All patients with diabetes undergoing procedures or surgery, or who are nil by mouth, should have their glycaemic control managed according to the variable rate intravenous insulin infusion (vriii) protocol attached to the patient’s prescription chart.

Patients with diabetes should ensure that they maintain good glycaemic control (HbA1c < 8.5%) in the months and weeks prior to surgery, as this improves the healing process post-operatively. Patients with diabetes in the peri-operative period and nil by mouth, should be managed according to the following protocol. (For diabetic ketoacidosis, see section on DKA).

Pre-operative assessment
- Patients with type-2 diabetes managed with diet alone, need no intervention prior to surgery.
- For procedures that involve giving intravenous radio-contrast, discontinue metformin 48hrs prior to the procedure. Otherwise, continue metformin in patients pre-operatively.

Before surgery
- To ensure that blood glucose is controlled within normal limits before surgery (target range: 5-10mmol/L), a random blood glucose should be obtained soon after the patient is admitted. If it is not in the target range, advice should be sought from the diabetic team, the anaesthetic team or both.
- An intravenous cannula should be inserted the evening before surgery.
- Patients should receive their usual doses of oral anti-diabetic and/or insulin (except for long-acting) on the day prior to surgery, including evening doses. For long-acting insulins, normal evening doses should be halved and given with their evening meal.
- From 6am on the morning of surgery, maintain glycaemic control by starting a glucose/potassium/insulin (GKI) regimen, using the following infusions:
  (i) 500ml 5% dextrose plus 0.45% NaCl with 0.15% KCl (premixed bag at 85 ml/ hr.) (If the patient has renal impairment, omit the potassium); and
  (ii) Soluble insulin (Human Actrapid) 50 units in 50ml 0.9% sodium chloride at the rate shown in the Perioperative Management table below.

These infusions should run simultaneously and through the same cannula.
- Bedside blood glucose measurements must be taken hourly from 6am and used to guide and adjust the rate of insulin infusion according to the table below.

Patients with type-1 diabetes should not be left without any intravenous insulin running. If blood sugar is <4mmol/L, give Glucose 10% at 100ml/hr; if no increase after 30mins give glucose 20% 100mls as a bolus and repeat blood glucose after 15mins. Continue insulin infusion at 0.5 units per hour.

<table>
<thead>
<tr>
<th>Blood Glucose (mmol/l)</th>
<th>Rate of insulin infusion (units/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3.9 – 4</td>
<td>0.5</td>
</tr>
<tr>
<td>4 – 6.9</td>
<td>1.0</td>
</tr>
<tr>
<td>7 – 9.9</td>
<td>2.0</td>
</tr>
<tr>
<td>10 – 14.9</td>
<td>3.0</td>
</tr>
<tr>
<td>15 – 19.9</td>
<td>4.0</td>
</tr>
<tr>
<td>20</td>
<td>5 and call doctor</td>
</tr>
</tbody>
</table>

- If glucose is temporarily stopped, eg. on route to theatre, insulin must also be stopped temporarily.
Never administer sodium chloride 0.9% as the sole intravenous fluid to a patient receiving insulin. If a patient is fasting for several days and there is concern regarding hyponatraemia, consult the anaesthetist.

Diabetic patients should be first on the theatre list where possible, to minimise duration of starvation.

**Treatment of hypoglycaemia for patients on a perioperative diabetic regimen**

- If blood glucose is <4mmol/l, give Glucose 10% at 100mls/hr; if no increase after 30mins give glucose 20% 100mls as a bolus and repeat blood glucose after 15mins. Inform the doctor at once.
- Do not administer oral hypoglycaemics on the day of surgery. A patient on the afternoon list must still be stabilised on intravenous glucose, insulin and potassium.

**Post-operative management**

- Blood glucose measurements should be taken hourly until the reading is stable and within normal range. Readings can then be taken 2-hrly. Serum potassium should be measured on alternate glucose samples.
- The first meal following surgery should be eaten while the intravenous insulin infusion and glucose 10% infusion continues, to check that the meal is tolerated. If tolerated, patients on subcutaneous insulin or oral hypoglycaemics can return to their usual regimen.
- **STOP** IV insulin infusion 1hr AFTER the first dose of subcutaneous insulin
- For patients taking metformin who receive contrast media, metformin may be re-started 48 hours after the procedure.

**Perioperative management of diabetes mellitus**

- Establish adequate diabetic control 2-3 days prior to surgery.
- Metformin should be stopped 48 hrs prior to procedure.
- Ensure that operation is first on theatre list.
- On morning of surgery, omit usual insulin or oral hypoglycaemic; check blood

<table>
<thead>
<tr>
<th>Type 1 Diabetes</th>
<th>Type 2 Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insulin treated</strong></td>
<td><strong>On oral agents</strong></td>
</tr>
<tr>
<td>Major surgery</td>
<td>Minor surgery</td>
</tr>
<tr>
<td>(no oral hypoglycaemics on day of surgery)</td>
<td></td>
</tr>
<tr>
<td>Observe blood glucose if BM not within target range, call anaesthetist</td>
<td></td>
</tr>
</tbody>
</table>

- At 06:00 establish intravenous insulin infusion (50 units soluble insulin Human Actrapid in 50ml 0.9% sodium chloride) and 500ml of 5% glucose +0.45%NaCl infusion + 10mmol/l potassium (depending on renal function) at 85ml/hr
- Check blood glucose hourly; adjust insulin rate according to variable prescription
- Aim to maintain blood glucose in the range 5-10mmol/L
- Seek advice for patients who are fluid restricted; or who