



All Wales Maternity & Neonatal Network Guidelines

Strategy for Screening and Management of Gestational Diabetes

Documents to read alongside this guideline	(1). Diabetes in pregnancy: management from preconception to the postnatal period. NICE guideline [NG3] Published date: February 2015 Last updated: 2020 (2) Managing hyperglycaemia during antenatal steroid administration, labour and birth in pregnant women with diabetes- An updated guideline from the joint British Diabetes Society for Inpatient Care. Diabetic Medicine.2022 Feb;39(2)- (3)Antenatal corticosteroids to reduce neonatal morbidity and mortality (Green-top Guideline No. 74) published Feb 2022
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Disclaimer: These guidelines have been ratified at the Maternity/Neonatal Guideline Committee Meeting; however clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.

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1 Introduction

Approximately 5% of pregnancies involve women with diabetes, most are gestational diabetes (87.5%), the remaining being pre-existing type 1 and type 2 diabetes. A separate guideline will cover the care of pregnant women with pre-existing diabetes.

Gestational diabetes mellitus (GDM) is a common disorder during pregnancy and its prevalence is increasing. GDM is any diabetes that is first diagnosed during pregnancy regardless of whether it resolves post-partum or develops into type 1 or type 2 diabetes. GDM diagnosed in the first trimester may represent previously undiagnosed Diabetes.

There is a higher incidence of macrosomia, birth injury, Respiratory Distress Syndrome (RDS), postnatal hypoglycaemia and other adaptation problems in the babies born to women with gestational diabetes.

In the long-term, babies born to women with gestational diabetes may develop obesity, diabetes and metabolic disorders.

Up to 50% of women diagnosed with GDM develop type 2 diabetes within 5 years of giving birth.

2 Pathophysiology

GDM is a hyperglycaemic state due to impaired glucose tolerance secondary to pancreatic β -cell dysfunction on a background of chronic insulin resistance. There is lowering of blood glucose levels early in pregnancy due to rise of oestrogen, progesterone and other pregnancy related hormones but as pregnancy advances, postprandial glucose levels steadily increase as insulin sensitivity decreases. To obtain optimal glucose control maternal insulin secretion needs to be increased or supplemented to counter altered insulin sensitivity.

Maternal hyperglycaemia results in excessive transfer of glucose to the developing fetus, resulting in fetal hyperinsulinemia, leading to fat depositions around neck, shoulders and abdomen, leading to shoulder dystocia, neonatal hypoglycaemia, long term risk of obesity, diabetes and cardiovascular disease.

For the mother there is increased risk of interventions in pregnancy, induction of labour, caesarean section (CS) and type 2 diabetes in the long term.

3 Risk Factor Based Screening for GDM

Every pregnant woman should be screened at booking for presence of risk factors for GDM.

Offer screening in all women with the following risk factors at booking:

1. BMI >30 Kg/m²
2. Previous macrosomic baby > 4.5 Kg or babies >97th Centile of personalised growth chart
3. Family history of diabetes (1st degree relative)
4. Family origin: Ethnic family origin with high prevalence of diabetes. (South Asian, Afro-Caribbean, Middle Eastern)
5. Previous history of gestational diabetes or history of Type 2 Diabetes in remission/Pre-diabetes (These women require early GTT)

Certain risk factors for GDM may only become apparent during pregnancy. Once identified the appropriate screening test should be undertaken within 5 working days irrespective of gestation if under 34 weeks gestation. See comment in section 4, if gestation >34/40 .

These factors include:

1. Glycosuria $\geq 2+$ on one occasion or 1+ on 2 occasions
2. Fetal macrosomia or Estimated Fetal Weight >97th Centile of personalised growth chart
3. Polyhydramnios (moderate/severe)

All women with risk factors for GDM, benefit from general dietary advice irrespective of the results of OGTT. This is done by the obstetric/midwifery team caring for the woman.

4 Screening test and timing of the test

The 2 hour, 75mg oral glucose tolerance test (OGTT) is the preferred screening test and is performed between the gestational age of 24-28 weeks in women with risk factors.

In women with previous gestational diabetes, and in women with type 2 diabetes in remission or pre diabetes, the OGTT should be performed at the earliest opportunity in the pregnancy before 16 weeks of gestation.

If the result is normal, the OGTT should be repeated between 24-28 weeks of gestation.

Alternatively, women can be offered early capillary blood glucose (CBG) monitoring for a week.

If new risk factors develop after 28 weeks, offer OGTT at the earliest opportunity (within 5 days).

However, after 34 weeks of gestation, there are no validated tests for screening for gestational diabetes. The following options could be considered:

- a) HbA1C (>39mmol/mol) along with Fasting Plasma Glucose (> 5.3)

OR

- b) Capillary blood glucose monitoring for 1 week, taking fasting and 1 hour postprandial samples (consider +ve for GDM if raised Fasting Blood Glucose or >3 abnormal postprandial readings)

If 2 tests done at intervals are reported as normal and the risk factors persist, discuss with local joint obstetric-diabetes team prior to conducting further screening tests.

Women who have had gastric bypass surgery (excluding gastric band) should not have OGTT. Instead advise testing CBG levels for a period of one week between 24-28 weeks of gestation. Consider +ve for GDM if raised Fasting Blood Glucose or >3 abnormal postprandial readings.

If women have received antenatal corticosteroids just before planned OGTT then defer the OGTT for at least 5-7 days after the last dose to avoid effect of steroids on the test results.

If women are continuing to take metformin during pregnancy for non-diabetic conditions (e.g. PCOS), it is recommended to discontinue temporarily for 4-5 days prior to the OGTT.

Do not use fasting capillary glucose, random blood glucose, HbA1c (at <34 weeks gestation), glucose challenge test or urinalysis for glucose to diagnose GDM.

4.1 Positive test result:

Fasting plasma glucose level ≥ 5.6 mmol/L or
2-hour plasma glucose level ≥ 7.8 mmol/L

Note if Fasting Plasma Glucose is >10 mmol/L or features of T1DM (weight loss, marked thirst or polyuria) an urgent same day referral should be made to the diabetes team.

Monogenic Diabetes Be aware that a form of monogenic diabetes, glucokinase deficiency, may present in pregnancy as gestational diabetes.

5 Care of women diagnosed with gestational Diabetes.

Women with gestational diabetes should be offered an appointment in the appropriate specialised antenatal clinic within a week of diagnosis.

The staffing arrangements of the specialist diabetes ante-natal clinic will vary between different locations however, would ideally be a diabetes specialist midwife, diabetes specialist nurse and a dietitian. Access to consultant obstetric and diabetologist review should be available as necessary if considered appropriate or at times suggested by the local pathway.

The specialist antenatal clinic team should be in contact with these women every 1 to 2 weeks throughout pregnancy for glucose control and assessment. This will include telephone consultations.

At first visit-

1. Explain to women with gestational diabetes:

- about the implications (both short and long term) of the diagnosis for her and her baby
- that good glucose control throughout pregnancy will reduce the risk of fetal macrosomia, trauma during birth (for woman and baby), induction of labour and/or caesarean section, neonatal hypoglycaemia and perinatal death
- that treatment includes changes in diet and exercise, and may involve medicines.

2. Teach women with gestational diabetes about self glucose monitoring.

Women should be given contact details of the midwifery and diabetes team and be aware of the targets of blood glucose monitoring (<5.3mmol/l fasting and <7.8mmol/l 1 hour post meals or <6.4mmol/l 2 hour post meal)

3. Offer women review with dietitian and advice about changes in diet and exercise at the time of diagnosis of gestational diabetes such as following a healthy diet, low glycaemic index food, exercise.

4. Offer the e prescription of the two national films on gestational diabetes.

<http://www.diabeteswales.org.uk > pocket-medic>

5. An HbA1c should be taken to exclude pre-existing diabetes (≥ 48 mmol/mol).

Subsequent Reviews (1-2 weekly, including telephone reviews)

6. Review Capillary blood glucose monitoring record and institute appropriate treatment.

7. Midwives providing care for the mother must discuss the benefits of breast feeding for mother and baby and be supported to hand express breast milk prior to delivery.

8. Arrange to monitor fetal growth in accordance with local HB's policy (GAP and GROW or NICE recommendation). Growth scans between gestation of 28 to 34 weeks, can be reviewed by the regular midwifery team in antenatal clinics as long as normal. (i.e., no macrosomia, growth restriction, polyhydramnios). The 36 weeks scan will coincide with Consultant Diabetes Antenatal Clinic.

9. Obtain consent for ongoing postnatal support and education to prevent type 2 diabetes (appendix 1)

New diagnosis of GDM- Refer to be seen by a member of the MDT within the appropriate Specialised ANC ideally within 1 week (DSN, Dietician, specialist diabetes MW)

1st Review In Specialist ANC (Consider group session by diabetes specialist educator)

Discuss diagnosis and implications. Give dietary and activity advice.

