and an autopsy was recommended. The pathology report listed the underlying cause of death as hypoglycemia related to exogenous insulin administration.

The hospital undertook an investigation but was unable to clearly identify how and when the patient might have received insulin. The most likely explanation appeared to be substitution of insulin for a scheduled subcutaneous (SC) dose of heparin on the evening before the patient was found unresponsive. The hospital subsequently changed the format of heparin supplied in ward stock from multidose vials containing a solution of 50,000 units/5 mL to single-use vials containing a solution of 10,000 units/mL, to enhance the differentiation between heparin and insulin. In addition, the existing policy requiring double-checks of selected high-alert medications (including insulin and heparin) before administration was supplemented by a requirement for these double-checks to be documented.

Root Cause Analysis

While the findings of the local analysis were inconclusive, the hospital was concerned that additional system vulnerabilities might be present. ISMP Canada was invited to assist the hospital with a root cause analysis of the incident. ISMP Canada medication safety specialists worked with a local team, which included representatives from direct care nursing, pharmacy, medicine, leadership, and quality and safety staff.

Analysis of this incident was particularly challenging because the specific circumstances of the error could not be conclusively determined. As a result, this situation was difficult for all the nursing staff who had been involved at points of care where the error might have occurred. Practitioners are well recognized as the "second victims" when harmful errors occur.[1]

The root cause analysis team identified 3 opportunities where insulin may have been inadvertently administered:

- Administration of rapid-acting insulin intended for a different patient during the night
- Substitution of insulin for a dose of heparin the evening before the patient was found unresponsive
- Administration of NPH insulin intended for a different patient the evening before

Eleven possible contributing factors were identified that might have played a part in the administration of insulin to a patient for whom such a drug was not intended. Of these, the following factors could occur in any healthcare setting and are important to share with others:

- inconsistent process for taking the medication administration record (MAR) to the bedside to support processes for identifying the patient and confirming the medications to be given
- inconsistent verification of patient identity before administration of any medication (such verification should be done by means of 2 unique identifiers)
- availability of both insulin and heparin in ward stock and availability of both medications in multidose vials
- lack of a routine process to label syringes containing injectable medications when prepared at a location remote from the bedside

- sub-optimal lighting for administration of medications at night

Recommended Actions

Of the recommendations made to the hospital where the reported incident took place, the following may have relevance for other healthcare organizations:

- Create standardized expectations and practices to enhance the safety of the medication administration process, including the following measures:
  - Confirm, immediately before any medication is administered and with direct reference to the medication administration record, the medication(s) to be administered and the identity of the patient.
  - Use 2 unique patient identifiers when administering medications (e.g., name and date of birth; name and health record number).
  - Ensure that all medications are labelled up to the point of administration.
  - *When possible, enlist patients to act as a check* — tell them that they are receiving insulin for their diabetes. Patients not expecting this will immediately query the need.
- Dispense insulin individually for patients for whom it is prescribed.[2,3,4]
- Assign a multidisciplinary team to undertake a self-assessment of insulin management within the organization. (Two examples of audit tools that may be of assistance are the American Society of Health-System Pharmacists' *Professional Practice Recommendations for Safe Use of Insulin in Hospitals*[4] *and* the *Subcutaneous Insulin Audit Tool* developed by the Victorian Medicines Advisory Committee of Australia.[5])
- Dispense heparin individually for patients for whom it is prescribed, using a unit-of-use product.
- Assess lighting, including task lighting, in patient care areas to determine if it is adequate for administration of medications. Staff members should have an optimal light source available to support their reading of armbands and information related to medication use (e.g., medication labels, MAR) at the bedside.

Conclusion

Most hospitals have policies and procedures that outline expectations of staff when they are administering medications, but staff members may not fully appreciate the risks associated with failing to systematically follow the procedurally defined practices. The term "drift" has been used to describe what happens when "cultural norms move away from an organization's endorsed values or processes". It has been stated that "the ability to manage 'drift' is the variable that makes some workplaces very safe and others not so safe".[6]

The incident described in this bulletin illustrates that multiple opportunities for error can co-exist, all of which require consideration in a root cause analysis of a critical incident. That the exact circumstances underlying this event could not be determined led to a broader assessment of the potential risks in the environment and the actions needed to address them.

The high prevalence of diabetes means that insulin is widely used in all healthcare settings and in the community. Recognizing the significant potential for harm with insulin errors[2,3,4,7,8,9] healthcare facilities and practitioners providing inpatient, long-term, and residential care are encouraged to use this bulletin as a prompt for evaluation of processes related to the management of insulin therapy in their own settings.

Please refer to page 3 for references.

Risk of Inadvertent Injection of Epinephrine Intended for Topical Use

Erfa Canada Inc. recently released *Health Canada Endorsed Safety Information* regarding the risk of inadvertent injection of the topical / nasal formulation.

For additional information, please refer to
- the letter *For Health Professionals*: http://www.hc-sc.gc.ca/dhp-mps/medeff/advisories-avis/prof/_2010/adrenalin_hpc-cps-eng.php, and
- the *Notice to Hospitals*: http://www.hc-sc.gc.ca/dhp-mps/medeff/advisories-avis/prof/_2010/adrenalin_nth-aah-eng.php.

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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.

Medication Incidents (including near misses) can be reported to ISMP Canada:
(i) through the website: http://www.ismp-canada.org/err_report.htm or (ii) by phone: 416-733-3131 or toll free: 1-866-544-7672.

ISMP Canada can also be contacted by e-mail: cmirps@ismp-canada.org. ISMP Canada guarantees confidentiality and security of information received, and respects the wishes of the reporter as to the level of detail to be included in publications.

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