ST VINCENT'S HOSPITAL SYDNEY
A FACILITY OF ST VINCENT'S HEALTH AUSTRALIA

Policies & Protocols

Inpatient Subcutaneous Insulin Pump Protocol

Procedure:

Objective:

To ensure that patients, whose diabetes is treated via a subcutaneous insulin pump ('pump'), are safely managed during their hospital presentation/admission.

Principles of Action:

1. Identify on admission all patients treated with a pump and document use in the Healthcare Record.
2. Consult Endocrine team early when a patient with a pump is admitted (including presentations to ED) page 6810 or after hours on-call via switchboard.
3. Continue diabetes treatment using the insulin pump unless a reason for discontinuation is identified (see **Process** below).
4. NEVER remove the pump (DKA likely to develop within 2-hours) until an alternative insulin regimen has been recommended by Endocrine.
5. Recognise that pumps are patient-operated devices and staff not trained in pump use should never attempt to operate functions or change settings.
6. Document all pump settings on the *Subcutaneous Insulin Pump Settings Chart – P438.5*. Seek assistance from Endocrine or Diabetes CNC (page 6157).
7. Prescribe:
   - Insulin type used in the pump on the *NSW Health Adult Subcutaneous Insulin Prescribing Chart SMR130035* and write 'insulin pump' below prescription.
   - In Medchart 'Insulin subcutaneous infusion pump – Novorapid (or Humalog) PATIENT CONTROLLED'.
8. Test BGLs and BKLs according to the 'SVH Blood Glucose and Blood Ketone Monitoring Protocol'.
9. Document all BGLs & BKLs, along with patient reported carbohydrate consumed, food bolus doses and correction bolus doses on the *Subcutaneous Insulin Pump Record Chart – P438.6*.
10. Exposure to X-Ray, CT scan, MRI must be avoided to prevent potential pump malfunction.
11. Alteration of pump settings are made by the patient as directed by the Endocrinologist.

Definitions:

Blood Glucose Level (BGL)	Measure of glucose in the blood in mmol/L.
	Measurement and documentation of the blood glucose

Blood Glucose Monitoring (BGM)	level (BGL) using a capillary (finger-prick) blood sample and point of care (bedside) blood glucose meter.
Blood Ketone Level (BKL)	Measure of beta-hydroxybutyrate (ketone) in the blood in mmol/L.
Diabetes Ketoacidosis (DKA)	Medical emergency most common in type 1 diabetes, characterised by hyperglycaemia, ketosis and metabolic acidosis.
Correction bolus dose	Insulin dose administered by the patient using the pump when hyperglycaemic.
Food bolus dose	Insulin dose administered by the patient using the pump when consuming food or drink containing carbohydrate.
Hyperosmolar Hyperglycaemic State (HHS)	Severe hyperglycaemia (usually >33.0mmol/L) (without elevated ketones) resulting in a raised blood osmolality and dehydration, sufficient to impair consciousness.
Hyperglycaemia	Blood glucose level more than 10mmol/L for 24 hours or more.
Hypoglycaemia	Blood glucose level less than 4mmol/L with or without symptoms.
Pump	See 'subcutaneous insulin pump'.
Subcutaneous Insulin Pump	A patient-held subcutaneous insulin delivery device that administers rapid-acting insulin only, in two ways: 1. Bolus doses - delivered to cover carbohydrate consumed or to correct a high BGL 2. Basal doses - delivered continuously using adjustable rates to cover basal insulin requirements
Type 1 diabetes	Autoimmune condition where the pancreas can no longer produce any insulin due to beta cell destruction (insulin deficient).