Teach glucose monitoring and discuss glucose targets.
 Notify primary care (see template letter in appendix 1)
 Prescribe GDM films (<http://www.diabeteswales.org.uk> > pocket-medic)



Continue 1 – 2 weekly review of capillary blood glucose. If targets not being achieved despite adequate medications including insulin and dietary modification, refer to Consultant Diabetes ANC.

Serial ultrasounds as per local HB's policy (GAP and GROW/ NICE recommendation) and result review by specialist MW until 34 weeks. If macrosomia or polyhydramnios refer to Consultant Antenatal Clinic.



36 weeks: Fetal growth scan followed by review in Joint Consultant obstetrician-diabetes antenatal clinic

Guide for initiating treatment:

Fasting plasma glucose (mmol/litre)	Fetal complication(s)	Intervention
<7.0	None	Diet and lifestyle changes
>= 7.0	None	Immediate treatment with insulin with or without metformin Diet and lifestyle changes
6.0 – 6.9	Fetal macrosomia Polyhydramnios	Immediate treatment with insulin with or without metformin Diet and lifestyle changes
In women treated initially with diet and exercise if blood glucose targets are not met within 1-2 weeks offer Metformin. If Metformin is contraindicated, not tolerated, unacceptable to the women or targets still not met despite Metformin, offer insulin.		
Treatment of persistent hyperglycaemia should be initiated by the diabetes specialist nurse and be tailored to the blood glucose profile and personal preferences of the woman.		
If insulin required, appropriate education to prevent and treat hypoglycaemia is required. For those requiring multidose insulin, consider continuous glucose monitoring (CGM) device.		

Include discussion on

- . Assessment of fetal wellbeing until delivery
- . Timing and mode of delivery. If ultrasound-diagnosed macrosomic fetus or growth > 97th centile on customised growth chart, women should be informed of the risks and benefits of induction of labour, vaginal birth and caesarean section (provide written information- RCOG/EIDO leaflets)
- . Analgesia and anaesthesia
- . Medication plan for labour and in the postnatal period
- . Care and monitoring of the new born
- . Infant feeding (breastfeeding reduces the risk of developing T2DM by 50%) and colostrum harvesting (appendix 4+5)
- . Instructions for postnatal testing of Fasting Plasma Glucose between 6-13 weeks after giving birth
- . Contraception, need for planning next pregnancy and recommend early GTT in next pregnancy



37-40 weeks Midwife review if consultant review not planned.

Book induction of labour or caesarean birth to effect delivery by 40+6 weeks in women without any maternal or fetal complications.

Reinforce dietary and lifestyle advice including benefits of breast feeding to reduce lifelong risk of developing type 2 diabetes. Information on Preventing Type 2 Diabetes Baby Steps (appendix 6)

5.1 Insulin safety

In women who require insulin to achieve optimal control of hyperglycaemia- it is essential that the women receive appropriate education including rotation of injection sites, education on prevention, early recognition and treatment of hypoglycaemia, and to always carry a fast acting form of glucose.

6 Antenatal corticosteroids for fetal lung maturation

Antenatal corticosteroids are recommended and offered in women presenting with preterm pre-labour rupture of membranes (PPROM) and suspected preterm labour with intact membranes or planned preterm vaginal or caesarean birth before 34+6 weeks gestation.

Consider antenatal corticosteroids if planned caesarean birth between 35 to 36+6 weeks of gestation. If elective caesarean birth is planned between 37 to 38+6 weeks gestation, do not routinely offer antenatal corticosteroids.

Informed discussion should take place with the woman (and her family members or carers as appropriate) about the potential risks and benefits of a course of antenatal corticosteroids. Although antenatal corticosteroids may reduce admission to the neonatal unit (NNU) for respiratory morbidity, it is uncertain if there is any reduction in RDS, transient tachypnoea of the newborn (TTN) or NNU admission overall, and antenatal corticosteroids may result increased risk of hypoglycaemia and potential developmental delay. The impairment of glycaemic control following steroid administration is likely to offset any intended benefits. The decision should be individualised.

Use of antenatal corticosteroids will be associated with a deterioration in glycaemic control for up to 72 hours and occasionally longer.

Women receiving corticosteroids should monitor blood glucose closely and may need to be admitted for blood glucose monitoring and variable rate intravenous insulin infusion (VRIII) or supplementary IV insulin.

(appendix 2a VRIII JBDS guideline,
2b- Supplementary VRIII with basal bolus insulin)

7 Intrapartum Care

Cardiff and Vale Place of Birth edit

Following the recent publication by Morelli et al, (2024) and a review of local safety data, women with **diet-controlled gestational diabetes mellitus (GDM)** who have maintained normal blood glucose levels throughout pregnancy and have no other obstetric, medical or fetal risk factors may be considered suitable for labour and birth in a **midwife-led unit**, following individualised assessment and shared decision-making (NICE 2026).

Care planning

If criteria met at 36 weeks for a review and discussion with **specialist midwife, consultant midwife or obstetrician**. Document clearly the place of birth in the electronic record.

Inclusion criteria to be assessed at 36 weeks.

- Diet controlled
 - No concerns with fetal growth
 - Well controlled BG levels within range 70% of the time (Fasting : 4.0 - 5.3 mmol/L. Pre Meal 4 – 6 mmol/L 1 hour post mean – no greater than 7.8 mmol/L)
 - No other comorbidities or complexities (eg raised BMI <35).
- If any other comorbidities present and requesting birth on MLU, please refer to birth choices for an individualised care birth plan.

Intrapartum Care

During labour, women should be encouraged to eat and drink according to their wishes and remain mobile, with support for normal physiological labour. IIA can be used to monitor the fetal heart as per MLC guideline and in line with NICE guidance.

Capillary blood glucose monitoring should be undertaken **HOURLY** during established labour in accordance with local policy, with a target maternal blood glucose level of **4.0–8.0 mmol/L**. Any deterioration in glycaemic control, development of obstetric complications, evidence of fetal compromise, or requirement for pharmacological treatment should prompt senior review and **consideration** of transfer to an obstetric-led setting. Care should be individualised, ensuring women receive information about their birth place options and are supported to make informed choices regarding intrapartum care.

Postnatal Care

Hypoglycaemic policy for neonate as below

8 Intrapartum Care

1. Induction and augmentation of labour can be carried out as for normo-glycaemic women. GDM should not be regarded as a contraindication to attempting vaginal birth after a previous caesarean section.

2. Women should continue with normal subcutaneous insulin regime (long acting and short acting insulin) and oral medications (Metformin) during prostaglandin induction until established in the active phase of the labour.

3. Women can eat and drink during labour (as per local policy). Stop subcutaneous rapid acting insulin regimen and oral agents (Metformin) but continue long acting insulin in labour. But be aware as insulin requirements reduce as soon as the placenta is delivered, making the woman vulnerable to hypoglycaemia for several hours if basal (long acting) insulin taken in the hours before delivery.

4. CBG should be monitored hourly during labour and levels maintained between 4–8 mmol/L (NICE, 2020; JBDS 2023). Check U&E prior to commencing VRIII. Commence VRIII if A) already on multidose insulin; B) if not on multidose insulin- check hourly CBG, if >8mmol/l on 2 occasions (repeat 2nd CBG 30 minutes after first abnormal reading). Stop VRIII after delivery of placenta. Use modified Obstetric Intrapartum VRIII chart (see appendix 3)

5. Women with GDM on medication should be advised to plan to birth on the Obstetric Unit/Labour Ward (NICE, 2022) due to the increased chance of shoulder dystocia, even where macrosomia is not suspected. Women who are diet controlled and in spontaneous labour are suitable for intrapartum surveillance via intermittent auscultation (NICE, 2022). For all other women Continuous Electronic Fetal Monitoring is recommended. Hourly blood glucose monitoring during labour is recommended for all women with GDM. (see Cardiff and Vale edit for GDM diet controlled).

Elective Caesarean Birth

Women with GDM on diet controlled or on Metformin, follow normal CS admission pathway. On admission CBG must be checked and then hourly:

- a. If < 4 mmol/L, follow hypoglycaemia pathways as per your own HB's policy
- b. If 4-8 mmol/L, proceed with CS as planned
- c. If >8 mmol/L, consider stat dose of 2-4 units of rapid acting insulin, depending on individual total insulin dose of insulin and insulin sensitivity (if in doubt liaise with diabetes team). Repeat CBG prior to CS. If 4-8 mmol/L then proceed with CS as planned. If CBG > 8 mmol/L, commence on VRIII for CS whether elective or emergency.

