

# DIABETIC CHILDREN: SURGERY AND FASTING - SCH

## PRACTICE GUIDELINE<sup>®</sup>

### DOCUMENT SUMMARY/KEY POINTS

- Schedule the procedure to be first on the list in the morning.
- Admit to hospital on the preceding afternoon.
- Some insulin is needed, even when fasting, to avoid ketoacidosis.
- Intravenous glucose may be needed when fasting to avoid hypoglycaemia.

### CHANGE SUMMARY

- Due for mandatory review. Document custodian confirmed no changes are necessary.

### READ ACKNOWLEDGEMENT

- All Clinical nurses and medical officers must read and acknowledge they understand the contents of this document.
- Mandatory annual BLS accreditation must be maintained.
- Line managers are to maintain records of staff read acknowledgements for quality review and compliance audit processes.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	Director, Clinical Governance	
<b>Date Effective:</b>	1 <sup>st</sup> April 2017	<b>Review Period:</b>
<b>Team Leader:</b>	Head of Department	<b>Area/Dept:</b> SCH Endocrinology

## 1 Principles

1. Schedule the procedure to be first on the list in the morning.
2. Admit to hospital on the preceding afternoon.
3. Some insulin is needed, even when fasting, to avoid ketoacidosis.
4. Intravenous glucose may be needed when fasting to avoid hypoglycaemia.

## 2 Before booking the procedure

5. Review diabetes control. If diabetes control is poor (HbA1c > 9.5%), review diabetes management and compliance. Defer elective procedures until control improved. Admit to hospital for stabilisation over the course of a week if necessary.
6. Schedule the procedure to be first on the morning list.
7. In consultation with the endocrine team, decide which of the following plans should be used:
  - A. IV insulin infusion,
  - B. modified insulin injections (for short procedures only), or
  - C. for pump patients, continuation of insulin pump (continuous subcutaneous insulin infusion)

### A. Standard Protocol with IV Insulin Infusion

1. Admit to hospital on the afternoon prior to the planned procedure.
  - i. Review blood glucose log-book and last HbA1c.
  - ii. Check U/A for ketones and finger-prick blood glucose level.
  - iii. Give the usual dose of short-acting insulin (Humalog, NovoRapid, Actrapid, or Humulin R), but only 2/3 of the usual intermediate acting insulin (Levemir, Protaphane, or Humulin NPH) on the evening before the procedure. This will avoid hypoglycaemia overnight while fasting. If the patient is on Lantus, which has 24-hour action, consult the endocrine team in advance about changing this to Levemir for the day before surgery.
  - iv. Insert IV cannula, cap and flush.
  - v. Perform finger-prick blood glucose monitoring before meals, snacks and at midnight, 3am and 6am.
  - vi. If hypoglycaemia (BG <4mmol/L) occurs while fasting, give 2mL/kg of 10% dextrose as bolus and start maintenance IV fluids N/2 saline + 5% dextrose.
2. Start maintenance IV fluid and insulin infusion at 6am.

- i. Give maintenance IV fluids as N/2 saline + 5% dextrose. If needed for longer than 12 hours add maintenance KCl. If IV fluids are needed for longer than 24 hours collect electrolytes.
- ii. Run insulin infusion initially at 0.02 units/kg/hr using a 50mL syringe pump
- iii. Have a bag of 10% dextrose available (needed to treat hypoglycaemia)

**Preparation of Insulin Infusion:**

- Use regular insulin, either Actrapid (Novo Nordisk) or Humulin R (Eli Lilly).
- Draw up the insulin in an insulin syringe (calibrated in units) and add to normal saline to give final volume of 50mL in a 50mL syringe.
- If an insulin syringe is not available, note that all insulins are available in a uniform concentration of 100Units per mL. (e.g. 32Units equates to 0.32mL)
- Add the same number of units of insulin as the patient's weight in kg (e.g. if the patient weighs 32kg add 32Units of insulin). **Running the infusion at 1mL/hr will then deliver 0.02Units/kg/hr.**
- Prime the connecting tubing by running some of the infusion into a kidney dish.

**Important:** Ensure that the insulin and dextrose-containing infusions are going through the **same cannula (or central catheter)** to avoid any interruption to dextrose while insulin is still running. (Note that insulin is compatible with TPN)

3. Check blood glucose level by finger-prick hourly while insulin infusion running.
4. Aim to maintain blood glucose level between 6 and 12mmol/L by varying the insulin infusion rate each hour according to blood glucose level (see table below as a guide). Contact the Endocrine team for advice if unsure.

