



Review Article

A mini review on medication incidents involving insulin

Simranjeet Kaur*, Abhay Chauhan

Faculty of Pharmaceutical Sciences, PCTE Group of Institutes, Ludhiana, Punjab, India

Correspondence:

Simranjeet Kaur, M Pharmacy Pharmacology, Assistant Professor, Faculty of Pharmaceutical Sciences, PCTE Group of Institutes, Ludhiana - 141012, Punjab, India. E-mail: Simranjstl@gmail.com

How to cite this article: Kaur S, Chauhan A. A mini review on medication incidents involving insulin. *Pharmaspire* 2021;13(1):8-10.

Source of Support: Nil,

Conflicts of Interest: None declared

ABSTRACT

Insulin is a life-saving pharmacological therapy used in the management of blood glucose in patients with Type I diabetes and patients with Type II diabetes whose blood sugar levels are not well-managed with oral anti-hyperglycemic agents alone. Insulin may be administered by a syringe, pen, or pump and there are various insulin preparations including rapid-acting, short-acting, long-acting, and pre-mixed. Although insulin use is integral to diabetes management, it can be harmful when used incorrectly. An excessive dose of insulin may cause seizures and coma. This review will outline all the reported incidents that occur due to insulin use.

Keywords: Type II diabetes, medication incidents, insulin

INTRODUCTION

For management of blood glucose in Type I diabetes patients, insulin is considered as a life-saving pharmacological therapy and for patients with Type II diabetes whose blood sugar levels are not well-managed with oral anti-hyperglycemic agents alone. Insulin may be administered by a syringe, pen, or pump and there are various insulin preparations including rapid-acting, short-acting, long-acting, and pre-mixed. Although insulin use is integral to diabetes management, it can be harmful when used incorrectly.^[1] An excessive dose of insulin may cause seizures and coma. Institute for Safe Medication Practices (ISMP) Canada identified insulin as one of the top ten medications reported as causing harm as a consequence of medication error.^[2] Insulin has been identified as a high-alert medication in the community setting. High-alert medications are drugs that bear a heightened risk of causing significant patient harm when they are used in error. Although mistakes may or may not be more common with these drugs, the consequences of an error are clearly more devastating to styles patients.^[3] Analysis of events that resulted in patients receiving a type of wrong dose (e.g., Wrong dose/over dosage, wrong dose/under dosage, and extra dose) reveals a variety of breakdowns that occurred in the medication-use process, including problems with insulin coverage orders, ambiguous orders written by prescribers, transcription, and order-entry errors, the obtainment and/or use of the incorrect blood glucose value of the

patient, and the ways in which information about insulin products is displayed on pharmacy labels and medication administration records.^[4]

MEDICATION INCIDENTS INVOLVING INSULIN

There a lot of medication incidents involving insulin which were extracted from community pharmacy incident reporting program. A total of 226 incidents were retrieved and 81 met inclusion criteria and were included in this qualitative multi- incident analysis.^[5] The 81 medication incidents were reviewed by ISMP Canada Analyst and categorized into four main themes, that is, product selection, therapeutic regimen change, dosage calculations, and storage requirements [Tables 1-4].^[6]

DISCUSSION

Insulin is widely used therapy which requires careful training in the management and monitoring of the patients. It is used by thousands of patients in U.K. and increasingly by those people with type 2 diabetes. The main cause of evolving of incidents of insulin is as due to poor communication between the physician and patients, drug names that sound alike and medications that look alike. Approximately 45% of errors are associated only with the prescription errors. However, if u want to avoid the errors you have to know about your insulin product, its brand name and the pharmaceutical company that manufacture it, its type—short or long acting, its duration of action. Insulin is a very potent medication. Injecting even a small amount more than prescribed dosage

Access this article online

Website: www.isfcppharmaspire.com

P-ISSN: 2321-4732

E-ISSN: XXXX-XXXX

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Table 1: Theme 1 – product selection (related to unique insulin properties)