Women with GDM on basal bolus insulin should be admitted on the morning of the ELCS, having fasted from midnight and omitted the morning short-acting insulin dose. Avoid pre-op drinks. Those on afternoon surgery lists should follow the appropriate 6 hours fasting prior to surgery.

Check U&Es on commencing VRIII and continue to check every 6 hours when on VRIII. Monitor CBG hourly whilst on VRIII (every 30 min from induction of General Anaesthesia until the woman is fully conscious).

8 Postnatal Care

1. Women are advised to stop all glucose lowering medication immediately after birth (exception being when it is thought to be pre-existing diabetes first recognised in pregnancy).
2. Monitor CBG 4 hourly, until first meal and an hour post meals on the first day to ensure there is no ongoing hyperglycaemia aiming for a target of 6-10 mmol/l.
3. Breastfeeding should be encouraged in all women with GDM and offer harvested colostrum if available. Advise women to feed baby within one hour of birth and every 2-3 hours in the first 24 hours to prevent neonatal hypoglycaemia.
4. Check baby's CBG 2-4 hours after birth to rule out neonatal hypoglycaemia and follow the local Neonatal Hypoglycaemia Prevention pathway.
5. Ensure baby is not discharged home in the first 24 hrs until feeding well and their blood glucose levels are within normal parameters.

8.1 Information at discharge and follow up

1. Women with GDM should be advised lifestyle changes (including weight management, diet and exercise). Encourage healthy diet choices with low GI Diet and weight loss if BMI > 30 or to avoid weight gain if normal BMI. Offer enrolment to the Baby Steps program
2. Arrange postnatal testing of FPG between 6-13 weeks or for HbA1c after 13 weeks to exclude diabetes and an annual HbA1c by the GP for early diagnosis and intervention.

FPG (6-13 weeks PN)	HbA1C (after 13 weeks)	advice
<6mmol/L	<39mmol/mol	Moderate risk of T2DM To follow lifestyle advice and annual HbA1C
6.0-6.9mmol/L	39-47 mmol/mol	High risk of future T2DM To follow lifestyle advice and annual HbA1C
>7.0mmol/L	>48mmol/mol	Likely has T2DM, needs confirmatory test

3. The diagnosis of gestational diabetes should be clearly communicated to primary care with appropriate **READ code L180811 or L180900** to facilitate this.
4. Women are at increased risk of developing GDM in future pregnancies and early OGTT or early blood glucose monitoring in future pregnancies is recommended.

9 Auditable Standards for Antenatal GDM care

Performance Standards to Measure Compliance with All Wales Strategy for Screening and Managing Gestational Diabetes

1. Screening women with risk factors for gestational diabetes in accordance with the above strategy / NICE Guideline NG3 2015(1): Using:

- BMI above 30 kg/m²
- previous macrosomic baby weighing >4.5 kg or babies >97th Centile of personalised growth chart
- previous gestational diabetes or h/o pre-diabetes/type 2 diabetes in remission
- family history of diabetes (first degree relative with diabetes)
- ethnic family origin with a high prevalence of diabetes
- glycosuria of 2+ or above on 1 occasion or of 1+ or above on 2 or more occasions detected by reagent strip testing during routine antenatal care.

Compliant:

Variance:

Reason for variance:

2. Using the All Wales Strategy / NICE Guideline NG3(1) definition of gestational diabetes rather than other definitions:

“Diagnose gestational diabetes using a 75g OGTT if the woman has either:

- a fasting plasma glucose level of 5.6 mmol/L or above or
- a 2 hour plasma glucose level of 7.8 mmol/L or above.”

Compliant:

Variance:

Reason for variance:

3. Using the All Wales Strategy / NICE Guideline NG3(1) targets for capillary glucose when treating gestational diabetes:

fasting capillary glucose < 5.3mmol/L

1 hour after food < 7.8mmol/L

2 hours after food < 6.4mmol/L

Compliant:

Variance:

Reason for variance:

4. 100% women with a new diagnosis of gestational diabetes to be seen by the specialist team within a week (note: this is not the combined obstetric / diabetes clinic but a specialised service to explain the diagnosis, give appropriate dietary advice, teach capillary testing – see standard(2))

Compliant:

Variance:

Reason for variance:

5. 100% communication with primary care of the diagnosis of gestational diabetes to facilitate READ coding and appropriate follow up with intervention to prevent diabetes.

Compliant:

Variance:

Reason for variance:

10 References

- (1). Diabetes in pregnancy: management from preconception to the postnatal period. NICE guideline [NG3] Published date: February 2015 Last updated: 2020 - [Overview | Diabetes in pregnancy: management from preconception to the postnatal period | Guidance | NICE](#)
- (2). All-Wales Strategy for Screening and Managing Gestational Diabetes 2017
- (3) Managing hyperglycaemia during antenatal steroid administration, labour and birth in pregnant women with diabetes-an updated guideline from the Joint British Diabetes Society for Inpatient Care. Diabetic Medicine. Revised February 2023. Last accessed April 2023. Available from - [JBDS 12 Managing diabetes and hyperglycaemia during labour and birth with diabetes February 2023.pdf \(abcd.care\)](#)
- (4) Stock SJ, Thomson AJ, Papworth S; the Royal College of Obstetricians, Gynaecologists. Antenatal corticosteroids to reduce neonatal morbidity and mortality. BJOG 2022;
- (5). Fetal Monitoring in Labour. NICE guideline. [NG229] Published date December 2022. [Fetal monitoring in labour \(nice.org.uk\)](#)

Appendix 1 Communication sheet to Primary Care

Clinic contact details

Date

Dear

Re: Patient details

Our records indicate that the above woman is a registered patient at your practice. She has recently been diagnosed with gestational diabetes.

The read code is: Gestational Diabetes Mellitus L180811 or L180900

Reason for Testing for gestational diabetes: _____

75g OGTT result: 0 minutes _____ mmol/L 120 minutes _____ mmol/L at ____ weeks gestation

She will be seen by the specialised diabetes antenatal team and treated in accordance with the Wales Strategy for Screening and Managing Gestational Diabetes. As part of this strategy it is recommended that she performs capillary glucose monitoring 4 to 7 times a day. She may require medication such as metformin and/or insulin.

We would be grateful if she could be prescribed:

strips for capillary glucose testing, lancets

Metformin or insulin if this is recommended by the specialised diabetes antenatal team.

Postpartum she will need testing (FPG between 6-13 weeks, HbA1c if after 13 weeks) to ensure no on-going diabetes with repeat testing on an annual basis. She will also need advice and intervention to reduce her future risk of type 2 diabetes.

- If the fasting plasma glucose is < 6.0 mmol/L (HbA1c < 39 mmol/mol or 5.7% after 13 weeks post partum) she has a moderate risk of future type 2 diabetes, should follow lifestyle advice and have an annual test for diabetes.
- If the fasting plasma glucose is 6.0 to 6.9 mmol/L (HbA1c 39 to 47 mmol/mol or 5.7 to 6.4% after 13 weeks post partum) she has a high risk of future type 2 diabetes, should follow lifestyle advice and have an annual test for diabetes.
- If the fasting plasma glucose is 7.0 mmol/L or above (HbA1c is 48 mmol/mol {6.5%} or above after 13 weeks postpartum) she is likely to have diabetes and need a diagnostic test to confirm this.

Women with previous gestational diabetes should have early OGTT in subsequent pregnancies
Women should be tested for diabetes if planning a pregnancy.

Women should be offered lifestyle advice to prevent future diabetes. If the BMI > 30kg/m² offer a referral to the dietetic service for weight management. Women should be offered participation in 'Baby Steps' program.