Roles and Responsibilities:

Medical Officers are responsible for:

- Referring all patients with an insulin pump to Endocrine and Diabetes CNC.
- Assessing suitability for continued use of the insulin pump whilst in hospital.
- Prescribing insulin:
  - As outlined under 'Principles of Action' within this protocol and
  - In accordance with the Medication Handling in NSW Public Health Facilities Policy and the High-Risk Medicines Management Policy – NSW Health Policy Directives[3,4].
- Documenting all pump settings and any adjustment to settings on the *Subcutaneous Insulin Pump Settings Chart – P438.5*
- Ensuring all patients who are at risk of hypoglycaemia **AND** are unable to eat or drink normally have a patent wide-bore intravenous cannula in situ.
- Ensuring blood ketone levels are ordered from pathology as per the SVH Blood Glucose and Blood Ketone Monitoring Procedure.

Registered & Enrolled Nurses are responsible for:

- Monitoring patients' BGLs according to SVH Blood Glucose and Blood Ketone

Monitoring Procedure.
- Documenting all BGLs & BKLs, along with patient reported carbohydrate consumed, food bolus doses and correction bolus doses on the *Subcutaneous Insulin Pump Record Chart – P438.6*

All clinical staff are responsible for:

- Ensuring insulin pumps are not exposed to plain X-Ray, CTscan or MRI.
- Treating hypoglycaemia according to SVH Hypoglycaemia Management Protocol.
- Alerting clinicians during clinical handover, that the patient is treated with insulin (a high-risk medicine)[3].
- Reporting insulin incidents, including near-miss incidents, and probable adverse events associated with insulin use, using the facilities' incident management system – Riskman.

Nurse Unit Managers are responsible for ensuring:

- Safe storage of insulin in the ward/clinical department according to Medication Handling in NSW Public Health Facilities – NSW Health Policy Directive and the SVH Hyperglycaemia & Insulin Management Protocol .
- Nurse participation in education and training relating to care of patients with subcutaneous insulin pumps.

Diabetes Educators are responsible for:

- Assisting in the assessment of patient suitability to continue pump treatment whilst in hospital.
- Ensuring patients receive appropriate diabetes education and training as required during the admission.
- Contacting the pump manufacturer's 24 hour help line if there are concerns regarding the technical functioning of the pump.

The patient is responsible for[6]:

- Daily operation of the pump (administering food bolus and correction bolus doses according to pump settings).
- Reporting to nursing staff all carbohydrate consumed, food bolus doses and correction bolus doses administered.
- Ensuring adequate supply of pump consumables whilst in hospital in order to perform a cannula site change every 3-days.
- Reporting any episodes of hypoglycaemia to nursing staff.

Process:

On presentation/admission

The treating MO will:

1. Identify diabetes patients treated with subcutaneous insulin pumps and clearly document this in the Healthcare Record.
2. Exclude DKA on presentation.
3. Consult Endocrine upon presentation/admission via page 6810 or after hours on-call via switchboard.

4. Continue diabetes treatment using the insulin pump unless a reason for discontinuation is identified (see below)

Contraindications for continuing insulin pump use in hospital[5,6]

- Patient has an altered state of consciousness
- Patient requires treatment for DKA or HHS
- Patient is critically ill or has a major psychiatric condition and is unable to operate pump
- Patient is unwilling/ unable to participate in own care for any reason during the admission
- Patient requires extended radiology procedures (> 2 hours)
- Patient has no access to spare infusion sets, batteries and other essential equipment to use the pump.
- Any other circumstances identified by the treating team/ endocrine team.
- Suspicion of pump or cannula malfunction and/or user error.
- Presence of air or blood in pump cannula tubing.

5. Ensure an alternative insulin regimen is prescribed and administered (after consultation with Endocrine) **before** a pump is suspended or removed.

DKA develops rapidly (2-hours) if pump is suspended without administration of alternative insulin (e.g. subcutaneous injection, IV insulin infusion).

5. Document all pump settings on the *Subcutaneous Insulin Pump Settings Chart – P438.5*. Seek assistance from Endocrine or Diabetes CNC (page 6157). See **Documentation** below.
6. Prescribe:
   - Insulin type used in the pump on the *NSW Health Adult Subcutaneous Insulin Prescribing Chart SMR130035* and write 'insulin pump' below prescription.
   - In Medchart 'Insulin subcutaneous infusion pump – Novorapid (or Humalog) PATIENT CONTROLLED'.

