Reference Number: UHBOBS038 **Version Number: 6**	**Date of Next Review: April 2024** **Previous Trust/LHB Reference Number:**

Diabetes in Pregnancy

Introduction and Aim

This document supports introduction of NICE NG 3 (2015) and QS 109 (2016). It sets out quality care guidelines for women who embark on pregnancy with diabetes, and supports identification and management of women who develop diabetes during pregnancy.

Diabetes increases risks during and after pregnancy for mother, fetus and Newborn baby. For this reason this is a multidisciplinary document, involving obstetric, diabetology, neonatology and midwifery Staff.

The incidence of gestational diabetes is rising with changing lifestyle and increasing pregnancy rates in a population of older women.

Objectives

- **To optimise opportunities for preconceptual counselling for women with type 1 and type 2 diabetes who are considering pregnancy**
- **To give optimum care to women with diabetes during pregnancy through monitoring of maternal and Fetal wellbeing**
- **To make appropriate decisions regarding timing and mode of delivery taking maternal preferences into account**
- **To support management of glycaemic control when pregnant women with diabetes are admitted**
- **To offer support to women regarding infant feeding choices, and to reduce the incidence of neonatal hypoglycaemia**
- **To assist the diabetic mother in making choices and decisions to optimise her long term health.**

Scope

This policy applies to all healthcare professionals in all locations including those with honorary contracts

Equality Health Impact Assessment	*An Equality Health Impact Assessment (EHIA) has not been completed.*
Documents to read alongside this Procedure	*NICE NG 3 (2015)* *NICE QS 105 (2016)* *JBDS-IP (2017)* *CAV DKA , adult hypoglycaemia, neonatal hypoglycaemia*
Approved by	*Maternity Professional Forum / Perinatal Guidelines Forum*

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1.1.1.1.1.1 Disclaimer

If the review date of this document has passed please ensure that the version you are using is the most up to date either by contacting the document author or the Governance Directorate.

Version Number	Date of Review	Reviewer Name	Date Approved	New Review Date
UHB 2	August 2010	A Rees	Aug 10	Aug13
3	Feb 14	P Amin	Feb 14	Feb 17
4	Dec 2018	*M. Beard, A. Roberts, A. Ellis.*	7/12/18	7/12/21
4a	July 2019	*MPF – GDM leaflet from Diabetes UK added as a link with recommendation to use*		
4b		*Oral GTT Guidance for Staff added as Appendix 4*		
4c	10th September 2020	*New Elective Caesarean Pathway added as appendix. New Gestational Diabetes and Pre-existing Diabetes Care Pathways added as appendices.*	26/08/2020	7/12/21
5	31/03/2021	*A Ali. Summary of Changes: Information to be given at booking appointment. Blood glucose and fetal monitoring in labour. GDM screening for women with BMI >30kg/m² Infusion fluid and rate of VRII for labour and c-section.*	17/04/2021	31/03/2024

6	October 2023	*RENAMED- Diabetes in pregnancy* *Summary of changes. Removal of information pertinent to screening, diagnosis and management of GDM as All Wales Guidancepublished on GDM. Ammendment to advice on corticosteroids at term to include patient choice and discussion of risks and benefits*	29/10/2023	29/10/2026

1 Contents

2 WOMEN WITH TYPE 1 or 2 DIABETES

2.1 General

All women with known diabetes should be referred early to the multidisciplinary team at joint Endocrine Antenatal Clinic (EANC) at either University Hospital of Wales or University Hospital Llandough.

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2.2 Pre-pregnancy Care

Women considering pregnancy should be advised to take high-dose folic acid supplements (5mg/day) from at least three months prior to conception until 12 completed weeks gestation. This is to reduce the incidence of neural tube defects, for which diabetic women have a higher risk.

Outcomes for mother and baby are improved with tight blood sugar control. Risks of miscarriage, Fetal anomaly and stillbirth are higher if control is poor. For this reason, an unplanned pregnancy should be avoided and contraceptive advice should be offered.

Women wishing to become pregnant with type 1 diabetes should be encouraged to achieve:

Fasting	5 - 7mmol/litre
Preprandial and other times of the day	4 – 7 mmol/litre

A sample for HbA1c should be taken at any preconception appointment, and the woman should aim for < 48 mmol/mol prior to discontinuing contraception. This reduces the risk of congenital anomaly in the fetus. If HbA1c is greater than 86 mmol/litre, the woman should be counselled of the high risk of poor fetal outcome. Routine blood glucose monitoring (4-6 times a day) should continue and be recorded.

Education should be provided by the multidisciplinary team, including the Diabetes Specialist Nurse (DSN) and Dietician regarding a healthy eating plan for pregnancy with emphasis on food groups and glycaemic index. This may include carbohydrate counting for those with type 1 diabetes.

Consideration should be given during preconceptual counselling of micro- and macrovascular complications, e.g. renal, retinal and hypertensive disorders. A review of medication should take place, including conversion from ACE inhibitors, angiotensin-2 blockers and the newer antiglycaemic medications when pregnancy is confirmed by positive pregnancy test. Statins should be discontinued.

