High-Risk Medicine Standard: Insulin
PRINTABLE STANDARD

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Insulin is a hormone produced by the pancreas and is responsible for the regulation of blood glucose levels. Insulin is most commonly used in the management of patients with diabetes. Knowledge about the different types, action profiles and presentations of insulin available in Australia is required to reduce the risk of medication errors. In NSW, insulin is one of the most common medicines involved in medication incidents leading to serious patient harm related to hypoglycaemia, hyperglycaemia and ketoacidosis.

Errors involving insulin include:

- incorrect timing of prescribing and administration
- inappropriate use of metric syringes instead of insulin syringes to draw up doses from insulin cartridges or vials
- withdrawal of insulin from pen devices inappropriately
- prescribing and/or administration of incorrect products that have different action profiles
- selection errors due to look-alike and sound-alike products including high concentration insulin products which have led to 2 to 5 fold dosing errors
- misinterpretation of intended dose prescribed due to unclear medication orders or prescriptions
- omission of basal insulin in patients with Type 1 diabetes.

This standard outlines the minimum actions required to mitigate risks associated with insulin use. This standard does not contain clinical guidance on insulin use.

Minimum requirements for clinical protocols

The Drug and Therapeutics Committee must approve any clinical protocols relating to insulin and ensure inclusion of the following, at a minimum:

- any specific training, qualifications, skills or competencies required to prescribe or administer insulin
- a statement that prescribed insulin orders and blood glucose levels are to be reviewed regularly to optimise dosing of insulin
- a statement that insulin is a time critical medicine, and early or delayed administration may cause hypoglycaemia or hyperglycaemia which could result in patient harm
- a statement that the indication and mode of delivery/device must be specified on all insulin orders
- appropriate management of insulin in patients who are:

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  - receiving enteral or parenteral nutrition
  - 'nil by mouth'
  - in the peri-operative period
  - hyperglycaemic
- appropriate storage of insulin
- a statement that basal insulin must not be omitted for patients with type 1 diabetes
- requirements for patient and/or carer education (see *Patient information/education* section).

Additional protocol requirements for subcutaneous insulin infusion pumps

- a statement to notify the diabetes management team of any patients admitted with an insulin pump. For example, endocrinologist and/or diabetes educator
- a requirement to document insulin pump details in the patient's health record including brand of insulin pump, type of insulin used, type of infusion set and location of infusion site
- insulin pumps with dose error reduction software are not to be manually overridden
- a requirement for assessment of the patient's continued competency to operate the insulin pump during admission
- contraindications to inpatient insulin pump therapy
- a statement that intravenous insulin infusion or subcutaneous insulin injections are to be initiated prior to disconnection of the insulin pump
- a statement that the words 'insulin pump' to be stated on the medication order
- explicit instructions on insulin pump therapy in patients undergoing medical/surgical procedures or procedures involving radiation
- guidance on monitoring of blood glucose levels and ketones
- guidance on management of hypoglycaemia or hyperglycaemia.

Additional protocol requirements for insulin infusions

- indications for intravenous insulin infusion
- clinical areas where intravenous insulin infusions may be used
- explicit infusion rate instructions including the initial rate and adjustments of rate in accordance with the blood glucose levels or ketone levels (for example, patients in ketosis)
- explicit instructions on requirements and frequency of blood glucose and ketone testing. This includes associated targets, and when to seek medical review

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- explicit blood glucose targets and escalation instructions when blood glucose levels are outside of these targets
- instructions on correct procedure for preparing the insulin infusion
- information on ceasing insulin infusion
- guidance on transition from intravenous to subcutaneous insulin.

Governance requirements

Adherence to the requirements specified in this standard is to be monitored by governance committees (for example, Drug and Therapeutics Committee) and service managers (including, but not limited to, Directors of Pharmacy and Nurse Unit Managers). An implementation checklist is available and can be used by facilities and individual units to determine compliance with these requirements.

Prescribing

- Insulin products are to be prescribed by brand name and strength (including correct proportions for pre-mixed and co-formulated insulins), with the addition of the active ingredient name(s) where possible.
- The medication orders for subcutaneous insulin are to include the name of the intended insulin delivery device (for example, InnoLet®, FlexPen®, Solostar®, FlexTouch® and KwikPen®).
- The medication order is to specify the time of dose clearly in relation to food or blood glucose level. For example, 5 units in the morning before or with meals.
- For paper-based prescribing specifically:
    - 'units' is to be written in full if not pre-printed on the prescription. Abbreviations such as 'u' or 'U' must NOT be used
    - prescribers must be contacted if the dose is not clearly written and the order amended prior to administration
    - trailing zeros are not to be used.
- Seek advice from the diabetes management team prior to switching patients from high concentration insulin to standard insulin products. These products are not directly interchangeable.
- Tall Man lettering for specified insulin products are to be used in electronic Medication Management (eMM) systems, automated dispensing cabinets and robotics and printed labels for insulin products. Refer to the most up-to-date Australian Commission on Safety and Quality in Health Care National Tall Man Lettering List.

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- High concentration insulin products are to be clearly distinguishable from other insulin products and appear consistently across eMM systems.
- Where supplemental insulin is prescribed, the intervals for administration are to be specified. For example, with meals only (unless nil by mouth). Additionally, the dose is to be specified in relation to the blood glucose level range.