Appendix 2a-

Management of blood glucose following steroids during pregnancy



Hospital..... Ward..... Consultant.....	Hospital Number..... Surname..... First Name..... Address..... Date of Birth.....								
Dosing Algorithm			Algorithm guide						
Algorithm	1 <80 units/day	2 >80 units/day	3 Uncontrolled on 2						
CBG (mmol/l)	Infusion rate (units/hr)								
<4.0	Stop insulin 20 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						
Signed									
Print									
Date									
Intravenous insulin									
Drug (please tick)	Dose	Volume	Route	Sign	Name	Date	Syringe preparation		
							Prepared by	Date	Time
Actrapid	50 units	49.5 ml normal saline (1 unit/ml)	IV					start	stop
Actrapid	50 units	49.5 ml normal saline (1 unit/ml)	IV						

- All patients should have hourly capillary blood glucose (CBG) measured
- Start VRII insulin with first dose of steroid and continue for 24 hours after last dose
- Algorithm 1** Most women start here
- Algorithm 2** Use on those using more than 80 units/day
- Algorithm 3** Use for those not achieving target on algorithm 2.
- If the woman is not achieving target on these contact the diabetes team or medical registrar out of hours
- Target BG = 4.0-7.8 mmol/l
- Check CBG hourly
- Move to a higher algorithm if CBG not dropping
- Move to a lower algorithm if CBG below 4.0mmol/l or dropping too fast
- Remember always check blood ketones if glucose is above 11.0 mmol/l**

Always continue basal subcutaneous insulin e.g. Humulin I, Levemir, Lantus

Intravenous fluid											
Date	Intravenous fluid and rate	Rate	Alt rate	Prescriber	Nurse						
	0.9% Normal Saline, 5% Dextrose, 20 mmol KCl	50ml/hr									
	0.9% Normal Saline, 5% Dextrose, 20 mmol KCl	50ml/hr									

Prescription of intravenous dextrose for management of hypoglycaemia											
Date	Time	Prescription	Volume	Route	Duration	Prescriber	Print	Given by	Time		
		20% Dextrose	100ml	IV	15 mins						

Capillary blood glucose monitoring												
Date	01.00	02.00	03.00	04.00	05.00	06.00	07.00	08.00	09.00	10.00	11.00	12.00
CBG												
Insulin rate												
Ketones												
Sign												
Date	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
CBG												
Insulin rate												
Ketones												
Sign												
Date	01.00	02.00	03.00	04.00	05.00	06.00	07.00	08.00	09.00	10.00	11.00	12.00
CBG												
Insulin rate												
Ketones												
Sign												
Date	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
CBG												
Insulin rate												
Ketones												
Sign												
Date	01.00	02.00	03.00	04.00	05.00	06.00	07.00	08.00	09.00	10.00	11.00	12.00
CBG												
Insulin rate												
Ketones												
Sign												
Date	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
CBG												
Insulin rate												
Ketones												
Sign												

Patients with type 1 Diabetes on insulin pumps should be referred to Diabetes team												
Maintain on IV insulin for 30 minutes after re-starting sub-cutaneous insulin regime. IV insulin has a half-life of 5 minutes												

Appendix 2b- VRIII with basal bolus insulin for steroid cover

Pt label	EDD	1st dose (name, date time)
	Gest age	
	Consultant	last dose steroid (name, date time)

Current insulin dose (please prescribe on the All Wales Insulin prescription Chart)					
short acting insulin (name)			long acting insulin (name)		total insulin dose (units)
Dose					

Regime for SUPPLEMENTAL Variable Rate Intravenous Insulin Infusion				
Continue usual short and long acting subcutaneous insulin				
As long as eating and drinking normally, there is no need for additional substrate fluid				
If not on insulin, use regime A				
CBG	A 0-40 units/day	B 80units/day	C 120 units/day	D >120units/day
<6.0 mmol/l	0	0	0	0
6.1-7.0 mmol/l	0.5	1	2	3
7.1-8.0 mmol/l	1	2	3	5
8.1-9.0 mmol/l	1.5	3	4	7
9.1-10.0mmol/l	2	4	6	10
>10.1 mmol/l	3	6	8	13
prescriber's signature				
Date				
time				

Check U&Es Record CBG hourly in the table below Check blood ketones if CBG>11 mmol/l	move up a scale if CBG persistently >7.8mmol/l (A-->B/B-->C/C--> D)
--	--

[illegible]

continue hourly CBGs for at least 12 hours after last dose of Dexamethasone and 24 hours after last dose of Betamethasone

11 Appendix 3 Intrapartum monitoring chart

TREATING HYPOGLYCAEMIA (ON VRIII) = CBG < 4 mmol/L																																																																																																																																	
NURSE LED TREATMENT Call for HELP + Stop IV Insulin + Check A-B-C																																																																																																																																	
Is patient asymptomatic or suitable for oral glucose - 4 glucose tablets or 2 glucose gels																																																																																																																																	
Is patient symptomatic or NBM:																																																																																																																																	
IV access secured																																																																																																																																	
1. Give 20% Glucose 100 mls IV Stat 2. Check CBG every 15 mins 3. If CBG < 4 mmol/L, repeat 20% Glucose IV up to 3 times (4 Boluses in total)																																																																																																																																	
OR... If NO time to secure IV ACCESS																																																																																																																																	
1. 1 mg Glucagon IM once + Secure IV access 2. Give 20% Glucose 100 mls IV Stat + Check CBG every 15 mins 3. If CBG < 4 mmol/L, repeat 20% Glucose IV up to 3 times (4 Boluses in total)																																																																																																																																	
Restart VRIII once CBG>4, run VRIII at 0.2 ml/hr for 1 hour, after 1 hour follow a reduced VRIII protocol (i.e. IN to ST)																																																																																																																																	
CONTINUED TREATMENT																																																																																																																																	
1. If persistent Hypoglycaemia after 3 boluses of 20% Glucose: • URGENT Medical or Diabetes Team review 2. If Hypoglycaemia occurs with Reduced VRIII protocol use 10% Glucose + 0.15% KCL (page 1)																																																																																																																																	
<table border="1"> <thead> <tr> <th colspan="4">20% GLUCOSE BOLUS</th> <th colspan="4">Date</th> <th colspan="4">Time</th> <th colspan="4">Sign</th> <th colspan="4">GLUCAGON</th> <th colspan="4">Date</th> <th colspan="4">Time</th> <th colspan="4">Sign</th> </tr> </thead> <tbody> <tr> <td>100 ml</td> <td>IV</td> <td>BOLUS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1 mg</td> <td>IM</td> <td>Once in 24 hrs</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4">As per treating HYPOGLYCAEMIA</td> <td colspan="4"></td> <td colspan="4"></td> <td colspan="4"></td> <td colspan="4">As per treating HYPOGLYCAEMIA</td> <td colspan="4"></td> <td colspan="4">Once in 24 hrs</td> </tr> <tr> <td colspan="4">Sign</td> <td colspan="4">Date</td> <td colspan="4"></td> <td colspan="4"></td> <td colspan="4">Sign</td> <td colspan="4">Date</td> <td colspan="4"></td> </tr> </tbody> </table>												20% GLUCOSE BOLUS				Date				Time				Sign				GLUCAGON				Date				Time				Sign				100 ml	IV	BOLUS															1 mg	IM	Once in 24 hrs											As per treating HYPOGLYCAEMIA																As per treating HYPOGLYCAEMIA								Once in 24 hrs				Sign				Date												Sign				Date							
20% GLUCOSE BOLUS				Date				Time				Sign				GLUCAGON				Date				Time				Sign																																																																																																					
100 ml	IV	BOLUS															1 mg	IM	Once in 24 hrs																																																																																																														
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Sign				Date												Sign				Date																																																																																																													
TREATING HYPERGLYCAEMIA (ON VRIII) = CBG > 12 mmol/L																																																																																																																																	
INITIAL TREATMENT Check Urinary or Blood ketones																																																																																																																																	
1. If Urinary ketones ≥ +++ or Blood ketones ≥ 3mmol/L a. Follow DKA management guidelines b. Urgent Medical or Diabetes Team review, if applicable Contact Anaesthetist on list 2. If Urinary ketones ≤ ++ or Blood ketones < 3mmol/L a. If patient unwell - Medical Team review b. Hourly Blood ketones and continue hourly CBG																																																																																																																																	
CONTINUED TREATMENT																																																																																																																																	
1. If patient has CBG > 12 mmol/L despite VRIII for two hours • Consider changing to an increased VRIII protocol 2. If persistent Hyperglycaemia • Medical Team or Diabetes Team review																																																																																																																																	
RESTARTING USUAL DIABETES MEDICATION																																																																																																																																	
- Patient must be able to eat and drink normally - Usual diabetes medication (including rapid-acting insulin) and a meal must be taken one hour before VRIII is stopped - Refer to the Birth Plan – as insulin doses need reducing postnatally (and women with GDM can usually stop insulin after delivery) - If LONG ACTING INSULIN was omitted, then continue VRIII till next LONG ACTING INSULIN dose given or contact Diabetes Team																																																																																																																																	
- Once VRIII stopped please refer to standard CBG monitoring - If patient is new to insulin as part of an emergency procedure consult Diabetes or Medical Team before stopping VRIII - If patient's CBG is outside the range of 4-14 mmol/L then consult Diabetes or Medical Team prior to discharge																																																																																																																																	