Recommend retinal assessment for women seeking pre-conception counselling if this has not occurred within the past six months. (**New, 2021**)

Offer women assessment of their renal function and quantification of any albuminuria by sending urine for an albumin:creatinine ration (ACr). Refer to a nephrologist if:

- serum creatinine is 120micromol/litre or more
- ACr is 30mg/mol or more
- Estimated glomerular filtration rate (eGFR) is less than 45ml/minute/1.73m^2.

(New, 2021)

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2.3 Booking Visit

An ultrasound scan to confirm a live pregnancy and for provisional dating should take place between 7-9 weeks.

At first visit:

- HbA1c and baseline U&E should be checked by the medical team at this appointment (Diabetologist or Obstetrician)
- If proteinuria is present or there is known nephropathy, urine should be sent for protein:creatinine ratio (P:CR) calculation
- Referral for retinal screening should be made unless previously done within 3 months
- Review of insulin regime should take place, with conversion if needed. If there is poor glycaemic control in a woman with type 2 diabetes, use of insulin should be discussed and implemented when appropriate. Testing of blood glucose using a glucometer should be encouraged 4-6 times a day
- Dietary and exercise aspects of diabetic control should be discussed with input from a dietician
- If not commenced by community midwife or General Practitioner, 150mg mg aspirin should be offered from 12 weeks gestation **(New, 2021)**
- A discussion should take place regarding management of hypoglycaemia as this is more common in pregnancy. This should include family members for emergency management. If hypoglycaemic episodes are frequent the woman should be advised to stop driving. Advise bedtime blood glucose should not be below 6 mmol/litre
- The “Five to Drive” (keeping blood glucose above 5mmol/litre during driving) rule should be emphasised and any woman commenced on insulin should inform the DVLA

- Management of hyperglycaemia should be discussed. Women with type 1 diabetes should check for blood ketones if blood glucose is >11 mmol/litre. High blood ketones may result in admission to Hospital.
- If not already initiated continuous glucose monitoring should be considered and discussed. **(New, 2021)**

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2.4 Maternal Antenatal Care

An early pregnancy scan should take place for dating and to confirm viability.

Women with pre-existing diabetes should be in contact with the EANC team at least fortnightly and weekly from 34 weeks gestation. Some visits, particularly earlier in pregnancy, may involve the diabetic team only, rather than obstetric and diabetic teams. Users of Insulin Pumps may see the obstetric teams only as their diabetic care will continue to be delivered by the Pump Clinic. However, the full team is available with any problems that have arisen.

Women should be made aware that the appointments may be lengthy and that the appointment time is only an indication of the first contact of their visit. Women may be seen by any or all of the healthcare team including Maternity Care Assistants, Sonographer / Midwife Sonographer, DSN, Dietician, Diabetologist, Obstetrician and Midwife.

Blood pressure and urine dipstick testing should take place at each visit with PCR if proteinuria is > trace on dipstick. The woman should also be weighed.

Glycaemic monitoring documentation should be checked and a discussion of control of blood sugar should take place. Postprandial blood glucose levels should be <7.8 mmol/litre at 1 hour. HbA1c should be checked at least twice in pregnancy by the medical team.

Insulin generally needs to be increased during pregnancy with increments greatest at times of peak fetal and placental growth.

Retinal assessment should take place in the first and third trimesters and the result documented within the hand-held record, and if there is a known retinopathy there should be ophthalmology review for six months after delivery (arranged by the medical team).

If antenatal administration of corticosteroids is required a deterioration of diabetic control may occur. Rarely maternal nifedipine administration mayalso disrupt control. In these circumstances there is increased risk of hyperglycaemia and ketoacidosis.

For this reason, any such administration should be with a variable rate I.V. insulin infusion (VRIII, see appendix). Women with insulin pumps should not require a VRIII as they can adjust their device. If their glycaemic control is of concern they may be asked to disable their pump following multidisciplinary agreement to start a VRIII. The DSN should be contacted at this stage.

Any woman with type 1 or 2 diabetes with additional anaesthetic risk factors should be referred for obstetric anaesthetist assessment at around 30 – 32 weeks.

An appointment at 36 weeks should include information and advice about timing and mode of birth, with discussion of induction of labour or caesarean section if this is indicated. In general, this will be between 37+0 and 38+6 weeks. Consider birth before 37 weeks if there is evidence of metabolic or maternal or fetal compromise **(New, 2021).** Women with diabetes who have previously had Caesarean birth can consider VBAC. In pregnancies with ultrasound diagnosed macrosomia the risks and benefits of vaginal birth, induction of labour and elective Caesarean section should be discussed **(New, 2021**). The plan for delivery should be clearly recorded in the diabetes care pathway filed in the antenatal notes, including guidance regarding intrapartum monitoring, return to pre-pregnancy diabetes medication, and guidance for breastfeeding

Contraceptive plans should be explored, and women should be aware that long-acting reversible contraception can be fitted / supplied prior to postnatal discharge from hospital.

