



Best Practice Guidelines for the Safe Use of Insulin in Irish Hospitals

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This document is intended as a “best practice” guideline and is not to be regarded as a document offering definitive legal advice in relation to the subject matter

About the IMSN

The Irish Medication Safety Network (IMSN) is an independent group of pharmacists and other specialists working in the acute sector, whose principal aim is to improve patient safety with regard to the use of medicines through collaboration, shared learning and action.

The following is a guideline from the IMSN, based on best practice as of February 2010. Local practice may deviate.

The Irish Medication Safety Network can be contacted via irishmedsafety@gmail.com

Background

Insulin as a high-alert medication

The US Institute for Safe Medication Practices considers insulin to be one of the top 5 'high-alert' medications i.e. drugs that bear a heightened risk of causing significant patient harm when they are used in error.(1, 2) Analysis of data from the reporting system maintained by the US Pharmacopoeia (USP) 'Medmarx' indicates that errors associated with insulin may be twice as likely to cause harm as errors with other prescribed drugs.(3) Research from the US has indicated that 33% of the medical errors that cause death within 48 hours of the error, involved insulin therapy in the care of a hospitalised patient.(4) The most common types of insulin errors are errors of omission (leading to hyperglycaemia) and inaccurate doses (leading to both hyperglycaemia and hypoglycaemia).(5)

Insulin errors in Ireland

Although very limited Irish data are available, the indications are that insulin-related errors are a significant clinical problem also in Ireland. A study in 2004 indicated that 199 medication incidents involving insulin were reported in 8 Northern Ireland hospitals, over a 9-month period, some of which had serious consequences.(6) Anecdotal evidence from hospitals in the Irish Republic also suggests that insulin, as an individual medication, accounts for a substantial percentage of the total number of medication errors reported in organisations.(7)

Best Practice Guidance

Very comprehensive guidance relating to the safe use of insulin in the inpatient setting have previously been published by the American Society of Health-System Pharmacists (ASHP).(8) The ASHP guidelines compile best practices from a broad range of recognised resources and are intended to meet and exceed regulatory and accreditation standards and recommendations of professional bodies [the American Association of Clinical Endocrinologists (AACE), the American Diabetes Association (ADA), the ASHP, the ISMP, and the USP].

The Irish Medication Safety Network (IMSNI) has decided to focus attention on four best practice guidelines from published recommendations. Our selection was based on practices which are relatively simple to implement, but which nonetheless would have a significant impact on insulin safety if complied with in individual organisations (Table 1).

Table 1: Safe use of Insulin: Suggestions for Consideration

<p>1. The abbreviation 'u' or 'iu' should not be used for units. The word 'units' must be written in full.(6, 8)</p> <p>2. All insulins should be measured in insulin pens or in appropriately-sized insulin syringes marked in units. Tuberculin and other 1ml or 2ml syringes should NOT be used.(6, 8)</p> <p>3. All staff, medical and nursing, involved in administration of insulin should receive training and be educated in the strength of licensed soluble insulin (standard of 100 units/ml).(6)</p> <p>4. A second practitioner, either medical or nursing, should perform an independent second check of insulin doses.(6, 8) This second check must:</p> <ul style="list-style-type: none">- include all aspects of administration irrespective of route or administration method,- be conducted from preparation through to actual administration and documentation of administration- include the use of any devices and calculations. <p>Note: The IMSN supports the self-administration of insulin, when it is safe to do so, and when undertaken in the manner specified in local hospital policy.</p>

The IMSN has collated and reviewed several examples of errors involving insulin, which have occurred in Irish hospitals. Generally these errors have multiple contributory factors and more than one best practice recommendation is applicable in terms of reducing the risk of reoccurrence. This is typical of the multifactorial nature of harmful medication errors and the complexity of the response required to address them. A case study of an error is provided below which illustrates the importance of guidance points 2, 3 and 4 (Table 1).

Sample Insulin Error

Patient was prescribed the following treatment for hyperkalaemia: 10mls of 10% calcium gluconate and 50mls glucose 50% with 10 units of Actrapid® insulin. In error, the intern administered an infusion of glucose containing 100 units of Actrapid® instead of 10 units. Approximately three hours later, the patient was discovered unresponsive, cold and clammy to touch, by nursing staff. On measurement, the patient's blood glucose level was found to be 0.7mmol/l. The hypoglycaemic attack was successfully reversed with 100mls of glucose 50%, followed by a 10% glucose infusion.

Contributory Factors

- The doctor was unfamiliar with insulin preparations and their administration; he therefore was unaware that the standard insulin concentration is 100units/ml.

- The product label for Actrapid[®] only specified the concentration (as 100units/ml) and not the total number of units in the entire vial (i.e. 1,000 units).^{*} This type of labelling can predispose operators to believe that there is 100 units in the entire 10 ml vial, as occurred in this case.

*[*Note: the labelling of Actrapid[®] vials has now been amended by the manufacturers to include the total number of units in the vial, as well as the concentration.]*

- A regular syringe with millilitre gradations, rather than an insulin syringe with insulin unit gradations was used to draw up the dose of Actrapid[®]; reducing the chance of detecting the error prior to administration.
- The doctor did not seek any second person check on the insulin preparation or its administration. There was therefore no opportunity for a second staff member to detect the dosing error and intervene.

Safe Use of Insulin: Implementation of Suggestions

Individual healthcare organisations can undertake a simple gap analysis in relation to insulin safety by comparing local practices with the recommendations in Table 1. The aim is to identify any system weaknesses which might be addressed by implementing new safety initiatives or strengthening existing ones.

The following insulin safety strategies address the four key recommendations and have previously been successfully employed by Irish hospitals:

- Consider designing a drug chart solely for insulin prescribing and administration. This drug chart may incorporate the following safety features:
 - the word 'units' pre-printed wherever a dose of insulin has to be filled in by the prescriber.
 - a reference list of the insulins most commonly prescribed in the hospital, classified by the different formulations of insulin, e.g. long-acting, rapid-acting and pre-mixed biphasic, with the brand names applicable to each category.
 - pre-printed prescriptions for various regimens, e.g. 'basal bolus', accompanied by a brief description of the components of the regimens and/or the rationale for their use.
 - provision of space for double signatures on the drug chart to prompt staff to seek a second person check on insulin doses.

- a warning that insulin has a standard concentration of 100units/ml.
- Review of wards to ensure all areas have insulin syringes in stock and that staff are aware of their availability.
- Development of an insulin education programme for both doctors and nurses, which incorporates training on practical points such as drawing up insulin from a vial using an insulin syringe and the use of the various administration devices available on the market. This education programme can be incorporated into the orientation training for each new intake of doctors.
- Active promotion of key recommendations (Table 1) at suitable educational opportunities e.g. diabetes study days, nursing in-services, intern orientation, junior doctor education sessions.
- Passive promotion of recommendations by means of in-house publications, where available e.g. Prescriber's Guides, medications safety bulletins, medication safety intranet sites.
- Use of in-house examples of insulin errors as opportunities for shared learning, by linking contributory factors identified for the errors to best practice recommendations that may prevent the incident arising.
- Addition of guidance to Prescriber's Guides regarding the typical dose range (in units/kg) of insulin that might be expected for patients with diabetes

References

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