USUAL DIABETES MEDICATION AND A MEAL MUST BE GIVEN ONE HOUR BEFORE VRIII IS STOPPED

MULTIPLE VRIII CHARTS				CHART OF			
Hospital:				OBS VRIII Variable Rate Intravenous Insulin Infusion For use in unwell pregnant diabetic women in antenatal period, during Labour and Caesarean Section (for antenatal steroids for fetal lung maturation, use separate chart)			
Ward:							
Cons.:							
Name:							
HOSP N.O: ADDRESSOGRAPH							
D.O.B:							
Date: / / 20							
When to use this chart				When not to use this chart			
INSTRUCTIONS • ALL women with T1DM • Women with T2DM on multidose insulin • Women with GDM on multidose insulin • Women with GDM whose CBG readings >7mmol/L on 2 occasions 30 minutes apart • Women who need to exit CSII/Pump protocol **Long acting insulin must be continued** throughout CBG must be taken HOURLY.				• In Women on CSII (Insulin Pump) self-managing in labour/during CS • Not to be used in patients receiving antenatal steroids (use chart specific for that) <i>Patients receiving steroids should be managed according to the 'Supplemental IV Insulin regime for pregnant women with Diabetes who require steroids for Fetal Lung Maturity' Guideline.</i>			
IV fluids							
All fluids must contain glucose or dextrose and be run through an IV pump							
STANDARD FLUID		ALTERNATIVE FLUIDS To be prescribed by an experienced clinician and reviewed regularly					
1 st choice in most patients	K > 6 mmol/L	K < 4 mmol/L	If repeatedly hypoglycaemic despite VRIII Reduced Protocol	Customised Fluid To be used by diabetes team			
0.45% NaCl + 5% Dextrose + 0.15% KCL or 'STANDARD'	0.45% NaCl + 5% Dextrose	0.45% NaCl + 5% Dextrose + 0.3% KCL	10% Glucose + 0.15% KCL	Prescribe on: FLUID PRESCRIPTION			
100 ml/hr	100 ml/hr	100 ml/hr	100 ml/hr	Specify rate: ml/hr			
Prescribed fluids are continuous (eg: as many bags required until VRIII stopped or prescription changed)							
FLUID PRESCRIPTION AND RECORD							
Daily electrolytes and change fluid as appropriate							
PRESCRIPTION				RECORD			
FLUID PRESCRIPTION	Date	Time	Sign	Date	Time	Nurse Prep.	Nurse Chk.
Prescribed fluids are continuous at 100 ml/hr (unless specified as in Customised Fluid)							

CBG mmol/L VRlll in labour target CBG 4-7 mmol/L A Standard B >80 units/day C Increased Specialist advice 1 Customised Specialist Advice 2 Customised Specialist Advice	< 4.0				FOLLOW TREATING HYPOGLYCAEMIA GUIDELINES (page 4)				FOLLOW TREATING HYPERGLYCAEMIA GUIDELINES (page 4)									
	4.0 - 5.5	5.6 - 7.0	7.1 - 8.0	8.1 - 11.0	11.1 - 14.0	14.1 - 17.0	17.1 - 20.0	>20.1	0.2	0.5	1.0	1.5	2.0	2.5	3.0	4.0	6.0	8.0
USE CODE (in red) to prescribe VRlll opposite on VRlll PRESCRIPTION AND INSULIN RECORD Select: Protocol according to instructions (page 1)	VARIABLE RATE INTRAVENOUS INSULIN INFUSION PROTOCOLS (mls/hr)																	
VRlll PRESCRIPTION AND INSULIN RECORD PRESCRIPTION RECORD	USE CODE: A, B, C, 1, 2				49.5ml of 0.9% Saline with 50 units Actrapid® in a 50 ml syringe				VRlll SET UP									
	Date	Time	Sign		Date	Time	Sign		Date	Time	Prep.	Chk.						
VRlll PRESCRIPTION AND INSULIN RECORD If in doubt continue VRlll till prescriber review																		
• Use a line with anti-reflux and anti-syphon valve • Prime line with 5ml before attaching to patient • Starting syringe volume should be 45ml when first attached to patient • Each new syringe must: • Start at 45mls • Be signed for on record opposite • Start before previous finished																		

Capillary Blood Glucose Level mmol/L CHECK CBG LEVELS HOURLY	0 - 0.9 1 - 1.9 2 - 2.9 3 - 4.0 4.1 - 4.9 5 - 5.9 6 - 6.9 7.1 - 8.0 8.1 - 8.9 9 - 10 10.1 - 10.9 11 - 11.9 12 - 12.9 13 - 13.9 14 - 14.9 15 - 16.9 17 - 20.9 >24.1	USUAL DIABETES MEDICATION AND A MEAL MUST BE GIVEN ONE HOUR BEFORE VRlll IS STOPPED (SEE PAGE 4)																	
	Ketones (Urine + or Blood mmol/L) VRlll Protocol in use (A, B, C, 1, 2) Insulin infusion rate mls/hr Volume to be infused ml Fluid infusion rate mls/hr Volume to be infused ml Volume infused ml Nurse's Signature	IF CAPILLARY BLOOD GLUCOSE > 12 MMOL/L FOR TWO HOURS FOLLOW HYPERGLYCAEMIA GUIDELINES IF CAPILLARY BLOOD GLUCOSE < 4.0 MMOL/L FOLLOW THE HYPOGLYCAEMIA GUIDELINES VRlll: 12 HOURS CHECK U+5, CHANGE FLUID AS APPROPRIATE																	
Date / / 20 Time hh:mm	PATIENTS WITH DIABETES ON INSULIN MUST ALWAYS HAVE A SOURCE OF INSULIN AND GLUCOSE or DEXTROSE or FOOD																		
IF VRlll > 12 HOURS ENSURE A PLAN IS IN PLACE FOR WHEN AND HOW VRlll IS TO BE STOPPED																			

IF CONTINUED BEYOND 24 HRS, DOCTOR REVIEW, CONTINUE WITH CLEAR RECORD OR TRANSFER TO NEW CHART

12 Appendix 4 Colostrum Harvesting



Antenatal Colostrum Harvesting Guidance

Cardiff and Vale UHB Infant Feeding Team, 2021

From 36 weeks of pregnancy

Exclusive breastfeeding and avoiding early introduction of cows' milk (infant formula) has been shown to have many long- term health benefits for babies.

Hand expressing and "harvesting" of colostrum (the first breastmilk you produce) in late pregnancy does not enhance your ability to breastfeed but can provide some of your own colostrum if your baby needs it following birth. **Most babies do not need colostrum harvested antenatally.** Your community midwife can talk to you more about this.

Your baby will benefit from skin to skin contact with you immediately or as early as possible following birth. This will help regulate your baby's heart rate, breathing and temperature. Early (within the first hour), frequent and effective breastfeeding is also important. Occasionally, newborn babies who are at a higher risk of hypoglycaemia (low blood sugar levels) require glucose or formula milk in addition to breastfeeding in order to stabilise their blood sugar levels. If your baby does not feed effectively or baby's blood sugars are low, additional colostrum expressed antenatally may be used.

Babies who will benefit from antenatal expression of colostrum include:

- Babies with diagnosed cleft lip, Downs Syndrome, cardiac conditions
- Babies of mothers on anti-hypertensive medication
- Babies of diabetic mothers
- Babies of mothers having complex deliveries
- Premature babies
- Strong family history of dairy intolerance or inflammatory bowel disease.

Nipple stimulation may cause uterine contractions. Therefore, mothers at risk of premature labour, antenatal haemorrhage, placenta praevia or expecting babies with potential physical problems, should NOT express colostrum antenatally. Breast pumps are not used in pregnancy.

Equipment

1. Sterile oral 1-2ml (purple) **colostrum syringes** - you can buy these on the internet or if medically indicated ask clinic midwife for equipment.
2. A small sterile plastic collection container (if unable to obtain syringes)
3. A sheet of your hospital identification labels for syringes – add the date and time of collection.

Useful information and videos

Hand expressing video: <https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/breastfeeding-resources/hand-expression-video/>

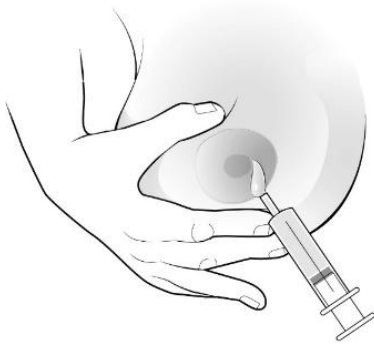
Expressing breastmilk information in Bump Baby and Beyond resource on line and in this leaflet: www.bumpbabyandbeyond.wales.nhs.uk

Hand expressing video: <https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/breastfeeding-resources/hand-expression-video/>

National Breastfeeding Network website for storage of breastmilk information: <https://www.breastfeedingnetwork.org.uk/breastfeeding-help/expressing-storing/>

13 <https://www.laleche.org.uk/antenatal-expression-of-colostrum/>

Hand Expressing Colostrum



Hand expressing is easy once you have the knack of it and is the best method of expressing colostrum (first milk) in the first day or so after birth, if you need to encourage your baby to feed.

Have a clean, sterilised container ready before you start. Some mum's find that their milk flows more easily if they gently massage their breasts before expressing as this stimulates the breastfeeding hormones which create the milk supply. Cup your breast, work your thumb and forefinger back from the base of your nipple about 2cms (you might feel a different texture here).