If delivery by caesarean section is planned, as this is likely to take place before 39 completed weeks, antenatal corticosteroids should be considered dependent on gestation and any other risk factors. This should include patient counselling sheet – for example Co-OPT Antenatal Corticosteroids Infographic | The University of Edinburgh discussing both the known and unknown risks and benefits of corticosteroids and varying gestations. If a jointdecision is made for corticosteroids then every effort should be made to time the administration of these within the week prior to delivery. Corticosteroids should be administered in two intramuscular 12mg doses, 24 hours apart withappropriate VRIII or insulin pump use – see earlier.

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2.4.1 Insulin Pump Users

Increasing numbers of young women with type 1 diabetes use insulin pumps. Their diabetic care will continue via pump clinic, but they should attend the joint EANC at booking and then from 24 weeks for 2-4 weekly scans and obstetric care. There should be regular communication between the obstetric

and pump clinic teams which should be documented within the notes and on the Welsh Clinical Portal (WCP) **(New, 2021)**

Women using pumps should not require a variable rate infusion during any administration of antenatal corticosteroids, but measurement of blood glucose should take place regularly as in the attached protocol. There should be a clear written plan in the notes if women on pump therapy require antenatal corticosteroids and for intrapartum glycaemic control. If there is concern or in emergency a VRIII may be more appropriate

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2.5 Fetal Antenatal Care

Routine detailed ultrasound scan for anomaly should take place at 20 weeks. If there are poor Cardiac views or any concerns, referral for a fetal echocardiogram or to the Fetal Medicine Unit can be made.

Regular ultrasound scans for fetal growth and amniotic fluid volume should begin at 28 weeks and the estimated fetal weight (EFW) should be plotted on a customised growth chart **(New, 2021).** Scans should continue 4 weekly in line with the fetal growth assessment protocol, at 32 and 36 weeks , with adjustments made to this frequency if any concerns arise. Scans should continue weekly for women who have not had their babies at 38 and 39 weeks.

If a fetus of a woman with diabetes develops macrosomia a discussion should take place to allow the woman to make an informed choice about mode of delivery. In particular the risks of shoulder dystocia should be discussed and this should be clearly documented.

If delivery by Caesarean section is planned, as this is likely to take place before 39 completed weeks, corticosteroids should be considered dependent on gestation (see above). Ideally this should be a maximum of a week before the birth. This is not required for vaginal births if the fetus is > 34+6 weeks gestation as the risk of neonatal hypoglycaemia are likely to outweigh that of respiratory concerns in the newborn.

Discussions about infant feeding should take place from early pregnancy. Exclusive breastfeeding reduces the risk of the child developing diabetes.

Babies of diabetic mothers are at higher risk of neonatal hypoglycaemia, and mothers can be encouraged to express and harvest colostrum from 36 weeks to benefit their baby.

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2.6 Labour and Birth

Aim for delivery >38 weeks if there is no evidence of fetal macrosomia, preeclampsia, worsening maternal condition, or poor diabetic control. If there are maternal or fetal concerns birth prior to 37+0 may be indicated.

Maternal glycaemic control during labour can reduce the risk of neonatal hypoglycaemia. Maternal blood glucose should be checked from a capillary sample hourly using Hospital POCT glucometers, and NOT the patient's own equipment. During cervical ripening maternal glucose monitoring and all glucose lowering medications should be continued as usual **(New, 2021)**

Once in established labour women should have hourly blood sugar monitoring aiming to keep between 4.0 – 7.0 mol/L. Meal time insulin and metformin should be discontinued, long acting insulin should continue and VRII for labour commenced. In women with type 2 diabetes on metformin only discontinue metformin once in established labour, monitor blood glucose hourly and commence VRII if TWO consecutive BM readings are above 7mmol/L half an hour apart **(New, 2021).**

U+Es should be checked 12 hourly for women in VRII to maintain potassium and bicarbonate levels **(New, 2021).**

If BM reading is below 4.0mmol/L treat hypoglycaemia with appropriate food or drink or 5% IV dextrose infusion if no solid food at the request of the anaesthetists. **(New, 2021)**

Women using insulin pumps are unlikely to require conversion to a VRII and should be able to manage their pump in labour as per the pump clinic team plan. A VRII may be appropriate if unstable i.e. BM >7.0mmol/L or concerns regarding ketoacidosis. **(New, 2021)**

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2.6.1 Caesarean Section

Unless there is poor diabetic control, same-day admission with listing first should take place for women with type 1 and type 2 DM. If there are maternal or fetal concerns admission the previous day may be advised for observation or glycaemic control. Pre-operative Lucozade should NOT be given.

On admission a blood glucose should be checked and management shouldbe initiated in line with the flowchart for Management of Well Controlled Diabetic Women for Caesarean Section (Section 10: Appendix: Flowchart: Management of Well Controlled Diabetic Women for Elective Caesarean Section). Blood glucose should be checked hourly. If general anaesthetic is used blood glucose monitoring should be at 30 minute intervals. Any other plan should be documented in the Maternity notes by the EANC team.

