HULL UNIVERSITY TEACHING HOSPITALS NHS TRUST
242 – PRE- EXISTING DIABETES IN PREGNANCY

Summary

To provide evidenced guidance, for the multidisciplinary management and care of women with pre-existing diabetes to reduce the risks associated with pregnancy. This will include:

- A timetable of antenatal care provision which will include a pre-conception review
- Individual documented management plans in pregnancy and the postnatal period up to six weeks
- Guidance when advising women of the risks of hypoglycaemia and hypoglycaemia unawareness in pregnancy
- Guidance for women who require antenatal steroids
- Guidance for women who experience diabetic ketoacidosis

FOR WOMEN WITH GESTATIONAL DIABETES, PLEASE REFER TO GUIDELINE 342 **https://pattie.info/Interact/Pages/Content/Document.aspx?id=3754&SearchId=592243**

1 PURPOSE / LEGAL REQUIREMENTS / BACKGROUND

Diabetes is the most common pre-existing medical disorder complicating pregnancy affecting 4 per 1000 pregnancies. It is associated with significant maternal morbidity and fetal morbidity and mortality. It should therefore be managed by a multidisciplinary team.

All pregnant woman with pre-existing diabetes are seen in the Medical Obstetric Team Clinic (MOT) which includes: Consultant Obstetricians, Diabetes Physicians, Diabetes Specialist Midwife/Nurse, Dietician and Midwives, at Hull University Teaching Hospitals NHS Trust.

2 POLICY / PROCEDURE / GUIDELINE DETAILS

Duties

The following section details staff duties and responsibilities for the implementation of this guideline. The following list is a guide only and is not exhaustive:

Obstetricians

The MOT Obstetrician in liaison with the Diabetes Physician, Diabetes Specialist Midwife/Nurse and the Diabetes Specialist Dietician will develop an individual management plan in pregnancy and the postnatal period up to six weeks.

Diabetes Physician

To provide senior medical knowledge on pre-existing diabetes liaising with the Obstetrician, Diabetes Specialist Midwife/Nurse and the Diabetic Specialist Dietician to develop the individual management plan in pregnancy and the postnatal period up to six weeks.

Diabetes Specialist Midwife/Nurse

To be the coordinator of care ensuring women are supported with:

- A timetable of antenatal care provision
- A multidisciplinary management plan
- Diabetic treatments are prescribed and adjusted in line with this guidance

Diabetes Specialist Dietician

Will provide advice on diet and medication adjustment as part of the multidisciplinary team.

Midwives
Will be able to recognise any diabetic complications and be able to take appropriate action and escalate to the appropriate obstetric team member.

Preconceptual Care - Preconception counselling is available through the Medical Obstetric Team (MOT) clinic to all women with diabetes to initiate and provide appropriate care and information. GPs and Nurse practitioners can refer any woman with pre-existing diabetes to the medical obstetric team pre-conception clinic at the Women & Children's Hospital. Women can also self refer by contacting the Diabetic Specialist Midwife/Nurse.

A specific individualised management plan will be developed in the Medical Obstetric Team (MOT) clinic and recorded for all the women with diabetes including, pregnancy, and post pregnancy management. The MOT Clinics are held weekly, and comprise of the following: Consultant Obstetrician, Diabetes Physicians, Diabetes Specialist Midwife/Nurse, Dietician and Midwives.

At subsequent visits, the woman is seen by the most appropriate member of the above team according to her clinical need. The team communicates effectively via documentation in the Diabetic Pregnancy Record (Individual management plan) and the woman's hand held records to optimise the care provided.

The woman will be reviewed as clinically indicated for assessment of blood glucose control (NICE 2015) with the MOT.

Timetable of antenatal appointments
The timetable of antenatal appointments is contained at **Appendix 2.**

Requirement to document Individual Management Plan
The outcomes of each MOT Clinic visit will be documented in the Diabetic Pregnancy Record (Individual management plan) by the team. Each Individual management plan will vary according to the woman's clinical condition. Documentation should also be made within the maternity hand held records following each visit.

Antenatal care
The antenatal care plan is followed according to the details contained in **Appendix 2.** Women who are diabetic will be referred for retinal screening by the Direct Access administration staff.

Midwifery care
Some women will have shared care with the community midwife. Women who have all their antenatal reviews at the MOT clinic will have coordinated care from a midwife. This will include discussions and referrals for:

- Healthy lifestyle
- Smoking in pregnancy
- Birth preparation
- To Infant Feeding Coordinator for an opportunity to discuss antenatal milk expression

Intrapartum care
Refer to **Appendix 5** for management of diabetes in labour and for caesarean section

Induction of Labour
Offer induction of labour, or caesarean section if indicated, at 37+0 and 38+6 weeks of pregnancy to women with type 1 or type 2 diabetes; otherwise await spontaneous labour. (NICE 2015)
Refer to 62 *Guideline for Induction of Labour*
https://pattie.interactgo.com/Interact/Pages/Content/Document.aspx?id=3759&SearchId=292933

If planned elective caesarean section- arrange procedure for first on the list.