The Nurse will:

1. Test BGL on admission and if >14mmol/L will:
   - Perform a capillary blood ketone test and inform MO of the result (ED only) OR
   - Inform treating team who must organise a formal blood ketone test via pathology.
2. If a pump needs to be discontinued for any reason it must be treated as a patient valuable (retail value $10,000) and stored according to SVH Patient Personal Belongings and Valuables Policy.

Ongoing treatment and care:

1. Perform ongoing BGLs and BKLs (where applicable) according to the SVH Blood Glucose and Blood Ketone Monitoring Procedure.
2. Document all BGLs & BKLs, along with patient reported carbohydrate consumed, food bolus doses and correction bolus doses on the *Subcutaneous Insulin Pump Record Chart – P438.6*
3. *Ensure that the patient is referred to the Diabetes CNC (page 6157 or via web*

Delacy) and where applicable to the dietitian (via web Delacy).

Radiology Procedures

1. Insulin pumps must not be exposed to plain X-Ray, CTscan or MRI.
    - The pump must be suspended and disconnected by the patient and must be stored in a secure location OUTSIDE of the procedure room or theatre when radiological procedures are being performed.
    - Suspension for > 2 hours risks development of DKA and must be avoided.
    - If a pump is inadvertently exposed to a radiological procedure Endocrine and the Diabetes CNC must be notified immediately.
2. Test BGL upon recommencement of the pump and if required the patient may administer a correction bolus dose of insulin.
3. Patients requiring regular disconnection from their pump should be considered for basal/bolus subcutaneous insulin injections (consult Endocrine).

Perioperative Management[6]

1. It can be advantageous in certain circumstances to continue insulin pump treatment during perioperative care. In order to do so the following must apply:
    - The peri-operative period is expected to be short in duration (< 4 hours)
    - Patient must agree to continue the insulin pump
    - Endocrinologist must agree to continue the insulin pump
    - Anaesthetist must agree to continue insulin pump
    - Anaesthetist must have access to the insulin pump during surgery to disconnect it if deemed necessary (hyper or hypoglycaemia or exposure to radiation) and an intravenous insulin infusion and/ or IV glucose should be commenced.
    - Intravenous insulin infusion should not be run at the same time as the insulin pump.
    - Pump cannula site must be placed away from the operation site.
    - Ensure the pump cannula is plastic not metal (if procedure requires diathermy).
    - All perioperative staff are made aware that the patient is using an insulin pump.
    - BGL is monitored hourly until the patient is capable of managing their pump postoperatively.
2. Discontinue the insulin pump if a prolonged perioperative period is expected (>4 hours) as it is probable that insulin rates will require adjustment. Commence IV insulin infusion.

Disposal of Waste/Equipment:

- As per SVH Waste Management and Infection Control Policies and Procedures:
    - Dispose of any sharps in approved sharps containers.
    - Dispose of insulin vials in approved sharps containers when empty or the patient has been discharged.

Post Procedure Patient Management:

- All patients receiving subcutaneous insulin require blood glucose monitoring (as per SVH Blood Glucose and Blood Ketone Monitoring Procedure):
  - At minimum qid
  - If fasting for a procedure, at minimum 2-hourly and if BGL falls below 6 mmol/L at minimum 1-hourly (NB excludes overnight).
- Blood glucose levels are reported to the Endocrine or the treating team (as per SVH Blood Glucose and Blood Ketone Monitoring Procedure).
- Blood glucose response should be reviewed by the prescriber or the treating team, at minimum, once daily.
- All patients who develop hypoglycaemia are managed according to SVH Hypoglycaemia Management Protocol.
- The insulin pump is not suspended for periods > 2hours unless an alternative subcutaneous or intravenous insulin regimen has been commenced.