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2.6.2 Spontaneous labour

Usual intrapartum care protocol should be used, with continuous Fetal monitoring, hourly maternal blood glucose testing and a VRIII (see Appendix). Following delivery diabetic medication should be per Diabetic Plan from the Maternity record. Any other plan should be documented in the Maternity notes by the EANC team.

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2.6.3 Induction of labour

Most women will be suitable for induction of labour on the induction ward providing that there are not significant concerns of fetal growth restriction and the umbilical artery Doppler is normal. These women will need a medical review on admission to north **(New, 2021)**
Normal diet and diabetic medication should continue during cervical ripening using prostaglandins. When it is possible to rupture the membranes, the usual intrapartum protocol should commence with continuous electronic fetal monitoring, hourly blood glucose monitoring and a variable
Rate intravenous insulin infusion.

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2.7 Neonatal Care

For neonatal management please refer to the health board Guideline for the prevention and management of hypoglycaemia in high risk infants on the postnatal ward.

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2.8 Postnatal Care

IF on VRII infusion rate should be reduced by 50% after delivery of the placenta in women with type 1 and 2 diabetes until eating and drinking **(New 2021)**
Return to pre-pregnancy diabetic medication – any variation should be documented by the EANC team in the Maternity Record.
Encourage breastfeeding. Guidance to avoid hypoglycaemia during breastfeeding will be documented. Seek support from the Seren Infant Feeding Team if required.
Discussion of contraception, with provision of this if not done at delivery.
Postnatal review by Diabetes service in the normal Diabetic Clinic at around 6 – 8 weeks postpartum.

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3 DIABETIC EMERGENCIES

Any diabetic woman who becomes unwell, particularly with vomiting, needs admission and review of blood ketones to exclude ketoacidosis.

Diabetic ketoacidosis (DKA) is a MEDICAL EMERGENCY and should be diagnosed as follows:

1. **The woman is known to have diabetes**
2. **Urinary ketones >++ or blood ketones >3.0mmol/L AND**
3. **Acidosis – venous blood gas pH <7.3 and/or bicarbonate <15mmol/L.**

CALL SENIOR MEDICAL REGISTRAR ON CALL / DIABETIC TEAM and follow Health Board algorithm for emergency treatment.

Maternal hypoglycaemia should be recognised and addressed rapidly.

Each clinical area on the Maternity unit has a 'HypoBox' with a copy of the Health Board algorithm and the required supplements and infusions. All staff should be aware of these and they should be checked regularly to ensure all contents are within date.

The DSN should be made aware of any admission of a diabetic woman during pregnancy, and any severe deterioration should also be referred to the general medical team on call.

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4 GESTATIONAL DIABETES

Please refer to the All Wales Guidance for the screening and management of gestational diabetes

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5 References

CEMACH Diabetes in Pregnancy: are we providing the best care? Findings of a national enquiry. February 2007

Joint British Diabetes Societies for Inpatient Care: Management if glycaemic control in pregnant women with diabetes in obstetric wards and delivery units. May 2017. Access via www.diabetes.org.uk/professionals

NICE NG3 Diabetes in pregnancy: management from preconception to the postnatal period. February 2015. Updated December 2020 Access via www.nice.org.uk/guidance/ng3

NICE QS109 Diabetes in pregnancy: Quality Standard. January 2016. Access via www.nice.org.uk/guidance/qs109

Cardiff & Vale University Health Board. Management of Adult Hypoglycaemia

Cardiff & Vale University Health Board. Management of Adult Diabetic Ketoacidosis.

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6 Appendices

6.1 Appendix: Variable Rate IV Insulin Infusion for Antenatal Steroid Administration.

Starts on next page.

Regime for variable rate IV insulin infusion (VRIII) for Antenatal Steroid Administration. Admission for steroid administration is not an indication for IV fluids, women should eat and drink as normal.

	Dosing Algorithm (see guide below)		
Algorithm >	**1**	**2**	**3**
	Most Women	If not controlled on Algorithm 1 or > 80 units/day insulin	If not controlled on Algorithm 2 after specialist advice
Blood glucose (mmol/L)	Infusion rate (units/hour = ml/hour)		
< 4	STOP INSULIN FOR 20 MINUTES Treat hypo per guideline and recheck BG in 10 minutes		
4.0 – 5.5	0.2	0.5	1.0
5.6 – 7.0	0.5	1.0	2.0
7.1 – 8.5	1.0	1.5	3.0
8.6 – 11.0	1.5	2.0	4.0
11.1 – 14.0	2.0	2.5	5.0
14.1 – 17.0	2.5	3.0	6.0
17.1 – 20.0	3.0	4.0	7.0
>20.1	4.0	6.0	8.0

Algorithm Guide

- **All women with diabetes should have capillary blood glucose testing hourly whilst on a variable rate iv insulin infusion for antenatal steroid administration. Use the health board point of care system for capillary blood tests.**
- **Start the variable rate infusion with the first dose of steroids and continue for 12 – 24 hours after the last dose.**
- **Use 50 units Actrapid insulin in 49.5ml 0.9% normal saline via a syringe driver**
- **Women continue with their normal insulin regime. Including both long and short acting insulin.**
- **Do NOT commence IV Dextrose/KCl/NaCl infusion.**

Algorithm 1 Most women will start here

Algorithm 2 Use this for women more likely to have a higher requirement for insulin (on >80 units/24 hours of insulin during pregnancy, or if not achieving target on Algorithm 1

Algorithm 3 Use this for women who are not achieving target on Algorithm 2 **(No patient starts here without DSN or medical review)**

Target BG = 4 – 7.8 mmol/L
Check BG hourly whilst on VRIII (half-hourly if having GA)
Move VRIII up if BG >target and BG not dropping
Move VRIII down if BG <4mmol/L or BG dropping too fast

If the woman is not achieving targets with these algorithms, contact the diabetes team (out of hours, Senior Medical Registrar on call).

