

Observational Study

Common errors with insulin use and potential solutions

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Medication error is the most unacceptable event in the course of treatment. Errors related to the use of insulins are common in clinical practice at various levels. Such errors may lead to serious consequences like episodes of hypoglycemia and hyperglycemia related to iatrogenic overdosing or under-dosing of insulin. This review aims to highlight the prevailing errors associated with the use of insulins and the action plan to prevent or minimize them.

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Key words : Insulin, diabetes, hypoglycemia, errors, nurse, pharmacist, health care, drug administration.

The United States National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer¹. It can involve any one of the following processes: Prescribing, Ordering, Dispensing, Distribution, Preparation, Administration, Labelling, Packaging, Nomenclature, Communication, Education, Use and Monitoring of Treatment. Such errors can lead to adverse drug reactions, drug-drug interactions, lack of efficacy, sub-optimal patient adherence, poor quality of life, bad patient experience, significant health and economic consequences such as increased use of health services, preventable medication-related hospital admissions and death^{2,3}. Estimating the prevalence of medication errors is difficult due to the varying definitions and classification systems, however it is very important to minimise medication error at various possible levels like patient level, pharmacy level, nursing level, doctor level and others too^{4,5}.

Insulin therapy is an important treatment for management of hyperglycemia in diabetes and almost all patients with any type of diabetes need treatment with insulin at least once in their lifetime. Inherent with low therapeutic index, insulin is a high-alert medication in terms for possible errors in both inpatient and outpatient settings and is among top five medications shown to be associated with medication error⁶. Error related to insulin use may result in episodes of hyperglycemia including diabetic ketoacidosis as well as episodes of hypoglycemia which may be severe on some occasions leading to even coma and death.

- Errors in insulin use are most unacceptable event
- Over/under dosing leads to hypoglycemia / hyperglycemia
- A holistic approach and preventive action plans can minimize it
- Education and vigilance is the key from doctors to patient level.

Levels of Medication Error for Insulin :

Errors related to use of insulin are possible at all levels including at the level of doctor, nurse, pharmacist, and patient. Factors associated at various levels with insulin medication errors have been discussed in Table 1⁷⁻¹⁵.

Action Plan for Prevention of Errors Associated with Insulin Use :

Reducing medication errors and improving medication safety in health care requires the prevention strategies at different levels discussed above. Insulin is one of the high risk medications in terms of possible errors and requires clear policies regarding insulin usage in the hospital setup. Most of the errors can be easily prevented through basic education and close vigilance at every level. Proper communication and documentation is also important at every level and any confusion related to type, dose, route of insulin should be checked directly with the prescribing doctor. Other strategies which have shown to reduce all kind of medication errors are regular measurement of safety related performance indicators, building relationships between care professionals, strengthening technical systems for sharing records, education manuals and reference lists, incorporating safety-related information into the training of health professionals, measuring and monitoring patient safety improvements over time, using checklists to improve the quality of care, using electronic tools for accurate health records, empowering and encouraging patients, and strengthening the workforce¹⁶⁻¹⁹. Action plan to decrease insulin related medication error has been summarised in Table 2²⁰⁻²⁴.

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Table 1 — Common medication errors with the use of insulins

Doctor's level :-

- Training issues
- Illegible/incomplete prescription
- Use of error prone abbreviation (especially "U" instead of the word "units")
- Therapeutic duplication
- Poor communication

Pharmacy level :-

- Training issues
- Storage issues/poor labeling
- Substitution without communicating with concern doctor

- Confusion due to sound alike insulins (Dispensing Insulin-R in place of Insulin-N)
- Providing syringe inappropriate to vial (40 IU syringes with 100 IU/ml vials)
- Poor communication to patients

Nursing level :-

- Lack of knowledge
- Poor nursing practice/negligence/poor documentation
- Improper storage/improper handling
- Wrong insulin identification
- Inaccurate loading
- Wrong timing/route of administration
- Multiple use of syringe/pen needle
- Poor communication or handover practices

Patient Level :-

- Illiteracy/ communication issue/language barrier
- Improper storage at home
- Using inappropriate syringes (using 40 IU syringes with 100 IU vials/cartridges)
- Inaccurate loading
- Faulty injection techniques or faulty use of insulin delivery devices (like Injecting without removing inner cap of needle)
- Poor adherence (eg, fear about insulin injections)

Conclusion :

Insulin is among high risk medications prone for medication error. Most of the medication errors are a result of a system failure rather than an individual failure. A holistic approach and preventive action plans can help totally cut such medical mistakes and prevent associated morbidity and mortality. Education and vigilance is the key and requires at every level from doctors to patient level.

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Table 2 — Action plan to prevent insulin medication errors at various levels

Doctor's level :-

- Regular physician education programs
- Prescriptions in legible manner/typed with clear/detail instructions
- Prescription must contains insulin name, dose, route, frequency and timing (eg, before food/with food/after food)

- Avoiding abbreviations

- Effective communication towards nursing staff and patient

Pharmacy level :-

- Regular education of pharmacist
- Maintain proper labeling of insulins
- Dispatching appropriate insulin syringes with vials

- Double check system/special policy for the dispense of concentrated insulins

- Effective communication with patient

- If there is any doubt related to insulin dose/type/frequency then communicate to concern doctors.

Nursing level :-

- Regular education programs
- Effective communication and documentation
- Educate patients about insulin adherence and solve patient queries related to insulin

- If there is any doubt related to insulin dose, route and frequency then communicate to concern doctors

Patient Level:-

- Education and counseling regarding disease/insulin therapy for patients/family members

- Educate patients to differentiate various insulins
- Utilize colour code of insulins/syringes/pen for illiterate patients

- Education regarding correct use of insulin delivery devices/injection technique/insulin storage etc.

- Prepare a schedule about insulin administration

- Utilize family support

Organization (Hospital) level:-

- Start drug information centre
- Perform safety rounds to confirm proper safety checks

- Arranging regular education for resident doctors/nursing staff/pharmacist

- Appointing diabetic educator

- Making special discharge policy for patients on insulin

- Patient education materials (providing leaflets regarding insulin storage/technique/injection sites etc.)

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