Documentation:

- All insulin is prescribed on the NSW Health Adult Subcutaneous Insulin Prescribing Chart SMR130035 and in Medchart (see Principles of Action).
- Insulin pump settings are documented on the *Subcutaneous Insulin Pump Settings Chart – P438.5* and must include:
  - Pump make/model
  - Insulin type used within pump
  - All insulin to carbohydrate ratio settings
  - All insulin sensitivity factor settings
  - All BGL target settings
  - All basal rate settings
  - All temporary basal rate settings in use
  - Date of last infusion set change
- All patient management of hyperglycaemia is documented in the patient's healthcare record.
- All patient management of hypoglycaemia is documented in the patient's healthcare record and on the NSW Health Adult Subcutaneous Insulin Prescribing Chart under Hypoglycaemia Treatment Record SMR130035.

Compliance:

- Reported Riskman incidents relating to insulin prescription and/or administration will be reviewed quarterly at the Endocrine Morbidity and Mortality meeting.
- Practice compliance will be monitored using:
- Subcutaneous Insulin Pump Bundle Audit - annually (in development)

Risk Rating: Medium

Standard:

NSQHS Standard 4 - Medication Safety

References:

1. Australian Diabetes Society, 2012. Guidelines for Routine Glucose Control in Hospital, accessed 11 September 2015, http://diabetessociety.com.au/documents/ADSGuidelinesforRoutineGlucoseControlinHospitalFinal2012.pdf.

2. National Health Service (NHS). Self-management of diabetes in hospital. Joint British Diabetes Societies for Inpatient Care Group. March 2012. Retrieved 23 February 2016 http://www.diabetologists-abcd.org.uk/JBDS/JBDS_IP_SelfManagement.pdf
3. NSW Health, 2015. Policy Directive: High Risk Medicines Management Policy, accessed 23 February 2016 http://www0.health.nsw.gov.au/policies/pd/2015/pdf/PD2015_029.pdf
4. NSW Health, 2013. Policy Directive: Medication Handling in NSW Public Health Facilities, accessed 23 February 2016, http://www0.health.nsw.gov.au/policies/pd/2013/pdf/PD2013_043.pdf
5. Use of Continuous Subcutaneous Insulin Infusion (Insulin Pump) Therapy in the Hospital Setting: Proposed Guidelines and Outcome Measures. Curtiss B. Cook, Mary E. Boyle, Nancy S. Cisar, Victoria Miller-Cage, Peggy Bourgeois, Lori R. Roust, Steven A. Smith andRichard S. Zimmerman *The Diabetes Educator* 2005 31: 849
6. Queensland Health. Inpatient Guidelines: Insulin Infusion Pump Management. Developed by the Statewide Diabetes Clinical Network Steering Committee July 2012. Accessed 9 July 2016 https://www.health.qld.gov.au/caru/networks/docs/sdcn-insulin-guide.pdf

Related NSW Health Policies & Procedures

- Medication Handling in NSW Public Health Facilities Policy
- High-Risk Medicines Management Policy

Risk Rating:

Not set

Focus Area(s):

- Medicines & Other Therapeutics
- Patient Care - Assesment/Management

Linked PP:

- Blood Glucose and Blood Ketone Monitoring Protocol
- High Risk Medicines Management Policy
- Hypoglycaemia Management Protocol
- Incident Management Policy
- Inpatient Diabetes Model of Care Policy
- Medication Administration Protocol
- Procedure for Management of Diabetic Ketoacidosis (DKA) and Hyperosmolar Hyperglycaemic State (HHS) Protocol
- SVH Medicines - Ordering, Supply and Storage of Medicines Protocol
- Waste Management Policy

Departments:

- Clinical Organisation Wide

Revision History:

Date Issued:	27/7/2016
Date of Last Review:	22/9/2016
Date of Next Review:	27/7/2019
Committee(s):	SVHN Patient Safety & Quality Committee
Approved By:	Chief Executive
Identifier:	9886

Suggest change (0 changes already suggested)

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