If Blood Glucose is:	Then, make the following change to insulin infusion rate:
> 12mmol/L	Increase insulin infusion by an increment of 0.1 mL/hr. With the next BGL, one hour later: <ul style="list-style-type: none"> <li>• if BGL still &gt;12mmol/L but is coming down, do not make a second increase (i.e. leave insulin infusion at the same increased rate)</li> <li>• if BGL is still &gt;12mmol/L and is stable or increasing, make another increase of 0.1 mL/hr</li> <li>• if BGL is between 7 and 12mmol/L next hour, leave insulin infusion at the same increased rate.</li> </ul>
7.1 - 12mmol/L	Leave insulin infusion unchanged
5.1 - 7mmol/L	Decrease by an increment of 0.1mL/hr
4 - 5mmol/L	Decrease by an increment of 0.1mL/hr and double the rate of the maintenance dextrose for 1 hour
<4mmol/L	Cease the insulin infusion for 30 minutes and double the rate of the maintenance dextrose for 1 hour. Check the BGL again in 30 minutes. When BGL >5mmol/L, restart the insulin infusion (but decrease the rate by an increment of 0.2mL/hr).

***N.B. Treatment for severe hypoglycaemia (BGL <2.5mmol/L):*** IV 10% dextrose 2mL/kg as a push dose. If IV access is unavailable and the child is conscious, abandon the fast and give a sweet drink. If the child is too drowsy to drink and there is no IV access, give glucagon 1 ampoule (1mg or 1unit) s/c or IM. Chart 10% dextrose bolus and glucagon PRN when setting up the insulin infusion.

5. Continue the insulin infusion until tolerating oral intake of solid food, at which point:
  - i. If due for a subcutaneous insulin injection, give usual dose pre-meal and then stop the insulin infusion and IV dextrose.
  - ii. If not due for an insulin injection, give short acting insulin with meal (dose to be determined by Endocrine team) and stop insulin infusion and IV dextrose.

## **B. Protocol: Modified Insulin Injections for Very Short Procedures Only**

For very short procedures (*under 30 minutes*) where rapid recovery is anticipated:

1. Schedule procedure for 8am.
2. Admit to hospital on the preceding afternoon, site IV line & give reduced evening insulin etc, as above (see section 1 under Standard Protocol above).
3. Start maintenance IV fluids as N/2 + 5% dextrose at 6am if BG <10mmol/L.
4. Delay normal insulin injection and breakfast until after the procedure (provided that food is tolerated before 10am).
5. Monitor blood glucose level by fingerprick hourly.
6. If there is any delay in the operating theatre or in establishing oral intake following the procedure, notify the endocrine team and start insulin infusion/ IV dextrose as above.

## **C. Protocol with Continuation of Insulin Pump Therapy**

### **(for pump patients only)**

- Insulin pumps cannot be worn for procedures that require exposure to magnetic fields (MRI) or radiation
- Patient should change the infusion set on the morning of the day before surgery (to give time for blood glucose monitoring during that day to check that the new set is working well).
- Admit to hospital on the preceding afternoon. Notify the anaesthetic team of plan to manage patient during the procedure using insulin pump.
- IV cannula insertion, blood glucose monitoring overnight and treatment of any hypoglycaemia while fasting as per section 1 under the Standard Protocol above.
- When fasting starts, continue insulin administration using the patient's usual basal rates (already programmed into the pump)

- Monitor the blood glucose by fingerprick hourly from 6am, including the intra- and post-operative recovery periods, until oral intake is re-established. If BG >15mmol/L contact the endocrine team for advice regarding extra insulin.
- Once the patient is able to eat or drink, discontinue IV fluids and the patient can recommence pre-meal.

**Copyright notice and disclaimer:**

The use of this document outside Sydney Children's Hospitals Network (SCHN), or its reproduction in whole or in part, is subject to acknowledgement that it is the property of SCHN. SCHN has done everything practicable to make this document accurate, up-to-date and in accordance with accepted legislation and standards at the date of publication. SCHN is not responsible for consequences arising from the use of this document outside SCHN. A current version of this document is only available electronically from the Hospitals. If this document is printed, it is only valid to the date of printing.