Incident Example	Possible contributing factors	Commentary
<p>Subtheme 1: Prescribing</p> <p>A number of weeks back, she went to the doctor who asked her what insulin she was on and she told her the new one that starts with an L. The doctor assumed Lantus®, but it was Levemir</p>	<ul style="list-style-type: none"> • Multiple formulations of same insulin type • Look-alike, sound-alike drug names • Knowledge deficit on drug names • Confirmation bias 	<ul style="list-style-type: none"> • Physicians should consider asking patients for a current and comprehensive medication list before prescribing new medication (s) or re-ordering refill of current medication (s)
<p>Subtheme 2: Order Entry</p> <p>The pharmacist noticed that the dose of the Humulin® N had “changed” to what the directions of the Humulin® R used to be. Upon further inspection, pharmacist noticed that no dose change was supposed to occur</p>	<ul style="list-style-type: none"> • Patient concurrently using multiple insulin products • Lack of independent double checks 	<ul style="list-style-type: none"> • Incorporate warning flags in pharmacy software to alert for potential mix-up during insulin selection at pharmacy order entry^[7,8] • Perform independent double checks throughout the entire pharmacy workflow. This may include verification with the patient regarding the current insulin product (s) being used at drop off^[7,9] • Highlight information related to look-alike/sound-alike insulin products as a part of pharmacy staff training^[7,10]
<p>Subtheme 3: Dispensing</p> <p>The patient noticed his insulin box was different than what he had before. He should have received Novolin® NPH and had been given Novolin® 30/70 in error</p>	<ul style="list-style-type: none"> • Proximity of storage of look-alike/sound-alike insulin products • Lack of independent double checks • Environmental distractions 	<ul style="list-style-type: none"> • Implement auxiliary alerts (e.g., labels or stickers) regarding look-alike/sound-alike drug pairs on insulin storage bins^[7] • Perform independent double checks throughout the entire pharmacy workflow. When a patient picks up his/her insulin, include a physical review (i.e., packages, labels, and insulin product) as they are provided to the patient^[7,9,10] • Organize the pharmacy environment to create a safe and efficient working area. For instance, segregate insulin products by storing them according to their onset of action (i.e., rapid-acting, short-acting, intermediate-acting, and long-acting), rather than by brand, in well-differentiated areas of the refrigerator (e.g., on different shelves)^[7,9,10] • Instruct patients and their family members to ask questions if they notice any unexpected changes in either the insulin packaging or product at the time of receiving the medication or at any other time^[10]

Table 2: Theme 2 – Therapeutic Regimen Change

Incident Example	Possible contributing factors	Commentary
<p>Prescription had specific instructions for use and was copied over by an old one with just “use as directed” on it. Direction was kept as before but there was a change in directions on the prescription, from 48 to 44 units</p>	<ul style="list-style-type: none"> • Frequent dose changes • Copying various prescriptions 	<ul style="list-style-type: none"> • Consider programming the pharmacy software or developing policies to restrict the process of copying from previous prescriptions for all insulin prescriptions (or high-alert medications) to prevent confirmation bias at order entry^[7] • Perform independent double checks throughout the entire pharmacy workflow. For example, during order entry or pick-up, verify with patient the most current prescription orders and directions from the prescriber^[7,9,11]
<p>Instructions were to stop Lantus®, and glyburide, and to start Novo Mix® 30. The drugs were inactivated on the client’s profile but the change to prescription was not given to the blister pack department</p>	<ul style="list-style-type: none"> • Lack of communication between pharmacy staff members • Lack of independent double checks 	<ul style="list-style-type: none"> • Develop a system for communication with respect to patient medication therapy changes/updates within the pharmacy (e.g., when a patient’s regimen changes or if patient is admit-ted to hospital) for multi-medication compliance aids • Perform independent double checks throughout the entire pharmacy workflow. For example, when filling compliance packs, verify printed prescription labels with patient’s most current prescription orders^[7,9,11] • Consider performing a comprehensive diabetes-focused medication review when a patient has a significant change in insulin therapy to ensure adequate communication of patient’s regimen between the patient and pharmacist. Pharmacist should also communicate and update the patient profile accordingly so that other pharmacy staff members are aware of the changes

