

# DIABETES – TYPE 1

## Management of Intrapartum and Postpartum

Weight (kg)
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### 1. ALLERGIES: SEE ALLERGY /ADR RECORD

### A. INTRAPARTUM MANAGEMENT

#### 2. ADMISSION INSTRUCTIONS

- DO NOT USE THIS PPO FOR GESTATIONAL OR PREGESTATIONAL TYPE 2 DIABETES (Use PPO #829385)
- Obtain Diabetes Education Centre report & plan for delivery, from antenatal file or Meditech patient care /reports online

#### 3. CONSULTS

- MRP \_\_\_\_\_
- Consult Obstetrician
- Notify physician managing diabetes: Dr. \_\_\_\_\_
- If no in-hospital expertise available, consider paging endocrinologist on call at BCW&C hospital 1-604-875-2161

#### 4. DIET: NPO Clear Fluids Diabetic Diet

#### 5. MONITORING

**Target Capillary Blood Glucose (CBG) = 4 to 7 mmol/L\***

*\*Correction of blood glucose may occur below 7 mmol/L due to delayed response to insulin (see section 7)*

- Measure CBG on admission and every 2 hours
- Measure CBG hourly if: in active labour; on insulin pump; on IV insulin; urine ketones greater than 2+ (small)
- Nurse to use Accu-Chek® Inform II meter to measure CBG. If patient self-monitoring, nurse to do supplemental CBG checks using IH Accu-Chek® Inform II meter QID (before meals and at bedtime). (see reverse)
- Record CBG levels on BC Perinatal Triage & Assessment Record or on BC Labour Partogram

**Urine Ketones** (refer to Seimen's Multistix ketone scale on reverse)

- Measure urine ketones every 2 hours or with each void and document as indicated above

#### 6. LABORATORY

- Patient to use personal blood glucose meter to self monitor blood glucose (see explanation on reverse)
  - Patient blood glucose meter check (GLUMCHEK)  
(Patient meter must be within 20% of lab value or patient monitor cannot be used in hospital)
- Lytes4 (Na, K, CL, CO<sub>2</sub>, Anion Gap) if urine ketones remain greater than 2 + (small) after 2 hours

\_\_\_\_\_

\_\_\_\_\_

#### 7. INTRAVENOUS THERAPY AND HYDRATION

- Initiate IV 0.9 % sodium chloride as primary line at \_\_\_\_\_ mL/H via infusion pump

**If patient is NPO, vomiting, or urine ketones greater than 2+ (small):**

- Add additional IV line of D10W at 50 mL/H attached to primary line at lower port and infuse via infusion pump
- Titrate 0.9% sodium chloride to 100 mL/H for total IV rate of 150 mL/H
- Advise patient of dextrose content change of IV solution if self-adjusting with insulin pump

**If urine ketones remain greater than 2+ (small) after 2 hours:**

- Increase D10W infusion to 100 mL/H
- Titrate 0.9% sodium chloride to 50 mL/H for total IV rate of 150 mL/H
- Resume D10W at 50 mL/H when urine ketones are equal to or less than 2+

Date (dd/mm/yyyy)	Time	Prescriber's Signature	Printed Name or College ID#
/ /			

## GUIDELINES FOR DECISION MAKING

### Identify Type of Diabetes

- Pre-gestational is diabetes that has onset prior to pregnancy (Type 1 or Type 2). Pre-gestational diabetes (Type 1) is ketotic prone and always requires insulin. Patient may self-identify type of diabetes or this may be found on last visit to Diabetes Education Centre (refer to Meditech Patient Care/Reports). Between 34 to 36 weeks, if the patient has attended the Diabetes Education Centre, there should be a plan for labour & delivery found in the Meditech Patient Care or Reports menu.

### Consults for glucose control

- Management of Type 1 diabetes during labour can be complex. If patient has pre-gestational Type 1 diabetes, and no in hospital specialist is available a consult may be obtained from BCW&C endocrinologist on call 24 hours/day (1-604-875-2161). Obstetricians should always be consulted for Type 1 diabetes care.

### Diet

- Clear fluids are not contraindicated unless maternal or fetal concerns. Women on insulin pumps may take juice every hour to avoid hypoglycemia and ketone production. If concerns identified notify Anesthetist or Obstetrician prior to initiating oral fluids. Hypoglycemia may be treated with juice if not NPO.