Insulin Pump Infusion Chart

INSULIN PUMP
INFUSION CHART

Ward:…….Date:……..

Addressograph	Actrapid Insulin in Sodium Chloride 0.9% IV Dose: 50 units in 49.5ml Normal Saline For use with VRIII for: **Steroids** as per Diabetic Guideline

Time	BG	VRIII Rate	Volume Remain	Total Volume Given	Sign
08:00					
09:00					
10:00					
11:00					
12:00					
13:00					
14:00					
15:00					
16:00					
17:00					
18:00					
19:00					
20:00					
21:00					
22:00					
23:00					
00:00					
01:00					
02:00					
03:00					
04:00					
05:00					
06:00					
07:00					

*Additional fluids intravenously may be needed if the patient is not eating or drinking reliably. Fluids, particularly dextrose containing fluids, may have to be restricted in patients who are at risk of or already have hyponatraemia. In some cases insulin without substrate fluids may have to be used (difficult i.v. access, fluid overload states, hyponatraemia or risk of hyponatraemia). Please consult senior medical/ obstetric staff as needed.

6.2 Appendix: Variable Rate IV Insulin Infusion for Labour or for Antenatal Women.

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Regime for variable rate IV insulin infusion (VRIII) for Labour or for Antenatal Nil by Mouth Episodes

	Dosing Algorithm (see guide below)		
Algorithm >	**1**	**2**	**3**
	Most Women	If not controlled on Algorithm 1 or > 80 units/day insulin	If not controlled on Algorithm 2 after specialist advice
Blood glucose (mmol/L)	Infusion rate (units/hour = ml/hour)		
< 4	STOP INSULIN FOR 20 MINUTES Treat hypo per guideline and recheck BG in 10 minutes		
4.0 – 5.5	0.2	0.5	1.0
5.6 – 7.0	0.5	1.0	2.0
7.1 – 8.5	1.0	1.5	3.0
8.6 – 11.0	1.5	2.0	4.0
11.1 – 14.0	2.0	2.5	5.0
14.1 – 17.0	2.5	3.0	6.0
17.1 – 20.0	3.0	4.0	7.0
>20.1	4.0	6.0	8.0

Algorithm Guide

- **Use 50 units Actrapid insulin in 49.5ml 0.9% normal saline via a syringe driver.**
- **Infuse sodium chloride 0.45% plus potassium chloride 0.15% plus dextrose 5% (in 500ml ready mixed bag pharmacy code GV332) at 50ml/hr via infusion pump* (New, 2021).**
- **Long acting insulin must be given.**
- **STOP all short acting insulin until normal eating and drinking has resumed.**
- **When able to eat and drink recommence short acting insulin <u>at mealtime</u> and discontinue the VRIII <u>30 minutes later.</u>**

Algorithm 1 Most women will start here.

Algorithm 2 Use this for women more likely to have a higher requirement for insulin (on >80 units/24 hours of insulin during pregnancy, or if not achieving target on algorithm 1.

Algorithm 3 Use this for women who are not achieving target on algorithm 2. **(No patient starts here without DSN or medical review)**

Target BG = 4 – 7.8 mmol/L
Check BG hourly whilst on VRIII (half-hourly if having GA)
Move up if >target and not dropping
Move down if <4mmol/L or dropping too fast

- If the woman is not achieving targets with these algorithms, contact the diabetes team (out of hours, Senior Medical Registrar on call).
- **GDM –** Aim to maintain good blood glucose control until delivery then stop all diabetes treatment.

Insulin Pump Infusion Chart

INSULIN PUMP INFUSION CHART

Ward:……Date:……

Addressograph	Actrapid Insulin in Sodium Chloride 0.9% Dose: 50 units in 49.5ml Normal Saline Infuse IV NaCl 0.45% plus KCl 0.15% plus dextrose 5% (50ml/hr) via an infusion pump (not for Antenatal Steroid Administration) For use with VRIII for: **Labour/Antenatal Nil by Mouth** as per Diabetic Guideline

Time	BG	VRIII Rate	Volume Remain	Total Volume Given	Sign
08:00					
09:00					
10:00					
11:00					
12:00					
13:00					
14:00					
15:00					
16:00					
17:00					
18:00					
19:00					
20:00					
21:00					
22:00					
23:00					
00:00					
01:00					
02:00					
03:00					
04:00					
05:00					
06:00					
07:00					

*Additional fluids intravenously may be needed if the patient is not eating or drinking reliably. Fluids, particularly dextrose containing fluids, may have to be restricted in patients who are at risk of or already have hyponatraemia. In some cases insulin without substrate fluids may have to be used (difficult i.v. access, fluid overload states, hyponatraemia or risk of hyponatraemia). Please consult senior medical/ obstetric staff as needed.