Using your thumb and finger gently compress and release this area. It should not hurt. Compress and release in a steady slow rhythm but make sure you don't slide your fingers over the skin or this will hurt.

After a little while drops of milk may appear, if they do not your fingers are not quite in the right place so move them a bit (further back usually) and have another go. You will soon find the right spot for you and next time it will be easier and quicker.

If you express before your baby is three or four days old your milk will be very thick and sticky and you will only see a few drops – later the milk will be thinner and squirt out. When the milk flow from this spot slows down move your finger like you are moving them around the face of a clock so that you express milk from all parts of your breast.

Ask staff to help you learn this skill- Maternity and NICU staff can help

A well-fitting breast pump may be useful following birth – once your full milk supply is established.

COMMON QUESTIONS ASKED BY MOTHERS

Is hand expressing difficult?

Hand expressing is easy to learn and will get easier with practice.

Can I use a pump instead?

Hand expressing is more effective than using a pump during pregnancy and for the first couple of days following birth until your full milk comes in. Colostrum may get stuck in the tubing if you use a pump. It is important that a breast pump fits well, ask for advice from maternity staff.

When can I start expressing?

From 36 weeks of pregnancy. Please confirm with your community midwife that it is safe for you to do.

How often do I need to express?

It is advisable to begin expressing for no longer than 3-5 minutes on each breast up to 3 times per day (you can store this in the same syringe).

How much colostrum will I express?

This varies from mother to mother. It may not seem a lot but a baby's first feed is no more than a teaspoon in the first 24 hours so every drop expressed is precious (liquid gold). Save all expressed colostrum, no matter how small.

If I cannot express any milk before giving birth does this mean I have no milk?

Not all mothers can express colostrum before giving birth. It is not an indication of your ability to produce breastmilk or your ability to breastfeed. *Don't worry if you express very little or nothing at all.*

How do I collect and freeze the expressed milk?

You can express directly into a syringe or sterile container and use a syringe to draw up the colostrum. Once you have expressed for the last time that day, label and date the syringe before putting it in the freezer. Colostrum can be frozen in the freezer compartment in a refrigerator for 2 weeks, a freezer compartment with separate door for 3 months and deep freeze (-18°C or lower) for 6 months.

How long can colostrum be safely refrigerated?

It can be safely refrigerated up to 3 days below 4 degrees Centigrade but ideally freeze as soon as possible.

When do I take the colostrum with me to the hospital?

We have very limited space for storing frozen colostrum/breastmilk therefore please only bring a small amount with you and to give it to the staff as soon as possible. It is advisable to store it in ice packs in a cool box between home and hospital to make sure it remains frozen. **Defrosted colostrum/breastmilk has a 12 hour shelf life after which it needs to be discarded.**

14 Appendix 5 Information for mothers on infant feeding



The benefits of breast feeding include short and long term benefits to both mother and baby.

The benefits of breast feeding for all babies include protection of the infant against infections and necrotising enterocolitis, improved mother baby bonding, improved intelligence, improved lifetime achievements and improved earning potential. Babies who are not breastfed have an increased risk of childhood obesity and subsequent associated health issues and type 1 diabetes. Benefits extending to the mothers include reduced chance of breast cancer, ovarian cancer and lifetime risk of type 2 diabetes (OR 0.65, 95% CI 0.49 to 0.86).

There are additional benefits which are highly relevant to mothers with diabetes mellitus.

Mothers with diabetes should be positively encouraged and supported to breast feed.

Benefits to the infant

- Earlier stabilisation of blood glucose
- A reduction in the rate of obesity or overweight in childhood, adolescence and adulthood OR 0.74 (0.7 to 0.78)
- A reduction in the risk of type 2 diabetes in childhood or adolescence OR 0.74 (0.7 to 0.78)
- A reduction in the risk of type 1 diabetes in childhood and adolescence OR 0.7 (0.56 to 0.87)

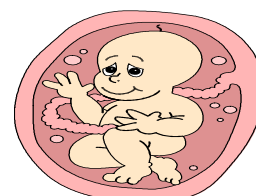
Benefits to the woman with diabetes

- Women with gestational diabetes are generally at increased risk of developing type 2 diabetes – 12 % of these women develop Type 2 diabetes within 2 years of pregnancy. Those women with gestational diabetes who breast feed their infants reduce this risk by about 50% compared with those who formula feed their babies. Those mothers who breast feed more exclusively or for longer experience the greatest benefits.

It is advisable for women with gestational diabetes mellitus and a planned delivery to be shown and supported to hand express breast milk starting at least 2 weeks prior to delivery. The colostrum / milk can then be frozen and stored ready to give the newborn baby within 1 hour of birth. Human milk induces normoglycaemia in the newborn infant better than formula feeding.

Useful information leaflets for mothers with diabetes mellitus are available (see appendix). These benefits of breast feeding should be discussed with the mother early on in pregnancy and reinforced at frequent intervals. This may be done in the specialist clinic or in the community. All healthcare professionals should support this in line with *Making Every Contact Count*.

**Mum...What is
Colostrum?**



From around 16 weeks of pregnancy a mother's body starts preparing colostrum ready for her baby



Colostrum is nature's perfect first baby food
The ideal "first gift" for a new baby!

Why is colostrum important?

A baby is very vulnerable in the first few hours and days outside of the protective environment of mum's womb.
Colostrum contains "antibodies" and many other important protective factors which protect your baby at this time.
Colostrum is rich in protein and tailor-made for your newborn baby's first few days.

**There is no other way your baby can receive this kind of protection.
Formula does not contain these protective factors**

How much colostrum does baby need?

A newborn baby's tummy is very small- just the size of a small marble and so a baby usually requires very small feeds in the first few days.

Your amazing body knows that your new baby's tummy only needs a small amount of food. Just a teaspoon or two (5-10ml) of precious colostrum provides all the goodness and protection your baby needs, packed into a perfect volume.

Imagine how stretched baby's small tummy would become if filled with 30-60 ml of formula milk at these first feeds!

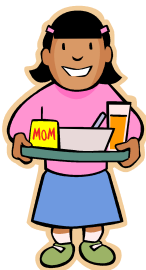


Baby's first few days outside of the safety of mum's womb

Babies need a gradual and gentle introduction to life outside of the womb.

The small volume of colostrum increases gradually day by day and this allows your baby's kidneys to adapt to the change from being fed by the umbilical cord.

Colostrum: Baby's truly amazing first food – only delivered by mum!



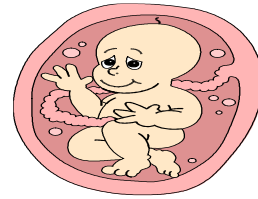
Changes on the 3rd day

Around the 3rd day after the birth, milk flow increases and your breasts may feel much fuller but this soon settles down. From then on a mother's milk is continually changing to meet her growing baby's needs; this is completely different to formula milk which of course never changes.

COLOSTRUM - A baby's first precious gift from mum
All wrapped up in a mother's love!



Mam...Beth ydy colostrwm?



O tuag wythnos 16 y beichiogrwydd, mae corff y fam yn dechrau paratoi colostrwm yn barod i'w babi.

Colostrwm yw bwyd cyntaf perffaith natur i fabi ac mae'n "anrheg gyntaf" delfrydol i fabi newydd!

Pam bod colostrwm yn bwysig?

Mae babi'n fregus iawn yn yr oriau a dyddiau cyntaf y tu allan i amgylchedd amddiffynnol groth y fam. Mae colostrwm yn cynnwys "gwrthgyrff" a llawer o ffactorau amddiffynnol pwysig eraill sy'n amddiffyn eich babi ar yr adeg yma.

Mae colostrwm yn cynnwys llawer o brotein ac mae wedi'i wneud yn arbennig i'ch babi newydd-anedig yn ystod ei ddyddiau cyntaf.

**Does dim un ffordd arall y gall eich babi gael y math hwn o amddiffyniad.
Nid yw llaeth powdr yn cynnwys y ffactorau amddiffynnol hyn.**

Faint o golostrwm sydd ar y babi ei angen?

Mae bol babi newydd-anedig yn fach iawn - yr un faint â marblen fach felly bydd ar y babi angen ychydig bach o fwyd ar y tro yn ystod y dyddiau cyntaf.



Mae eich corff anhygoel yn gwybod mai dim ond ychydig iawn o fwyd mae ar fol eich babi newydd ei angen ar y tro. Mae dim ond llond llwy de neu ddwy (5-10mls) o golostrwm gwerthfawr yn rhoi'r holl faeth ac amddiffyniad y mae ar eich babi ei angen.