### Blood glucose levels

- Blood glucose level between 4 to 7 mmol/L are the ideal targets during labour; these levels are associated with less neonatal hypoglycemia. In Type 1 diabetes all efforts should be made to keep glucose at this level to avoid any risk of hyperglycemia and risk of diabetic ketoacidosis.
- If the patient wishes to use her own blood glucose meter, the accuracy of her home glucose meter must be checked (prior to being used for monitoring). Order patient blood glucose meter check (GLUMCHEK) from lab. Patient meter must be within 20% of lab value to be used in hospital. The accuracy percent will be printed on the lab report. In addition to the patient self monitoring, the RN is required to do supplemental CBG testing using IH Accu-Chek® Inform II meter to support lab requirements. Recommend typically 4 times within 24 hour period (before meals and at bedtime).

### Urine ketones

- If blood sugars are between 4 to 7 mmol/L, ketones may indicate lack of sufficient calories for the work of labour. If eating, then fluids that contain calories (juice) may be given. If NPO the patient needs IV dextrose. Any ketone readings above small should be treated.

Scale: Seimen's Multistix: (SI Units)	Equivalent to:	Equivalent to:
1+ = 0.5 mmol/L	trace	5 mg/dL
2+ = 1.5 mmol/L	small	15 mg/dL
3+ = 4 mmol/L	moderate	40 mg/dL
4+ = 8 mmol/L	large	80 mg/dL
5+ = 16 mmol/L	greater than large	160 mg/dL

- In Type 1 diabetes, ketones may also indicate ketoacidosis (DKA) or relative lack of insulin. Blood glucose does not have to be elevated for DKA in pregnancy. Patient may have their own ketone meter which can measure blood ketones and is more accurate in detecting DKA, than urine ketones. If concerned regarding DKA, measurement of electrolytes for anion gap or blood gases should be done and IV insulin should always be initiated.

### Intravenous Fluids

- 0.9% sodium chloride is the maintenance fluid of choice for managing diabetes patients.
- If hypotension from regional anesthesia or hemorrhaging is present, the fluid choice may be determined by Anesthesia or Obstetrical services. Blood Glucose may rise due to dehydration.
- IV dextrose may be necessary to prevent ketosis (*see above*).

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### 8. INSULIN

- Discontinue previous subcutaneous insulin orders
- Choose **ONE** of the following 3 options (refer to the antenatal record and/or the Diabetes Education Centre plan for delivery in Meditech Patient Care/Reports):

**Option 1 – Continuous Subcutaneous Insulin Infusion (Insulin Pump)**

- Patient may self adjust insulin with pump once the following is completed:
  - Patient assessment complete. Patient is alert, oriented with no altered state of consciousness or cognitive status, including no medication related impairment, and no other absolute contraindications (*see reverse*).
  - Patient/caregiver Insulin Pump Questionnaire (#826386) and Agreement (#826385) forms are completed
- Patient to check CBG every hour and can record CBG and insulin basal/bolus amounts on Patient Insulin Pump Log (form #826384)
- If patient self-monitoring CBG, nurse to do supplemental CBG checks using IH Accu-Chek® Inform II meter QID (before meals and at bedtime) (*see reverse side of page 1*).
- Nurse to record CBG and insulin basal/bolus amounts hourly on BC Perinatal Triage & Assessment record or BC Labour Partogram
- If CBG is greater than 7 mmol/L on 2 occasions or above 10 mmol/L on any occasion, transfer to IV insulin infusion and notify prescriber (See Option 3)
- If patient becomes unable to self-manage glucose or any absolute contraindications present (*see reverse*), notify prescriber and transfer to IV insulin
- Once IV insulin infusion has started have patient disconnect from insulin pump

**\*\*OR\*\***

**Option 2 – Subcutaneous Sliding Scale Insulin**

- Assess need for basal insulin and if required, write stat dose on separate physician order sheet
- Last dose of basal insulin was: \_\_\_\_\_
- Notify prescriber if CBG is less than 4 mmol/L or greater than 6 mmol/L on 2 consecutive readings
- If CBG has fallen by 2 mmol/L or greater with a sliding scale dose of aspart (Novorapid®), wait an additional hour, recheck CBG, then assess need for subsequent dose (as indicated in the chart below)

Subcutaneous Sliding Scale Insulin Orders	
Capillary Blood Glucose in mmol/L	Units of insulin aspart (NovoRapid®) subcutaneously (SC)
Less than 4	Follow hypoglycemia protocol (IH #829518) and consider IV of D10W at 50 mL/H
4 to 6	none
6.1 to 7	2 units SC
7.1 to 8	3 units SC
8.1 to 9	4 units SC
9.1 to 10	5 units SC
Greater than 10	Call prescriber and consider IV insulin Option 3

**\*\*OR\*\***

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## GUIDELINES FOR DECISION MAKING

**Insulin:** Type 1 diabetes always requires insulin. This may be accomplished in three ways.

### 1. **Continuous Subcutaneous Insulin Infusion (Insulin Pump)**

If patient has managed with an insulin pump during pregnancy, check the instructions from the last Diabetes Education Center visit for a self-management plan during labour and delivery (refer to Meditech Patient Care/ Reports). At the time of presentation, the nurse should refer to the *IH Insulin Pump Self-Management In Emergency and Acute Care Clinical Practice Standard* and, in collaboration with the Primary Care Provider and the patient, the following must be completed:

- a. Ensure there are no contraindications for self management.