6.3 Appendix: Variable Rate IV Insulin Infusion for Elective Caesarean Section

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Regime for variable rate IV insulin infusion (VRIII) for Elective Caesarean Section

	Dosing Algorithm (see guide below)		
Algorithm >	**1**	**2**	**3**
	Most Women	If not controlled on 1 or > 80 units/day insulin	If not controlled on 2 after specialist advice
Blood glucose (mmol/L)	Infusion rate (units/hour = ml/hour)		
< 4	STOP INSULIN FOR 20 MINUTES Treat hypo per guideline and recheck BG in 10 minutes		
4.0 – 5.5	0.2	0.5	1.0
5.6 – 7.0	0.5	1.0	2.0
7.1 – 8.5	1.0	1.5	3.0
8.6 – 11.0	1.5	2.0	4.0
11.1 – 14.0	2.0	2.5	5.0
14.1 – 17.0	2.5	3.0	6.0
17.1 – 20.0	3.0	4.0	7.0
>20.1	4.0	6.0	8.0

Algorithm Guide

- **Use 50 units Actrapid insulin in 49.5ml 0.9% normal saline via a syringe driver.**
- **Infuse sodium chloride 0.45% plus potassium chloride 0.15% plus dextrose 5% (in 500ml ready mixed bag pharmacy code GV332) at 50ml/hr via infusion pump* (New, 2021).**
- **Long acting insulin must be given for type 1 and type 2 diabetes.**
- **STOP all short acting insulin until normal eating and drinking has resumed.**
- **When able to eat and drink recommence short acting insulin at mealtime and discontinue the VRIII 30 minutes later.**
- **GDM – STOP all anti-diabetic medication including insulin when VRIII starts**

Algorithm 1 Most women will start here.

Algorithm 2 Use this for women more likely to have a higher requirement for insulin (on >80 units/24 hours of insulin during pregnancy, or if not achieving target on algorithm 1.

Algorithm 3 Use this for women who are not achieving target on algorithm 2 **(No patient starts here without DSN or medical review).**

Target BG = 4 – 7.8 mmol/L

Check BG hourly whilst on VRIII (half-hourly if having GA)

Move VRIII up if BG >target and not dropping.

Insulin Pump Infusion Chart

INSULIN PUMP INFUSION CHART

Ward:……Date:……..

Addressograph	Actrapid Insulin in Sodium Chloride 0.9% Dose: 50 units in 49.5ml Normal Saline Infuse IV NACl 0.45% plus KCl 0.15% plus Dextrose 5% (50ml/hr) via an infusion pump (not for Antenatal Steroid Administration) For use with VRIII for: **Elective caesarean section** as per Diabetic Guideline

Time	BG	VRIII Rate	Volume Remain	Total Volume Given	Sign
08:00					
09:00					
10:00					
11:00					
12:00					
13:00					
14:00					
15:00					
16:00					
17:00					
18:00					
19:00					
20:00					
21:00					
22:00					
23:00					
00:00					
01:00					
02:00					
03:00					
04:00					
05:00					
06:00					
07:00					

*Additional fluids intravenously may be needed if the patient is not eating or drinking reliably. Fluids, particularly dextrose containing fluids, may have to be restricted in patients who are at risk of or already have hyponatraemia. In some cases insulin without substrate fluids may have to be used (difficult i.v. access, fluid overload states, hyponatraemia or risk of hyponatraemia). Please consult senior medical/ obstetric staff as needed.

6.4 Appendix: Oral GTT – Guidance for Staff

6.4.1 Introduction and Aim

Gestational diabetes (GDM) affects 2-5% of pregnancies worldwide. It is usually asymptomatic but has serious consequences that can be reduced by treatment. Women who develop gestational diabetes have a 1 in 2 chance of developing it again in a future pregnancy, a strong risk factor for diabetes in the future and developing metabolic syndrome. Treatment of GDM is effective in reducing macrosomia, pre-eclampsia and shoulder dystocia. Patients need to be given clear advice so they can make an informed decision about screening and healthcare professionals need to deliver appropriate guidance about the screening process.

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6.4.2 How should we Test?

Use the 2-hour 75 g OGTT to test for gestational diabetes in women with risk factors.
HbA1c testing is no longer recommended for diagnostic use for diagnosis.

Offer women who have had gestational diabetes in a previous pregnancy:

- early self-monitoring of blood glucose or
- a 75 g 2-hour OGTT as soon as possible after booking (whether in the first orsecond trimester), and a further 75 g 2-hour OGTT at 26–28 weeks if the results of the first OGTT are normal.
- Offer women with any of the other risk factors for gestational diabetes a 75 g2-hour OGTT at 26–28 weeks, as below.

