



Bwrdd Iechyd Prifysgol
Abertawe Bro Morgannwg
University Health Board

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UNTIL CTM GUIDELINE IS RATIFIED AND
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Management of Women with Type I Diabetes or Insulin Treated Type II Diabetes

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Members of the Multidisciplinary Team

If there are any concerns in relation to the management of diabetic or obstetric care, the diabetic team should be contacted for advice:

Princess of Wales Hospital

Sally Bowden (Specialist Diabetic Nurse)

Gail Griffiths (Midwife)

Dr Aditi Miskin (Obstetrician)

Dr Lawrence Cozma (Diabetologist)

Dr Sushama Hemmadi (Obstetrician for Neath women)

Singleton Hospital

Heather Mogford (Specialist Diabetic Nurse)

Tanya Lewis (Midwife)

Dr Richard Chudleigh (Diabetologist)

Dr Margery Morgan (Obstetrician)

Dr Myriam Bonduelle (Obstetrician for Neath women)

Mr Marsham Moselhi (Obstetrician for Llanelli women)

Antenatal Steroid Administration in Patients with Diabetes

Betamethasone (12mg repeated after 24 hours)

Patients with Gestational Diabetes - Diet controlled or On Metformin

- These patients can be managed as outpatients
- Advise to do Blood Sugar pre meal and 1 hour post meal for 48 hours
- If post prandial blood sugar is more than 8 mmol take a second reading one hour later
- If blood sugars still above 8 mmol please advise to call Labour Ward POW or Labour Ward Singleton Hospital.
 - These patients will need admission to Ward 11 (POW) and Ward 19 (Singleton)
 - If on admission post prandial blood sugar with next meal remains higher than 8 mmol –patient will need Insulin Sliding Scale

Patients with Type 1 or Type 2 Diabetes on Insulin or GDM on Insulin

1. Admit to Ward 12 (PoW) or Ward 19 (Singleton)
2. Insert cannula
3. 1st dose Betamethasone
4. Start an IV insulin infusion of 50 units of actrapid with 50mls of normal saline using a syringe driver as per the chart according to the **current** total 24 hour dose of rapid acting (eg Novorapid)* subcutaneous insulin (eg if using 40 units of Novorapid start with column B)
5. **Do not** include the basal insulin (eg Levemir)* in this calculation as this is continued subcutaneously).
6. There is no need for an additional dextrose infusion if woman eating and drinking.
7. Check blood glucose hourly

	Total subcutaneous 24 hour insulin dose					F
	A	B	C	D	E	
	<35iu	36-59iu	60-83iu	84-104iu	105-130iu	
Blood glucose (mmol)	Insulin infusion rate (units/hour)					
<4.0	0	0	0	0	0	
4.1 – 6.0	0.5	1	1.5	2	3	
6.1-9.0	1	2	3	4	5	
9.1-12.0	2	3	4	5	7	
12.1-16.0	3	4	5	6	8	
>16.0	Call Dr	Call Dr	Call Dr	Call Dr	Call Dr	

8. If blood glucose is > 7.0mmol/l on 2 occasions move to the stronger sliding scale (eg B to C) or if blood glucose is < 4.0mmol/l on 1 occasion move to the weaker sliding scale (eg B to A)
9. The protocol is designed to keep blood glucose between 4.0-9.0mmol/l most of the time, Occasionally there is a tendency to get postprandial peak,
10. If not achieved contact the diabetes team for review or medical registrar out of hours.
11. Continue normal oral diet
12. **Continue basal insulin** (eg Lantus, Levemir, Insulatard) at current dose*
Rapid acting insulins: Novorapid, Humalog, Apidra
* Basal insulins: Levemir, Lantus, Insulatard
13. Rapid acting insulin is **stopped** while on the IV insulin infusion
14. 2nd dose Betamethasone after 24 hours .Continue IV insulin for 24-36 hours after the second dose of Betamethasone
15. After 24-36hours the IV insulin can be stopped provided blood sugar control is consistent with the target range (4 mmol-9mmol) . In patients taking Insulin this should be timed to occur 1 hour following a pre-meal dose of rapid acting Insulin

Management of Patients with Diabetic Ketoacidosis (DKA) in Pregnancy

Diabetic ketoacidosis (DKA) in pregnancy is a medical emergency, which without prompt recognition and treatment is associated with significant rates of maternal and fetal mortality.