Postnatal care
All women will have an individualised plan of care for the first 6 weeks of the postnatal period, including: Insulin /metformin adjustments, Infant feeding support will be arranged by the multidisciplinary team.

Type 1 Diabetes
Return immediately to their pre pregnancy insulin doses
If the first full meal is tolerated (not a snack) recommence the pre pregnancy doses of subcutaneous insulin and discontinue IV Insulin approximately 30mins after starting the meal (NB this is required as IV Insulin is metabolised in 10-15mins)
For the administration of long acting insulin see individual care plan
Monitor blood glucose 2 hourly for 12 hours. Contact diabetes team if the results are constantly over 9mmols/l (test blood for ketones if blood glucose over 13 mmols/l)
Blood glucose may be monitored 4 hourly when stable and the woman is self caring
Aim to maintain blood glucose levels between 4-9 mmols/l and avoid hypoglycaemia
Type 2 Diabetes (diet / oral / Insulin) the individual care plan will identify previous treatment
Monitor blood glucose 2 hourly for 8 hours then pre meals and pre bedtime, If over 9mmols/l on 2 consecutive occasions inform medical staff.
Aim to maintain blood glucose levels between 4-9 mmols/l and avoid hypoglycaemia

Targets for Glycaemic Control
Women will be supported by the multi-disciplinary team to achieve glycaemic targets, by optimising the drug requirement and provision of education by the Dietician/Diabetes Specialist Nurse/Midwife. An individualised glycaemic target will be determined by the MOT each visit in line the NICE Diabetes in Pregnancy Guideline. The frequency of appointments will be arranged according to clinical need.

Advising of Risks of Hypoglycaemia and Hypoglycaemia unawareness in pregnancy
Women with type 1 diabetes will be advised of the risk of hypoglycaemia and hypoglycaemia unawareness by the MDT during their first assessment in the MOT clinic. Further advice will be provided by the MDT during any subsequent visits if issues or concerns are raised by the woman. This will be documented in the Diabetic Pregnancy Record.

Offering antenatal fetal cardiac ultrasound at 20 weeks
This investigation is offered to all women with pre-existing diabetes between 18-22 weeks along with the anatomy scan. Refer to **Appendix 2** for further details.

Women who are suspected of having diabetic ketoacidosis are admitted immediately to a high dependency unit where they can receive both medical and obstetric care.

In suspected cases of DKA: Refer to **Appendix 3** for the management process.

After confirmation of diagnosis in Women's and Children's Hospital the woman will be immediately admitted to a high dependency unit where they will receive both medical and obstetric care. The attending Obstetric Registrar or Consultant will liaise with the on-call Medical Consultant, the Outreach team and consult with the on-call Consultant Endocrinologist regarding the management of the woman.

If the woman is located elsewhere in the hospital, other than the Women and Children's Hospital (e.g. AAU), the on-call Medical Registrar & Outreach Team will be immediately contacted via on-call bleep (through Switchboard) for immediate assessment and management. The on-call Consultant Endocrinologist must be informed by the Medical Registrar.

The Labour Ward Co-ordinator and/or On-call Obstetric Registrar/Consultant will be contacted by the Medical Registrar.

3 PROCESS FOR MONITORING COMPLIANCE

Once with the 3 cycle of the guideline or as identified from any risk management, safety or quality issues

4 REFERENCES

- Confidential Enquiry into Maternal and Child Health. (2007).*Diabetes in Pregnancy: Are we providing the best care? Findings of a National Enquiry: England, Wales and Northern Ireland.* London: CEMACH. Available at HHUUwww.cemach.org.ukUUHH;
- Confidential Enquiry into Maternal and Child Health. (2005). *Pregnancy in Women with Type 1 and Type 2 Diabetes in 2002-03, England, Wales and Northern Ireland.* London: CEMACH. Available at HHUUwww.cemach.org.ukUUHH
- Department of Health. (2001). National *Service Framework for Diabetes (England) Standards.* London: The Stationery Office
- NICE (2015) Diabetes in Pregnancy https://www.nice.org.uk/guidance/ng3