<b>Absolute Contraindications to Insulin Pump Self Management by Patient / Caregiver</b>
<ul style="list-style-type: none"><li>• Mental Illness that interferes with ability to self manage diabetes (eg. suicidal)</li><li>• Critical illness (e.g. sepsis, trauma)</li><li>• Persistent unexplained hyperglycemia or inability to achieve blood glucose targets on insulin pump</li><li>• Diabetic Ketoacidosis (DKA)/Hyperglycemic Hyperosmolar Syndrome (HHS)</li><li>• Persistent unexplained hypoglycemia: Two or more blood glucose reading less than 4 mmol/L despite medical consultation and treatment review</li><li>• Refusal to participate in self-care or sign Patient / Caregiver Agreement (#826385)</li><li>• Questionable patient/caregiver self management competency (i.e. inability to complete Patient / Caregiver Questionnaire #826386)</li></ul>



- b. Insulin Pump Self Management in Emergency and Acute Care: Patient / Caregiver (Delegate) Agreement (#826385)

- c. Insulin Pump Self Management in Emergency and Acute Care: Patient / Caregiver Questionnaire (#826386)

The patient should have a delivery plan for adjusting insulin during labour, although insulin requirements often decrease in labour, the requirement depending on how labour progresses, may be unpredictable. If at any time glycemic control is not obtained these patients should be transferred to IV insulin protocol.

### 2. **Subcutaneous Sliding Scale Insulin**

Patients who have managed during pregnancy with subcutaneous insulin may be treated with subcutaneous insulin during labour. Sliding scale subcutaneous rapid insulin (aspart / NovoRapid®) may be used every 2 hours to maintain the capillary blood glucose (CBG) targets. It is critical that patients have their basal insulin at their usual times. Basal could be: glargine (Lantus®) or NPH (Humulin®N) or detemir (Levemir®). A decrease in the basal dose (30 to 50%) in active labour may be appropriate as patients in active labour or post-delivery are more sensitive to insulin. If basal insulin is required, write a STAT order on a regular physician order sheet, not on this PPO. This will not be an ongoing daily dose and should be readjusted post-delivery. If at any time the blood sugar targets are not maintained the patient should be transferred to IV insulin infusion.

### 3. **IV Insulin Infusion**

This method ensures the delivery of insulin. It is especially effective over subcutaneous or pump delivery if there is any hypotension or dehydration as insulin is not absorbed as well from subcutaneous sites in these situations.

## **Postpartum Management**

Once newborn delivered, new insulin orders must be obtained. Patients are more sensitive to insulin post-delivery and may not even require insulin for some time after delivery. Watch for hypoglycemia. If on an insulin pump, they should have post-delivery rates pre-programmed into the pump from the Diabetes Education Center (DEC). If on subcutaneous insulin, basal insulin needs to be ordered at their usual time at a reduced rate compared to pregnancy. These amounts may be found on the plan from the DEC last visit report or the patient may be able to self-adjust. If on IV insulin, subcutaneous insulin may be ordered post-delivery but depending on CBG, IV may need to continue until subcutaneous insulin is absorbed and this may be up to 2 hours.

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### 8. INSULIN (cont'd)

- Option 3 – IV Insulin Infusion for Intrapartum Management** (see reverse)
  - Discontinue all previous insulin orders and patient's own insulin pump
  - Mix 100 units regular insulin in 100 mL 0.9% sodium chloride (= 1 unit/mL)  
(follow steps to prepare insulin infusion on reverse of page 3)
  - **Initiate IV insulin infusion at 1 unit/H (1 mL/H)**
  - Run D10W at 50 mL/H to start and titrate according to IV Regular Insulin Infusion Chart (page 3)
  - Titrate primary 0.9% sodium chloride for a total IV volume of 150 mL/H
  - Record CBG and IV insulin infusion rate every hour on BC Perinatal Triage & Assessment record (PSBC 1590) or BC Labour Partogram (PSBC 1583)
  - Notify prescriber for specific orders if CBG is less than 4 mmol/L or greater than 10 mmol/L on 2 consecutive readings