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6.4.3 Who is offered the Oral Glucose Tolerance Test?

Oral glucose tolerance tests (OGTT) should be offered to the following patient groups between weeks 26-28 of pregnancy, modified from NICE guidance.

- Personal history of GDM in any previous pregnancy. An Oral Glucose Tolerance Test should be offered as soon as formally booked, around 16weeks. If negative a repeat is needed at 28 weeks
- Previous baby weighing >4.5 kg
- BMI of 30 kg/m_2 or more **(New, 2021)**. This is agreed by Wales consensus.If BMI is >45, OGTT should be offered at 16 weeks. If negative a repeat is needed at 28 weeks
- Glycosuria of 2+ or more on dipstick testing on one occasion or 1+ on two occasions
- Diagnosis by a doctor of polycystic ovarian syndrome (PCOS)

- Previous unexplained stillbirth
- Previous unexplained polyhydramniosBlack or Asian ethnicity
- First degree relative with type 1 or 2 diabetes.

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6.4.4 Advice on Ethnicity for OGTT

The NICE guidelines about ethnic origin when looking which would put you at higher risk of GDM are decidedly vague. RCOG guidelines state if someone's family originates from these areas, then they should be screened for gestational diabetes South Asian (e.g. India, Sri Lanka, Nepal) Chinese, African-Caribbean, Middle Eastern (e.g. Egypt, Iraq,Turkey).

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6.4.5 What preparation should we be giving patients coming in for an oral glucose tolerance test?

1. A patient information sheet should be given to the patient at least 3 days before the test. This includes a brief outline of the reason for the test and the procedure that is used. The patient information leaflet will inform regarding exercise, diet and fasting. It should be establishing what medications patients are taking before the test and so tailored advice can be given.

2. The patient should follow an unrestricted diet (containing at least 150g carbohydrate daily) and usual physical activity and amount of exercise for at least 3 days before the test.

3. The patient must fast for 10-14 hours before the test is administered. Water may be drunk during the fast. The patient should not smoke or drink any caffeine containing beverages (such as coffee or tea) on the morning of the test. Chewing gum is not allowed to be taken but there's no reason why patients should be cancelled for having brushed their teeth with toothpaste or used mouthwash.

4. Any long-term drug treatments should be taken as usual on the morning of the test. If the patient is receiving a drug known to affect glucose tolerance this should be noted on the form.

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6.4.6 OGTT in Fasting Women

Women are advised not to fast whilst preparing for their oral glucose tolerancetest. They need to be following an unrestricted diet containing 150g of carbohydrate for at least 3 days before their test date.

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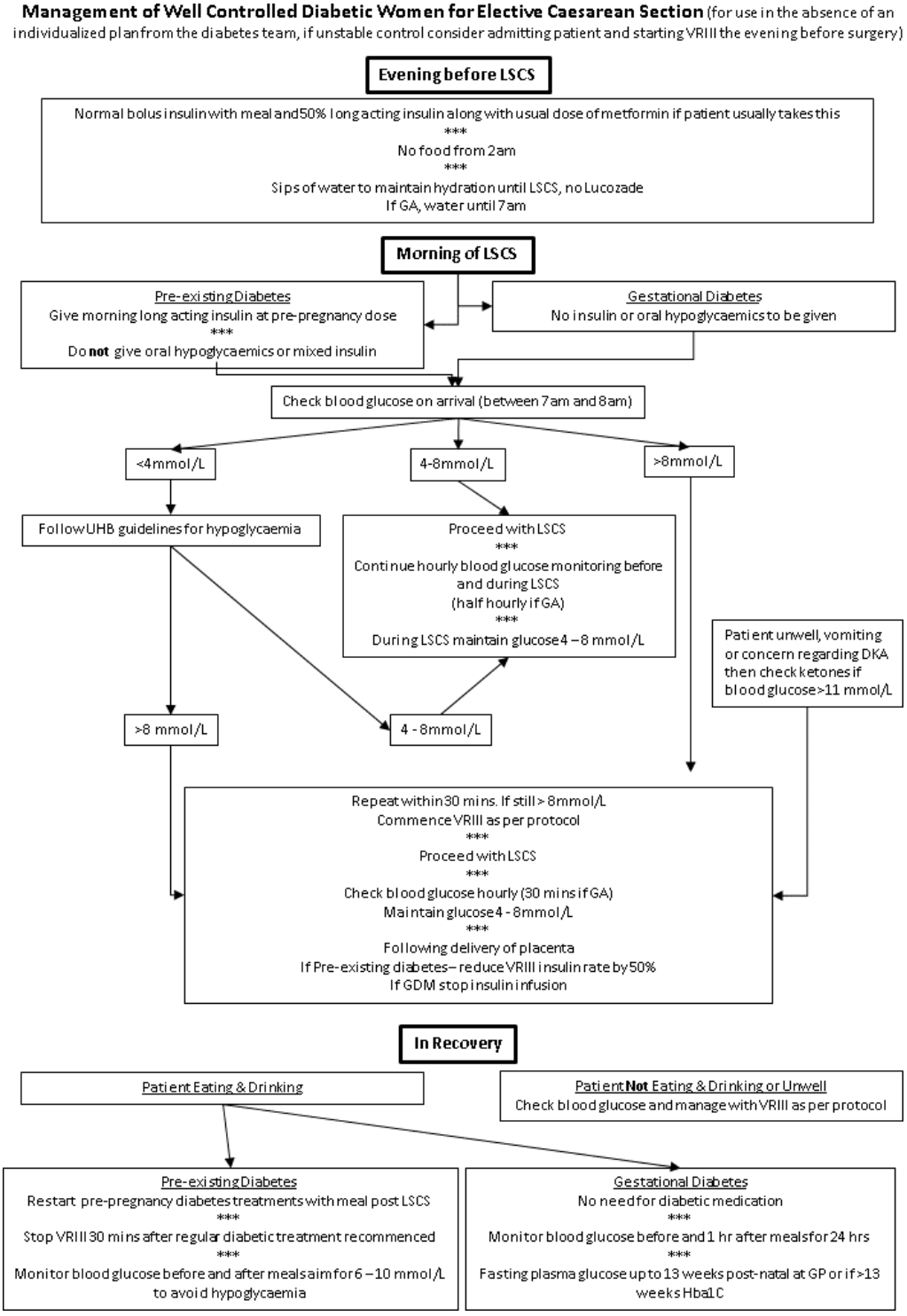
6.5 Appendix: Flowchart: Management of Well Controlled Diabetic Women for Elective Caesarean Section