5 APPENDICES

- **Appendix 1** - Care of Diabetic Women Receiving Antenatal Corticosteroids & Ready Reckoner
- **Appendix 2** - Antenatal appointment schedule
- **Appendix 3** - Management of symptomatic pregnant women with diabetes
- **Appendix 4** - Pregnancy Diabetic Ketoacidosis Care Pathway & Diabetic ketoacidosis
- **Appendix 5** - Elective Admission for induction of Labour or LSCS
- **Appendix 6-** Blood glucose monitoring chart
- **Appendix 7-** Guidance for management of women with diabetes on insulin pump therapy during labour and delivery
- **Appendix 8-** Initial assessment of diabetic woman poster

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Email distribution to all midwifery, obstetric and anaesthetic staff. Discussion and approval at obstetric guidelines meeting, obstetric governance meeting and health group governance meeting.			
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May 2014	V11.1	Obstetric Guidelines Group	Amendment to monitoring form – frequency of audit
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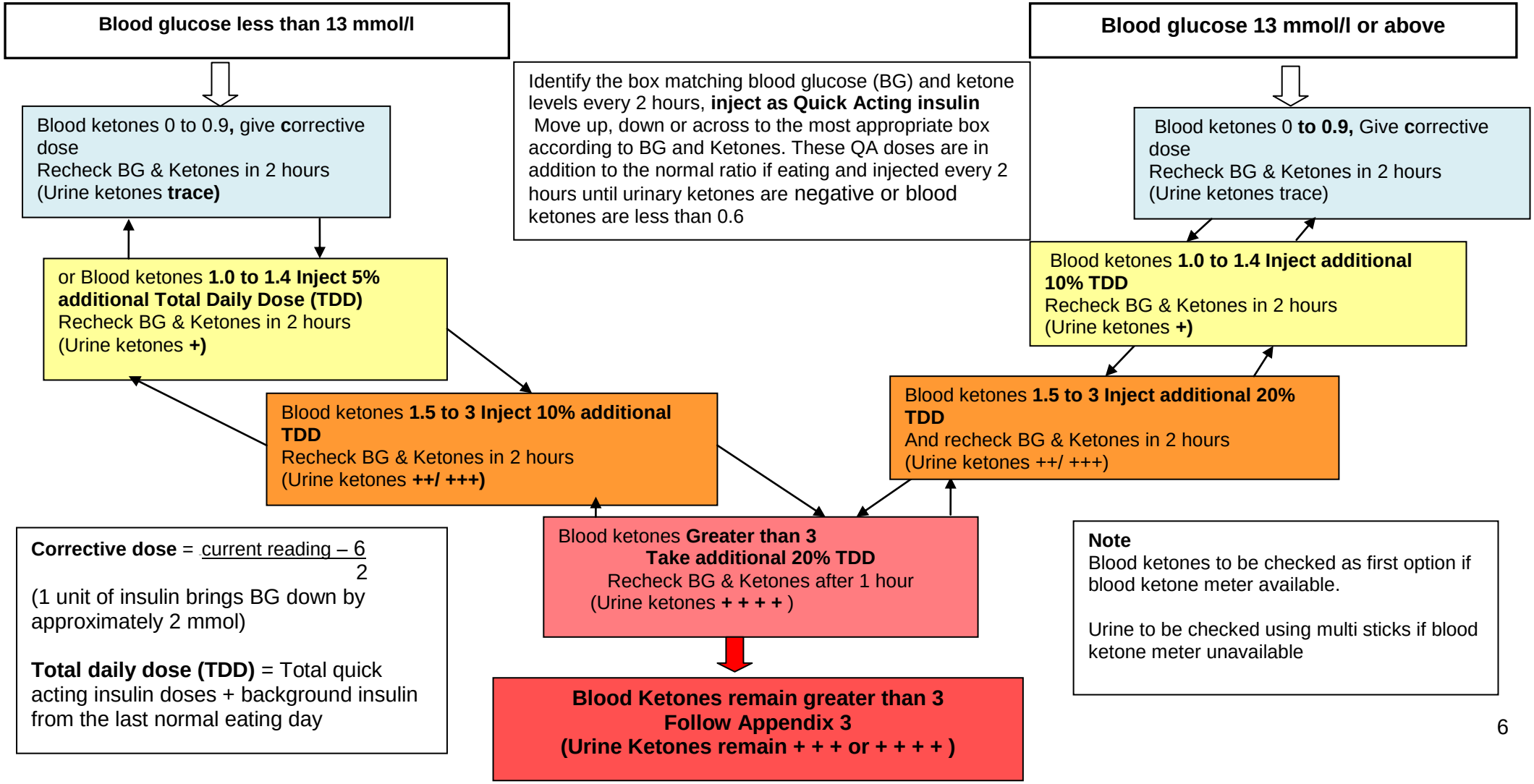
August 2018	V12.1	Linda Wilkinson Diabetic Specialist Midwife Jennifer Moverley Clinical Governance Midwife	Update to reflect change of insulin to Actrapid & criteria for admission for antenatal steroid regime
June 2019	V13	Dr Belinda Allan	Review & renewal including amendment relating to management of DKA in pregnancy and insulin pumps during delivery