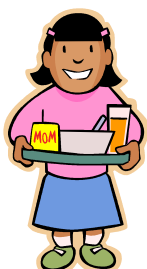
Dychmygwch faint fyddai'r bol bach hwn yn cael ei ymestyn petai'n cael ei lenwi â 30-60 mls o laeth powdr yn yr ychydig droeon cyntaf hyn.

Dyddiau cyntaf y babi y tu allan i ddiogelwch groth mam

Mae ar fabanod angen eu cyflwyno'n raddol ac yn dyner i fywyd y tu allan i'r groth.

Mae'r ychydig o golostrwm yn cynyddu'n raddol bob dydd ac mae hyn yn rhoi cyfle i arennau eich babi addasu i'r newid o gael ei fwydo drwy'r llinyn bogail.

Colostrwm: Bwyd cyntaf anhygoel y babi - dim ond gan mam!



Newidiadau ar y 3^{ydd} diwrnod

O gwmpas y 3^{ydd} diwrnod ar ôl yr enedigaeth, byddwch yn dechrau cynhyrchu llaeth a bydd eich bronnau'n teimlo llawer llawnach, ond bydd hyn yn gwella cyn bo hir. O'r adeg honno bydd llaeth mam yn newid yn gyson i fodloni anghenion ei babi sy'n tyfu; mae hyn yn hollol wahanol i laeth powdr oherwydd nid yw hwnnw byth yn newid, wrth gwrs.

COLOSTRWM - Anrheg gyntaf gwerthfawr babi gan ei fam.
Wedi'i lapio'n dynn yng nghariad mam!



What you should know from 34 weeks of pregnancy Preparing for feeding your baby - before the birth.

What is colostrum?

Colostrum is the very rich milk a mother produces during pregnancy and in the first few days after the birth. Colostrum is an excellent source of food and energy and also has very important protective factors that strengthen our baby's gut and help prevent infections.

Why express colostrum before the birth?

Some babies may have problems with low blood sugar levels in the first few days after birth.

This problem is more common if baby has to be delivered early or if mum is diabetic. Other babies may have particular physical problems (e.g. cleft lip/palate) that may prevent them from breast feeding straight away

**A baby in these situations may require extra feeds.
The very best food for all babies is their mothers' milk.**

- Babies born early or with particular problems that prevent them from breast feeding may be particularly vulnerable to certain illnesses and infections. Mother's milk will help protect them from these as well as keep their sugar levels steady.
- For the baby of a diabetic mum it is important that they have their mother's milk not just to keep their sugar levels steady but research has shown us that mother's milk will reduce the risk of the baby subsequently developing diabetes in childhood.

Many maternity hospitals now encourage pregnant diabetic women or mothers where feeding problems are anticipated to hand express small but precious amounts of their colostrum before baby is born so that this can be given to the baby instead of formula if baby needs extra feeds in those early hours after the birth.

Learning a new skill - practice makes perfect!

Expressing milk by hand may take a little practice in order for you to become confident. Many mothers have found it beneficial to learn this skill towards the end of pregnancy so that:

- ✓ Mum can store her colostrum so that it can be given to her baby for any extra feeds that are necessary
- ✓ Mum will feel more confident with hand expressing after the birth and thus be able to provide more of her own milk for her baby.

What to do next?

If you would like to know more about hand expressing for your baby before the birth, please tell your community midwife or the ante-natal clinic midwife. They will arrange an appointment for when you are about



34 weeks pregnant. At this appointment you will be taught how to hand express and given information about storing your milk at home, bringing it into hospital and its use after your baby has been born.



Godro colostrwm i'ch babi cyn iddo gael ei eni

Beth ydy colostrwm?

Colostrwm ydy'r llaeth maethlon iawn y mae mam yn ei gynhyrchu yn ystod beichiogrwydd ac yn y dyddiau cyntaf ar ôl yr enedigaeth. Mae colostrwm yn ffynhonnell ardderchog o fwyd ac egni ac mae ganddo hefyd ffactorau amddiffynnol sy'n cryfhau coluddion eich babi ac yn helpu i atal haint.



Pam godro colostrwm cyn i'r babi gael ei eni?

Mae'n bosibl y bydd rhai babanod yn cael problemau gyda lefelau siwgr isel yn y gwaed yn y dyddiau cyntaf ar ôl cael eu geni. Mae'r broblem hon yn fwy cyffredin os bydd y babi'n gorfod cael ei eni'n gynnar neu os ydy'r fam yn ddiabetig. Mae'n bosibl y bydd gan fabanod eraill broblemau corfforol penodol (e.e. gwefus/taflod hollt) fydd yn eu hatal rhag bwydo'n syth

Mae'n bosibl y bydd babi yn y sefyllfa yma angen ei fwydo'n amlach. Y bwyd gorau un i bob babi ydy llaeth ei fam

- Mae'n bosibl y bydd babanod sy'n cael eu geni'n gynnar neu gyda phroblemau penodol yn fwy tebygol o gael rhai mathau o salwch, a bydd llaeth y fam yn helpu i'w hamddiffyn rhag y rhain yn ogystal â chadw eu lefelau siwgr yn gyson
- Mae'n bwysig bod babanod mamau diabetig yn cael llaeth eu mam, nid yn unig i gadw lefelau eu siwgr yn gyson, ond mae ymchwil wedi dangos bod llaeth mam (ac osgoi cyflwyno cynnyrch llaeth buwch yn gynnar) yn gallu lleihau risg y babi o ddatblygu diabetes yn ystod ei blentyndod.

Mae llawer o ysbytai mamolaeth bellach yn annog merched diabetig sy'n feichiog neu famau sydd i fod i roi genedigaeth yn gynnar neu pan fo problemau bwydo yn cael eu rhagweld, i odro ychydig o golostrwm gwerthfawr â llaw cyn i'r babi gael ei eni er mwyn gallu ei roi i'r babi yn hytrach na fformiwla os bydd ar y babi angen ei fwydo'n amlach yn ystod yr oriau'n syth ar ol cael ei eni.

Dysgu'r sgil newydd - fe ddaw gydag arfer!

Mae godro llaeth â llaw yn sgil y bydd gofyn i chi ei hymarfer cyn y byddwch yn hyderus efallai. Mae llawer o famau yn elwa o ddysgu'r sgil tuag at ddiwedd eu beichiogrwydd oherwydd:

- ✓ Mae mam yn gallu storio ei cholostrwm er mwyn iddo gael ei roi i'w babi os bydd angen ei fwydo'n aml
- ✓ 2) Bydd mam yn teimlo'n fwy hyderus i odro â llaw ar ôl yr enedigaeth ac felly'n gallu rhoi mwy o'i llaeth i'r babi

Beth i'w wneud nesaf?

Os hoffech chi wybod mwy am odro colostrwm â llaw i'ch babi cyn iddo gael ei eni, Dywedwch wrth eich bydwaig cymuned neu'r fydwaig yn y clinig cyn geni.

Bydd yn trefnu apwyntiad i chi pan fyddwch o gwmpas ar wythnos 34 eich beichiogrwydd.

Yn yr apwyntiad, cewch ddysgu sut i odro â llaw, a chewch wybodaeth am storio eich llaeth gartref, dod â'r llaeth i'r ysbyty a'i ddefnyddio ar ôl i'ch babi gael ei eni.



What you can do at 36 weeks of pregnancy**Hand expressing colostrum for your baby before the birth**

- Hand expressing milk simply means squeezing milk out of your breast.
- Your midwife can teach you how to do this, ask for additional written guidance.
- YouTube has useful clips about this.

When and how often can I express?

- ✓ You can start to hand express colostrum at about 36-37 weeks of your pregnancy.
- ✓ Start by expressing for about 3-5 minutes each time about 3 times each day.
- ✓ As you become more confident you can increase the time spent hand expressing to 5-10 minutes about 3 times a day.

How to express your breast-milk

1. Stimulating the flow of colostrum by showering or having a bath before expressing; alternatively you can use warm cloths and gentle massage to prepare your breast.

2. Wash your hands before hand expressing .

3. Cup your breast with your hand in a 'C' shape with 4 fingers under the breast and the thumb at the top. Your thumb and finger need to be about 3-4c the nipple

4 Using your thumb and index finger gently squeeze this area – be gentle, gentle, this shouldn't hurt.

5. Release the pressure and then repeat again and again, building up a rhythm.

- Avoid sliding your fingers over the skin.
- Now express from the other breast in the same way.

**How much breast-milk will I get?**

Colostrum is very concentrated and thick. Initially you may see just a small glisten of liquid on your nipple, after a day or two this may become a drop, followed by a drip forming as your colostrum

flows more easily. If you do not see any sign of any milk, try moving your fingers slightly towards the nipple or further away, find the spot that works best for you.