Due to the physiological changes that occur during pregnancy, this complication can occur at lower levels of hyperglycaemia >11.0mmol/l. Patients in the third trimester are at the greatest risk. Intercurrent illness or interventions such as administration of steroids can also trigger DKA. Therefore it is important to be vigilant for this potential complication.

Criteria to diagnose DKA

Each of:

- Diabetes or blood glucose >11.0mmol/l
- pH <7.30
- Blood ketones > 3.0mmol/l (DKA can occur at lower levels of ketonaemia)

Milder cases of DKA not fulfilling strict criteria still need senior medical input and aggressive management of DKA

Patients at risk

- Type 1 diabetes
- Type 2 diabetes with insulin therapy (rarely)
- Intercurrent illness or steroid therapy
- Nausea & Vomiting
- Abdominal pain
- Hypotension
- Altered conscious level
- Blood glucose >11.0mmol/l
- Blood ketones >1.0mmol/l (**urine ketones greater than 2+**)

Symptoms

Include:-

- Rapid breathing
- Nausea and Vomiting
- Abdominal Pain (mimicking pancreatitis or appendicitis)

Osmotic diuresis leads to severe dehydration with increasing confusion and later stupor/coma and death.

Management

1. Prompt history and examination
2. Measure blood glucose and blood ketones using the PCX Meter
3. If blood ketones > 1.0mmol/l (**or urine ketones greater than 2+**) check arterial blood gas
4. Send blood for FBC, Glucose, U+E, LFT, Urate, Coag screen, Group and Save

Management

- Admit to Labour ward HDU in Singleton and HDU in POWH
- Seek **Urgent Senior Obstetric and Senior Diabetes specialist review** (medical registrar after 5pm) and Senior Anaesthetic review
- Ensure patient is managed according to the **local hospital adult medical DKA protocol**
- **These patients need to be cared under joint care between Medicine and Obstetrics**
- Obstetric patients need close maternal and fetal monitoring with specific attention to fluid balance.
- There should be a low threshold for senior and critical care review.

This is a guideline only, DKA should ALWAYS be considered in a pregnant patient with diabetes who is unwell and specialist advice should be sought

Management of Women in Labour

Induction of Labour

Aim to deliver as priority case. All patients to be admitted on morning of induction following normal breakfast and insulin.

VE to be carried out on admission. If cervix favourable- transfer to labour ward If unfavourable- follow IOL protocol.

Once in established labour

- Admit to Labour Ward
- Inform Senior Obstetrician and Diabetes Specialist Nurse (in office hours)
- Commence continuous electronic fetal monitoring of the fetal heart

Follow protocol:

- Hourly blood glucose measurements from time of admission using Precision PCX monitor.
- Set up insulin and Dextrose infusions through same venflon using the appropriate connector.
- Dextrose- 500ml of 10% with 10mmol KCL.
- Set Dextrose/ KCL at 100mls per hour DO NOT ALTER INFUSION RATE
- Insulin- use syringe driver and make up 50 units of Actrapid insulin to 50mls with normal saline
- Calculate the **current** total 24hr subcutaneous insulin requirement. **(This calculation should total the rapid insulin (eg Novorapid) AND basal insulin (eg Levemir.)***
- Using the chart, commence a insulin infusion at the rate recommended in the appropriate column (eg if using 65 units per 24 hours use column C).

	Total subcutaneous 24 hour insulin dose				
	A	B	C	D	E
	<35iu	36-59iu	60-83iu	84-104iu	105-130iu
glucose (mmol/l)	Insulin infusion rate (units/hour)				
<4.0	0	0	0	0	0
4.1 – 6.0	0.5	1	1.5	2	3
6.1-9.0	1	2	3	4	5
9.1-12.0	2	3	4	5	7
12.1-16.0	3	4	5	6	8
>16.0	Call Dr	Call Dr	Call Dr	Call Dr	Call Dr

- Check blood glucose hourly

- If blood glucose is > 7.0 mmol/l on 2 occasions move to the stronger sliding scale (eg C to D) or if < 4.0mmol/l on 1 occasion move to the weaker sliding scale (eg C to B)
- The protocol should keep blood glucose between 4.0-9.0mmol/l, if not achieved contact the diabetes/medical team
- If blood glucose <2 or > 14mmol or the patient is unwell perform blood ketone testing using a PCX monitor.
- If ketone values are >1.0mmol/l consider diabetic ketoacidosis (DKA) a possibility, seek urgent diabetic/medical review and manage according to local DKA policy.
- Also perform standard blood Glucose (grey top), FBC, U&E and other investigations as clinically indicated.