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6.6 Appendix: Pre-Existing Diabetes Care Pathway

EDD……

Patient Addressograph

Type 1 □
Type 2 □

BMI:

Pre-pregnancy Medication and Dose:

Past Medical History:

Folic Acid to 12 Weeks: Yes □ No □

Aspirin 150mg to 36 weeks: Yes □ No □

Drug History:

Allergies:

Obstetric History: G P

Steroids Given: Yes □ No □

Date: ……

Results:

	Booking	1st Trimester	2nd Trimester	3rd Trimester
Date				
HbA1c				
Hb				
U+Es				
ACr				
Retinal Screening				

Risks Discussed:

Maternal:

- ☐ Pre-eclampsia
- ☐ Hyperglycaemia
- ☐ Polyhydramnios
- ☐ Caesarean section
- ☐ Induction of labour

Fetal:

- ☐ Macrosomia
- ☐ Intrauterine growth restriction
- ☐ Stillbirth
- ☐ Shoulder dystocia
- ☐ Neonatal jaundice
- ☐ Neonatal hypoglycaemia
- ☐ Congenital malformation

Plan for Antenatal Care Discussed:

- ☐ Importance of good diabetic control
- ☐ Diabetic review every 2 weeks and ANC review every 4 weeks from 28 weeks
- ☐ Serial Growth scans from 28 weeks
- ☐ Timing of delivery
- ☐ Contraception planned post delivery
- ☐ Anaesthetic Review Needed: Yes □ No □

Plan for Delivery:

36 week Hb:

Intrapartum Plan:

Variable rate insulin infusion required in labour: Yes □ No □

Postnatal Plan:

Contraception:

Infant Feeding:

Future pregnancy planning:

Changes to blood glucose therapy after birth:

Date:	Gestation:	BP:	Urine:	FM:	RE:
Obstetric					

Sign: **Print:**

Diabetic

Sign: **Print:**

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6.7 Appendix: Gestational Diabetes Care Pathway

EDD……

Patient Addressograph

Obstetric History:

G P

BMI:

Past Medical History:

Drug History:

Allergies:

Results at diagnosis of GDM:

	Date	Result
GTT – Fasting		
GTT – 2 Hour		
HbA1c		
Hb		

Initial Consultation by diabetic team at diagnosis:

- ☐ BM monitoring
- ☐ Dietary advice
- ☐ Breast feeding
- ☐ Contact info given
- ☐ Links provided

Obstetric Consultation at 1 week following diagnosis: Risks Discussed

Maternal:

- ☐ Pre-eclampsia
- ☐ Hyperglycaemia
- ☐ Polyhydramnios
- ☐ Caesarean section

Fetal:

- ☐ Macrosomia
- ☐ Intrauterine growth restriction
- ☐ Stillbirth
- ☐ Shoulder dystocia

☐ Induction of labour

☐ Neonatal jaundice
☐ Neonatal hypoglycaemia
☐ Congenital malformation

Plan for Antenatal Care Discussed:

☐ Importance of good diabetic control
☐ Serial growth scans
☐ ANC review every 4 weeks
☐ Timing of delivery
☐ Contraception planned post delivery
☐ Anaesthetic Review Needed: Yes □ No □

Plan for Delivery:

36 week Hb:

Intrapartum Plan:

Postnatal Plan:

Contraception:

Infant Feeding:

Stop blood glucose therapy following birth:

Testing for diabetes postnatally with GP and yearly thereafter:

Date:	Gestation:	BP:	Urine:	FM:	RE:
Obstetric					

Sign:	**Print:**
Diabetic	
Sign:	**Print:**

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