Note: *You may find that when you express you feel your womb going hard and relaxing – this is called ‘Braxton Hicks’ contractions. Don’t worry about these, unless they begin to feel like period type cramps or mild labour contractions. This is rare, but if this happens, you should stop expressing and rest. If they don’t stop and you think you might be in labour, you should telephone the Delivery Suite for further advice.*

Where to store your expressed colostrum

- You will need to collect the milk in clean containers such as a sterile pot or syringe. Your midwife can provide you with a pot (for collection) and a selection of small syringes with “bungs” for the tips that you can use to store the milk in.
- All of the colostrum you collect in a 24 hour period can be combined in one sterile container and stored in the freezer at minus 18°C.
- The container needs to be labelled with your name and the date you expressed the milk
- You can store your milk in the fridge at a temperature of about 4°C for up to 48 hours; after which time you should place it in its container in a clean zip-lock bag and place it in your freezer at a temperature of minus -18°C.

Going in to have your baby J

- ❖ Don’t forget to bring any breast-milk you have expressed with you when you come into hospital to have your baby. Depending on how much you managed to collect you may only want to bring a small amount to begin with, your partner/family could bring more once the baby has been delivered.
- ❖ On admission to hospital let the midwife know you have the milk with you and she will arrange for it to be stored in a designated fridge on the maternity ward or on the neonatal unit. Ensure that the midwife caring for you during your admission and delivery is aware that you have collected your milk antenatally should it be needed for your baby.



Godro colostrwm â llaw i'ch babi cyn iddo gael ei eni

Pryd alla i o odro, a pha mor aml?

Gallwch ddechrau godro colostrwm â llaw pan fyddwch tuag wythnos 36 eich beichiogrwydd. Dechreuwch drwy odro am 3-5 munud bob tro tua 3 gwaith y dydd. Wrth i chi ddod yn fwy hyderus, gallwch dreulio 5-10 munud yn godro â llaw tua 3 gwaith y dydd.

Sut i odro eich llaeth

Yn syml, mae godro â llaw yn golygu gwasgu llaeth o'ch bron. Bydd eich bydwraig yn eich dysgu sut i wneud hyn.

1. Mae'n gallu helpu i gael cawod neu fath cyn godro â llaw; neu gallwch ddefnyddio cadachau cynnes a thylino'n ysgafn cyn godro er mwyn symbylu'r llif o golostwrwm

2. Cwpanwch eich bron gyda'ch llaw mewn siâp 'C',

4 bys o dan y fron a'r bawd uwch ei phen.

Dylai eich bawd a'ch bys fod tua 4cm o fôn y deth



3. Gyda'ch bawd a'ch mynegfys, gwasgwch y darn hwn yn ysgafn - ni ddylai hyn frifo

4. Gollyngwch y pwysau ac yna ail adrodd eto ac eto, gan fynd i rythm. Peidiwch â llithro eich bysedd dros y croen. Gan fod y llaeth cyntaf (colostrwm) yn ddwys iawn, mae'n drwchus a bydd yn dod allan o'ch bron *fesul diferyn*

5. Os na fyddwch yn gweld unrhyw ddiferion o laeth, ceisiwch symud eich bysedd ychydig tuag at y deth neu ymhellach i ffwrdd, i ddarganfod yr union le sy'n gweithio orau i chi

6. Pan fydd y llif yn arafu, symudwch eich bysedd o amgylch y fron, (fel symud o amgylch y rhifau ar y cloc), fel eich bod wedi godro'r llaeth o amgylch y fron i gyd. Rwan, gwnewch yr un fath gyda'r fron arall

Sylwer: Mae'n bosibl y byddwch yn sylwi y bydd eich groth yn mynd yn galed ac yna'n ymlacio wrth i chi odro - gelwir hyn yn gyfngiadau 'Braxton Hicks'. Peidiwch â phoeni am y rhain, oni bai eu bod yn dechrau teimlo fel poenau mislif neu gyfngiadau esgor ysgafn. Mae hyn yn beth prin, ond os bydd yn digwydd, dylech roi'r gorau i odro, a gorffwyso. Os nad ydynt yn cilio, ac os ydych yn meddwl y gallech fod yn cael poenau esgor, dylech ffonio'r ward geni i gael mwy o gyngor.

Ble i storio fy llaeth

- Bydd arnoch angen casglu'r llaeth mewn cynhwysydd glân fel galipot neu chwistrell di-haint. Bydd eich bydwraig yn rhoi galipot i chi (i gasglu'r llaeth) a chwistrellau bach a "chorcyn" ar eu blaenau i chi storio'r llaeth ynddynt.
- Gallwch gadw'r holl golostwrwm rydych yn ei gasglu mewn cyfnod o 24 awr mewn un cynhwysydd di-haint a'i gadw mewn rhewgell ar minws 18°C.
- Bydd angen rhoi label ar y chwistrell gyda'ch enw a dyddiad godro'r llaeth.

- Gallwch storio llaeth yn yr oergell ar dymheredd o tua 4°C am hyd at 48 awr; wedi hynny, dylech ei roi yn ei gynhwysydd mewn bag 'zip-lock' glân a'i roi yn y rhewgell ar dymheredd o minws 18°C.

Faint o laeth fydda i'n ei gael o'r fron?

- ✓ Bydd hyn yn amrywio o un fam i'r llall, mae unrhyw beth o ychydig ddiferion i lond llwy de yn arferol. Mae'r llaeth cyntaf yn ddwys iawn o ran maeth ac mae'n helpu eich babi ymladd haint. Mae'r ychydig bach o laeth a gewch yn berffaith i'ch babi newydd.
- ✓ Peidiwch ag anghofio dod ag unrhyw laeth rydych wedi'i odro gyda chi pan fyddwch yn dod i'r ysbyty i gael eich babi. Yn dibynnu ar faint rydych wedi'i gasglu, mae'n bosibl na fyddwch eisiau dod â dim ond ychydig i ddechrau, gall eich partner/teulu ddod â mwy pan fydd y babi wedi'i eni.
- Wrth gael eich derbyn, dywedwch wrth eich bydwraig eich bod wedi dod â'r llaeth a bydd hi'n trefnu iddo gael ei gadw mewn oergell benodol ar y ward famolaeth neu'r uned i'r newydd-anedig. Gwnewch yn siwr bod y fydwraig sy'n gofalu amdanoch yn gwybod eich bod wedi casglu eich llaeth cyn geni rhag ofn y bydd ei angen ar eich babi.

15 Appendix 6 Postnatal Baby Steps program to prevent T2DM

BABY★STEPS

Part of the myDesmond digital health platform

Helping you to walk away from Type 2 diabetes after a diagnosis of gestational diabetes



★ Are you over 18 years old?

★ Were you diagnosed with gestational diabetes during pregnancy?

★ Do you live in Wales?



If you answered YES to the above questions then you can now access to the Babysteps digital diabetes prevention programme. All you have to do is scan the QR code above  or visit www.letspreventdiabetes.wales complete the request form and your registration code will be sent via email within a few days

BABY★STEPS

Rhan o blatfform iechyd digidol myDesmond

Eich helpu i droi eich cefn ar ddiabetes math 2 ar ôl cael diagnosis o ddiabetes yn ystod beichiogrwydd



★ Ydych chi dros 18 oed?

★ A gawsoch ddiagnosis o ddiabetes yn ystod beichiogrwydd?

★ Ydych chi'n byw yng Nghymru?



Os byddwch yn rhoi ateb cadarnhaol i'r cwestiynau uchod, gallwch nawr gael mynediad at raglen atal diabetes digidol Babysteps. Yr oll sydd angen i chi ei wneud yw sganio'r cod QR  neu ewch i www.letspreventdiabetes.wales llenwch y ffurflen gais Ac arhoswch nes byddwch chi'n derbyn eich cod cofrestru trwy e-bost o fewn ychydig ddyddiau

Provided for you on behalf of:



Gŵyl Gwelthreda Diabetes Implementation Group

Brought to you by:




Baby Steps poster Wales v1: 15/12/2021

Darparwyd i chi ar ran:



Gŵyl Gwelthreda Diabetes Implementation Group

Darparwyd gan:




Baby Steps poster Wales v1: 15/12/2021

16 Appendix 7 Abbreviations list

GDM	Gestational Diabetes
CS	Caesarean Section
PCOS	Polycystic Ovarian Syndrome
HB	Health Board
OGTT	Oral Glucose Tolerance Test
CBG	Capillary Blood Glucose
FPG	Fasting Plasma Glucose
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
DSN	Diabetic Specialist Nurse
MW	Midwife
ANC	Antenatal Clinic
USS	Ultrasound
ELCS	Elective Caesarean Section
VRII	Variable rate insulin infusion
U&Es	Urea and Electrolytes
BMI	Body Mass Index
NICE	National Institute Clinical Excellence