***Rapid acting insulin eg Novorapid, Humalog or Apidra**

*** Basal insulin eg Levemir, Lantus or Insulatard**

Post Delivery

- After delivery of the placenta change the rate of insulin infusion to the column that relates to the **pre-pregnancy** daily dose.
- When eating a normal diet subcutaneous insulin can re start.
- **If basal insulin (Lantus or Levemir) has been administered within the last 24 hours**, then this should continue to be administered at the usual time at the pre pregnancy dose.
- **If more than 24 hours has elapsed since the last dose of basal insulin** then it must be given at the pre-pregnancy dose before discontinuing IV insulin (it should then continue to be given daily at this time pending diabetic review).
- Rapid acting insulin (Novorapid / Humalog or Apidra) at the pre pregnancy dose can be given before the next meal.
- The intravenous insulin infusion can be discontinued one hour later.
- Beware hypoglycemia following delivery.
- Check blood glucose 4hourly.

If hypoglycemia occurs with B.M. < 4.0;

- Treat according to ABBMU hypoglycemia guidelines and use HYPO BOX
- Seek medical/diabetic review as insulin doses may need further reduction

Elective Caesarean Section

The night before elective Caesarian Section

- Take half of Long acting Insulin the night before elective Caesarean section
- Morning of elective Caesarean section start on Insulin Sliding Scale
- Mealttime insulin to be stopped once nil by mouth for Caesarean section

Intravenous Insulin:

- 1 Start insulin infusion prior to elective CS
- 2 Use sliding scale on page 3
- 3 Use 50 units of Actrapid in 49.5ml 0.9% saline in syring pump – ask doctor to prescribe on PRN Side of drug chart and specify starting rate (ie. A/B/C/D/E)
- 4 Glucose – 500ml of glucose 10% with 10mmol potassium chloride (KCl)
- 5 Set up insulin and glucose with KCl infusions through the same venflon using the appropriate connector
- 6 Set glucose with KCl infusion at 100mls per hour. DO NOT ALTER INFUSION RATE
- 7 Check blood glucose hourly

¹ If it is not documented which scale to use, start with scale B or calculate from total subcutaneous 24 hour insulin dose as indicated on chart

Please note:

- 1) Stopping of Insulin sliding scale when patient goes to theatre for caesarian section will be at Obstetric Anesthetists own discretion
- 2) Ensuring that Insulin Sliding Scale is restarted in the room post operatively is responsibility of the Obstetric Anesthetists if they stop the Insulin in theatre

Intrapartum Management of Women using Insulin Pump Therapy

Steroid use and management of insulin pump therapy

Use of steroids in women with diabetes is associated with worsening glycaemic control and usually requires an increase in medication. Target blood glucose for patients on CSII is 4.0-7.0mmol/l and should be measured

- 2 hourly for 24 hours
- 3-4 hourly subsequently.

The recommendations below are a guide only and should only be implemented if blood glucose rises >8.0mmol/l. If adequate control is not achieved then convert to an intravenous glucose/insulin infusion as per hospital guidelines

After administration of Betamethasone adjust the pump rates as follows

- 6-24 hours increase the basal rate to 125%
- Day 2-3-increase basal rate to 140% and increase the usual bolus rate by 40%
- Day 4-increase basal rate to 120% (of usual rate) and increase the usual bolus rate by 20%
- Day 5-increase basal rate to 110% and increase the bolus rate by 10%
- Day 6-7-the insulin infusion rate should return to normal

The blood glucose values should be checked pre and post meal and every 3-4 hours. Correction boluses should be given for blood glucose values >8.0mmol/l

The intra-partum management of patients using insulin pump therapy

If diabetes is **stable and** the patient and ideally partner can manage the pump, then pump therapy can continue during labour.