IV Regular Insulin Infusion and Dextrose Infusion Orders		Initial Rate for IV INSULIN is 1 unit/H = 1 mL/H
Capillary Blood Glucose in mmol/L	Regular Insulin IV Solution (1 unit/mL)	Dextrose IV (D10W) Solution
Less than 3	Stop insulin infusion for 1 hour	D10W @ 100 mL/H
3.1 to 3.5	Decrease insulin IV by 1 unit/H	D10W @ 75 mL/H
3.6 to 4	Decrease insulin IV by 0.5 units/H	D10W @ 50 mL/H
4.1 to 6	Leave insulin IV the same	D10W @ 50 mL/H
6.1 to 7	Increase insulin IV by 0.5 units/H	D10W @ 50 mL/H
7.1 to 8.5	Increase insulin IV by 1 unit/H	D10W @ 50 mL/H
8.6 to 10	Increase insulin IV by 1.5 units/H	D10W @ 50 mL/H
10.1 to 12	Increase insulin IV by 2 units/H	D10W @ 50 mL/H
Greater than 12	Increase insulin IV by 2 units/H	Stop D10W for 1 hour

**Note:**

- If CBG falls **more** than 2 mmol/L in one hour and is **greater** than 5 mmol/L, decrease IV insulin rate to 1 unit/H. Dextrose IV at 50 mL/H.
- If CBG falls **more** than 2 mmol/L in one hour and is **less** than 5 mmol/L, stop IV insulin for one hour. Dextrose IV at 50 mL/H.
- If IV insulin is **stopped** and blood glucose rises **greater** than 5 mmol/L in one hour, restart IV insulin at 0.5 units/H.

### B. POSTPARTUM MANAGEMENT

- Discontinue all insulin at time of delivery
- Measure capillary blood glucose (CBG) 1 hour postpartum, then Q2H x 2, then Q4H x 2, then before meals and at bedtime for remainder of stay. Record CBG on the IH Subcutaneous Insulin Administration and Blood Glucose Record – Adult Eating/Bolus Enteral Feeds.
- Patient to restart subcutaneous insulin or insulin pump as per Diabetes Education Centre report and plan for delivery (from antenatal file or Meditech patient care/reports online) or as by prescriber. If using insulin pump, patient to record CBG and insulin amounts on Patient Insulin Pump Log (form #826384). If patient self-monitoring CBG, nurse to do supplemental CBG checks using IH Accu-Chek® Inform II meter QID (before meals and at bedtime) (see reverse side of page 1).
- Diabetic Diet as tolerated

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## Insulin Infusion for Intrapartum Management

- Insulin is a High Alert Medication and requires an Independent Double Check (IDC) with two healthcare providers. Document IDC on BC Perinatal Triage & Assessment Record or BC Labour Partogram.

### Steps to prepare Insulin Infusion

This solution may be mixed by a RN or by pharmacy in some IH facilities. If prepared by nursing, the maximum storage time is 24 hours.

1. Refer to IH InsideNet Medication Manual (for Parenteral Drugs): Insulin IV and infusion chart  
**Add 100 units insulin-Regular (1 mL of 100 units/mL) to 100 mL 0.9% sodium chloride = 1 unit/mL**
2. Label the bag with medication name, concentration, date & time. Label bag with the patient's name & second identifier.
3. Spike the insulin bag with a non-ported IV line and prime the line. Insulin is absorbed to the surfaces of IV infusion solution containers, glass and plastic. Priming the tubing with the insulin solution and letting it flow through the tubing for a few seconds will help to saturate the set prior to administration.
4. Label the solution set tubing near the end by the connector as "insulin line".

### Steps to setting up IV lines for patient receiving IV insulin infusion:

1. Ensure patient has a Y extension set (9" standard bore bifurcated) attached to their IV cannula.
2. Label one port of the Y connector as "IV fluids" and the second port as "Insulin Only".
3. Initiate main line of 1,000 mL 0.9% sodium chloride. Infuse through a Sigma infusion pump using the drug library for IV fluids in the Obstetrics menu.
4. Connect the main line to "IV Fluid" port of extension set.
5. Prime an non-ported IV line of D10W. Label the solution set tubing near the end by the connector as "D10W line" and infuse through a Sigma infusion pump using the drug library for IV fluids in the Obstetrics menu.
6. Connect the D10W line into the lower port of the 0.9% sodium chloride IV line.
7. Infuse the insulin through a Sigma infusion pump using the drug library for insulin in the Obstetrics menu.
8. Connect the insulin line to the second port on the extension set labeled "Insulin Only".
9. Infuse 0.9% sodium chloride, D10W and Insulin as ordered on page 3.