Table 3: Theme 3 – dosage calculations

Incident example	Possible contributing factors	Commentary
<p>Example: Prescription for 4–10 units of insulin a day×90 days (was) entered as 45 ml. Only 15 ml were required</p>	<ul style="list-style-type: none"> • Knowledge deficit on insulin dosing units • Illegible handwriting on prescription 	<ul style="list-style-type: none"> • Physicians should use standardized pre-printed order forms to avoid insulin unit related dosing and calculation errors^[7,11] • Prescribers are encouraged to write all insulin orders in units instead of milliliters (ml) and to spell out “units” rather than writing “U”^[12,13]
<p>Refill came up as early refill. Wrong days’ supply was put on original prescription.</p>	<p>Knowledge deficit on conversion from insulin units to ml and total number of days’ supply</p>	<ul style="list-style-type: none"> • Develop policies for pharmacy staff to document handwritten calculations for insulin quantity during order entry and again by a different staff member during the dispensing process. • Highlight information related to insulin dosing calculations
<p>Doctor ordered insulin syringes for up to 100 units, we filled for 1/2 cc (up to 50 units) (syringes)</p>	<ul style="list-style-type: none"> • Variety of syringe sizes available 	<ul style="list-style-type: none"> • Highlight information related to insulin syringe sizes as a part of pharmacy staff training^[14]

Table 4: Theme 4 – Storage Requirements

Incident example	Possible contributing factors	Commentary
When the pharmacist saw the patient walking in, assuming the patient was in to pick up prescription, patient walked around the store, said she would return, and the insulin was put in the drawer instead of the fridge.	<ul style="list-style-type: none"> • Environmental distractions • Confirmation bias 	Reinforce existing policies and procedures with regards to dispensing refrigerated products. Refrigerated products should always be returned to the fridge immediately after filling ^[15]

can make a huge difference in your blood glucose level. Hence, it is important to measure carefully when drawing up insulin in a syringe. Moreover, all insulins will maintain their potency longer if kept in a refrigerator. All insulins must be kept from freezing or overheating. Hence, we have to store it safely. To avoid the errors this thing also always be kept in mind that if we are using more than one insulin, we have to consult the member of our health-care team whether and we should mix our insulin doses together in the same syringe. For most insulin, mixing is fine but must be done properly, so we have to ask for instructions. In some cases, mixing is not safe like Lantus (glargine) insulin cannot be mixed in the same syringe with any other insulin.

CONCLUSION

Medication incident involving insulin in pharmacy practice is common and has the potential to cause serious patient harm. Areas to 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. The result of this multi-incident analysis is intended to educate health-care professionals on the vulnerabilities that contribute to these insulin specific medication incidents.

REFERENCES

1. Institute for Safe Medication Practices. ISMP List of High-Alert Medications in Community/Ambulatory Healthcare. Institute for Safe Medication Practices; 2011. p. 5-10.

2. ISMP Canada. Top 10 Drugs Reported as Causing Harm through Medication Error. ISMP Canada Safety Bulletin; 2006. p. 1-2.
3. ISMP Canada. Community pharmacy incident reporting (CPhIR) database. Can Saf Bull 2006;6:10-8.
4. Rodziewuz TD, Houseman B, Hipskind JE. Medical Error Prevention. Treasure Island, FL: StatPearls Publishing; 2015. p. 1-5.
5. ISMP Canada. Deaths Associated with Medication Incidents Occurring Outside Regulated Healthcare Facilities. Vol. 14. ISMP Canada Safety Bulletin; 2014. p. 1-2.
6. ISMP Canada. Preventable Medication Errors-Look-alike/Sound-alike Drug Names. Pharmacy Connection. Berlin: Springer; 2014. p. 28-33.
7. Kawano A, Li Q, Ho C. Preventable Medication Errors-Look-alike/Sound-alike Drug Names. Pharmacy Connection. Berlin: Springer; 2014. p. 28-33.
8. ISMP Canada. Patient Report of Insulin Mix-up Shared. ISMP Canada Safety Bulletin; 2007. p. 1-2.
9. ISMP Canada. Lowering the risk of medication errors: Independent double check. ISMP Can Saf Bull 2005;5:1-2.
10. ISMP Canada. Patient report of insulin mix-up shared. ISMP Can Saf Bull 2007;7:1-2.
11. Ciociano N, Bagnasco L. Look alike/sound alike drugs: a literature review on causes and solutions. Int J Clin Pharm 2014;36:233-42.
12. ISMP Canada. Do Not Use: Dangerous Abbreviations, Symbols and Dose Designations. ISMP Canada; 2006. p. 1-5.
13. ISMP Canada. Insulin errors. ISMP Can Saf Bull 2003;3:1-2.
14. ISMP Canada. Top 10 drugs reported as causing harm through medication error. ISMP Can Saf Bull 2006;6:1-2.
15. ISMP Canada. Community Pharmacy Incident Reporting (CPhIR) Database. ISMP Can Saf Bull 2006;6:1-2.