Storage and supply

- Store all unopened insulin products in a medication fridge that is appropriately temperature monitored.
- All insulin for subcutaneous injection is to be administered via a pen/prefilled device. Insulin cartridges and vials are only to be used:
    - for the preparation of IV insulin infusions
    - where a suitable prefilled device is unavailable for the required insulin type (use a cartridge loaded into a reusable pen device in this instance)
    - to load subcutaneous insulin pumps (performed by patient only). If the patient is unable to reload their insulin pump, the diabetes management team is to be notified
    - prepare bolus doses for the correction of severe hyperkalaemia in accordance with local protocols.
- Pens, cartridges and InnoLet® devices are for single patient use only. Label with patients' details and expiry date.
- Once opened or removed from refrigerated storage, all insulin products are to be labelled with the patient's name, MRN and date of opening/removal from refrigeration and stored in a locked patient-specific cabinet or drawer. Opened insulin products are not to be placed back into refrigerated storage.
- In-use insulin delivery devices and cartridges may be kept at room temperature for 21 to 28 days in accordance with the relevant Product Information.
- At the end of the patient care episode, used insulin products are to be discarded using safe sharps disposal practices or supplied to the patient (with appropriate labelling on the product) upon discharge where appropriate.
- Do not expose insulin products to direct sunlight or extremes of temperature.
- Different insulin products are to be stored separately and be clearly identified to avoid selection error. Do not store together.
- Dispensing labels are to be affixed to the body of the insulin delivery device (not to the removable cap).

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- Hospital supply of high-concentration insulin products must only occur through individual patient dispensing. High-concentration insulin products are not to be held as ward stock.
- Warning labels are to be affixed on high concentration insulin product packaging, dispensing labels and shelving areas to alert clinicians to their high concentration.

Administration

- Unclear medication orders are not to be used for administration. The order must be ceased and re-prescribed correctly and clearly.
- Blood glucose monitoring, medical care interventions and meal delivery are to be coordinated to ensure insulin administration is within the ideal timeframe.
- Clinicians are not to withdraw insulin from an insulin delivery device using a needle and syringe. This may cause device malfunction, dosing error and insulin contamination.
- All insulin preparations are for single patient use only.
- Cloudy insulins are to be gently re-suspended by gently rolling between palms or gently inverting the product to prevent incorrect proportions of insulin being administered.
- Clear insulins are to be checked for sediments and impurities prior to administration.
- All clinicians are to use a safety needle when administering insulin with an insulin delivery device to reduce risk of sharp's injury. Refer to CEC factsheet Safe Administration of Medication Pen Devices – Information for Health Care Providers.
- When an insulin dose is being administered using an insulin pen device the device is to be primed, by expelling 2 units of insulin (repeat until insulin is visibly expelled from the needle) prior to dialling up the required insulin dose, to ensure an accurate dose is delivered.
- An independent second person check is to be employed when administering insulin. The second person check processes are outlined in the NSW Health Policy Directive *Medication Handling* (PD2022_032) including circumstances where a second person check is not mandated (for example, when a medicine is administered by an authorised prescriber).
- Patients who normally self-administer their insulin using disposable insulin injector pens may continue to do so under supervision in accordance with the NSW Health Policy Directive *Medication Handling* (PD2022_032) and must contain explicit instruction by the prescriber that the medication is for self-administration. For self-administered doses, second person checks are to occur in accordance with local policies or procedures.
- Patients prescribed high concentration insulin are to self-administer their insulin under supervision (where possible), to reduce the risk of administering the wrong dose.
- Where an insulin dose cannot be administered as ordered, the authorised prescriber is to be notified, and appropriate documentation made in the patient's clinical record. For example, the

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patient refuses their insulin dose or the patient has not eaten and the insulin order specifies to be given with a meal.

- Safe sharps disposal practices are to be followed after each administration of an insulin dose.
- Clinicians are not to attempt to remove a standard needle from a patient's insulin delivery device. If the patient is unable to remove the needle, the entire device including the needle tip is to be discarded in a sharps disposal unit.

Medication review

- Where possible, all patients receiving insulin are to have a medication review within 24 hours of admission (if continuation of existing therapy) or within 24 hours of initiation (if commenced as a new medication).

Patient information/education

- Patients commencing insulin or changing their insulin type or delivery device are to receive appropriate and timely education, ideally by the diabetes management team.
- Patients and/or carers are to be provided with:
    - relevant education and written information regarding insulin with particular attention to adverse events (including recognition of hypoglycaemia and hyperglycaemia) and how they are to be managed
    - individual written information on their dosage regimen that specifies the patient's dose and frequency for taking their insulin
    - advice on safe storage and disposal of insulin products and associated consumables.
- Professional Health Care Interpreters are to be utilised for patients and/or carers who are not fluent in English or who have hearing or visual impairments.

Staff education

- Local protocols are to address any specific training, qualifications, skills or competencies required to prescribe or administer insulin.
- Clinicians (where relevant to their scope of practice) are to receive education on the safe use of insulin. The Health Education and Training Institute eLearning module 'Safe Use of Insulin: Challenge' (Course code: 417133532) and Learning Pathway 'Inpatient Management of Diabetes Mellitus' as well as the 'Thinksulin' clinical decision support application are available for this purpose.

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