If problems arise start an intravenous glucose/insulin infusion as per hospital guidelines prior to removing the pump. The insulin regime should be selected on the basis of total daily dose immediately pre-labour (data available on pump/patient notes).

Intra-partum

An intravenous cannula must be inserted.

The usual basal rate should continue and blood glucose **must** be measured **hourly** aiming for target glucose of 4-7mmol/l.

Time from onset of labour to delivery can be lengthy. Blood glucose values fluctuate and will rise and/or fall outside the target range. Adjustments will need to be made on the pump to manage these fluctuations.

Hyperglycemia

- If blood glucose is $> 7.0\text{mmol/l}$ a correction bolus should be administered, aiming for a blood glucose of 5.0mmol/l .
- eg (1 unit of insulin will reduce blood glucose by 2.5mmol/l unless otherwise documented eg if blood glucose is 10.0 give 2 units.)
- After 1 hour if blood glucose is above 7.0mmol/l repeat the correction bolus applying the same calculation.
- If after a further 30mins blood glucose is above 7.0 convert to IV glucose/insulin as per protocol.

Hypoglycemia

- If blood glucose is $<4.0\text{mmol/l}$ treat hypoglycemia as per hospital protocol using 3 glucose tablets / lucozade initially, repeat glucose after 15 minutes to ensure resolution.
- If glucose remains $<4.0\text{mmol/l}$ repeat the above until hypoglycemia is corrected.
- If the patient has > 1 hypoglycemic episode reduce the basal rate to 50% using a temporary setting. This rate should continue for the remainder of labour and should not increase back to 100%.
- If further hypoglycemia occurs then convert to IV Glucose /insulin as per protocol.

Post delivery

After delivery of the placenta

- The patient/partner should reduce the basal rate by 50% of the pre-labour rate **or to the pre-pregnancy dose** if known. If breast feeding, the basal rate may need reducing by a further 10-20%.
- Bolus doses can re-start once eating and drinking, use the pre-pregnancy ratios (or 1 unit insulin per 10g of carbohydrate if not known).

It is anticipated that the duration of time to undergo this procedure is short, ie < 2 hours. If diabetes is **stable** and Anesthetist is agreeable the insulin pump can continue during the LSCS at the current basal rate, hourly blood glucose measurements should continue.

- If hypoglycemia <4.0mmol/l, correct with IV bolus of 20g glucose (80-100ml of 20% Dextrose or 30-40ml of 50% Dextrose), and repeat blood glucose after 15mins to ensure resolution or repeat the above. Consider converting to intravenous glucose/insulin infusion.
- If hyperglycemia >10.0mmol/l develops convert to an IV glucose/insulin infusion.

Re-starting the insulin pump

If the insulin pump has been discontinued and replaced with Glucose/Insulin infusion, then the insulin pump should re-start when eating and drinking normally. The Glucose/Insulin infusion should continue for **30 minutes** after the first mealtime bolus dose.

Directorate of Women & Child Health

Checklist for Clinical Guidelines being Submitted for Approval by Quality & Safety Group

Title of Guideline:	Management of women with Type 1 Diabetes or Insulin Treated Type 2 Diabetes in Labour
Name(s) of Author:	Aditi Miskin, Richard Chudleigh
Chair of Group or Committee supporting submission:	Labour Ward Forum
Issue / Version No:	1
Next Review / Guideline Expiry:	May 2020
Details of persons included in consultation process:	Labour Ward Forum membership Consultant Obstetricians involved in caring for women with diabetes Richard Chudleigh & Lawrence Cozma (Diabetologists)
Brief outline giving reasons for document being submitted for ratification	Requirement for health-board wide policy regarding the management of pregnant women with Type 1 & 2 diabetes.
Name of Pharmacist (mandatory if drugs involved):	n/a
Please list any policies/guidelines this document will supercede:	n/a
Keywords linked to document:	Insulin, diabetes, diabetic, dka,
Date approved by Directorate Quality & Safety Group:	
File Name: Used to locate where file is stores on hard drive	Pow_fs1\ABM_W&CH_mgt\clinical governance\policies & procedures – ratified\maternity

* To be completed by Author and submitted with document for ratification to Clinical Governance Facilitator