APPENDIX 1

CARE OF DIABETIC WOMEN RECEIVING ANTENATAL CORTICOSTEROIDS

- Women with diabetes in pregnancy who are at risk of preterm delivery should receive antenatal corticosteroids.
- Women prescribed insulin (either pre-existing to pregnancy or during pregnancy) should receive corticosteroids as an inpatient. Women who are prescribed metformin only or are diet controlled (either pre-existing or during pregnancy) can receive corticosteroids as an outpatient.
- Blood glucose checked 2 hourly following administration of first corticosteroid, until 24 hours following second corticosteroid.



Care of Diabetic Women Receiving Antenatal Corticosteroids

Ready Reckoner

TDD	5%	10%	20%
15	1	2	3
20	1	2	4
25	1	3	5
30	2	3	6
35	2	4	7
40	2	4	8
45	2	5	9
50	3	5	10
55	3	6	11
60	3	6	12
65	3	7	13
70	4	7	14
75	4	8	16
80	4	8	16
85	4	9	18
90	5	10	18
95	5	10	20
100	5	10	20
105	5	10	21
110	6	11	22
115	6	11	22
120	6	12	24
125	6	12	24
130	6	13	26
135	7	13	26
140	7	14	28

TDD	5%	10%	20%
145	7	14	28
150	7	15	30
155	8	15	30
160	8	16	32
165	8	16	32
170	9	17	34
175	9	17	34
180	9	18	36
185	9	18	36
190	10	19	38
195	10	19	38
200	10	20	40
205	10	20	40
210	10	21	42
215	11	21	42
220	11	22	44
225	11	22	44
230	11	23	46
235	12	23	46
240	12	24	48
245	12	24	48
250	12	25	50
255	13	25	50
260	13	26	52
265	13	26	52
270	14	27	54

APPENDIX 2

PRE-CONCEPTION AND SPECIFIC ANTENATAL CARE FOR WOMEN WITH DIABETES TYPE 1 & 2

Appointment	**Care for women with diabetes during pregnancy**
Pre Conception appointment.	Offer information, advice and support in relation to optimising glycaemic control – aiming for pre-meal blood glucose levels 4~6 if clinically safe Take a clinical history to establish the extent of diabetes-related complications. Review medications for diabetes and its complications Offer retinal and/or renal assessment if these have not been undertaken in the previous 12 months.
Receipt of referral	Appointment to be offered at the next MOT clinic Confirm viability of pregnancy and age at 7-9 weeks (NICE 2015) Offer woman with diabetes and co morbidities i.e. BMI $\geq$ 30kg/m^2 , autonomic neuropathy an anaesthetic assessment in the third trimester
Booking appointment (ideally by 10 weeks)	Discuss information, education and advice about how diabetes will affect the pregnancy, birth and early parenting. Hba1c to be obtained at booking .Obtain BCP if no result for the last 3 months
Approximately 16 weeks	Ensure women have been included in retinal screening pregnancy pathway
18-21+6 weeks	Offer fetal anomaly scan including four-chamber view of the fetal heart and outflow tracts
Approximately 28 weeks	Offer ultrasound monitoring of fetal growth and amniotic fluid volume as per clinical assessment Check the woman has attended retinal screening
Approximately 32 weeks	Offer ultrasound monitoring of fetal growth and amniotic fluid volume as per clinical assessment
Approximately 36 weeks	Offer ultrasound monitoring of fetal growth and amniotic fluid volume as per clinical asessment. Offer information and advice about: • Timing, mode and management of birth • Analgesia and anaesthesia • Changes to hypoglycaemic therapy during and after birth • Management of the baby after birth • Initiation of breastfeeding and the effect of breastfeeding on glycaemic control • Contraception and follow-up.
37-38 weeks	Offer induction of labour, or caesarean section if indicated If IOL/LSCS is declined at this gestation weekly MOT appointments from 37 weeks (including CTG monitoring in ADU prior to appointment) and 3 weekly GAP ultrasound monitoring must be offered until delivery instead
1. All women receive individual antenatal appointments, however the above chart identifies the minimum number of appointments they will be offered. 2. Women are seen by the Community Midwives (CMW)/ General Practitioner(GP) between 20-28 weeks if stable	

Care of the unwell pregnant woman with diabetes

A diabetic pregnant woman admitted with any illness is at risk of diabetic ketoacidosis (DKA)

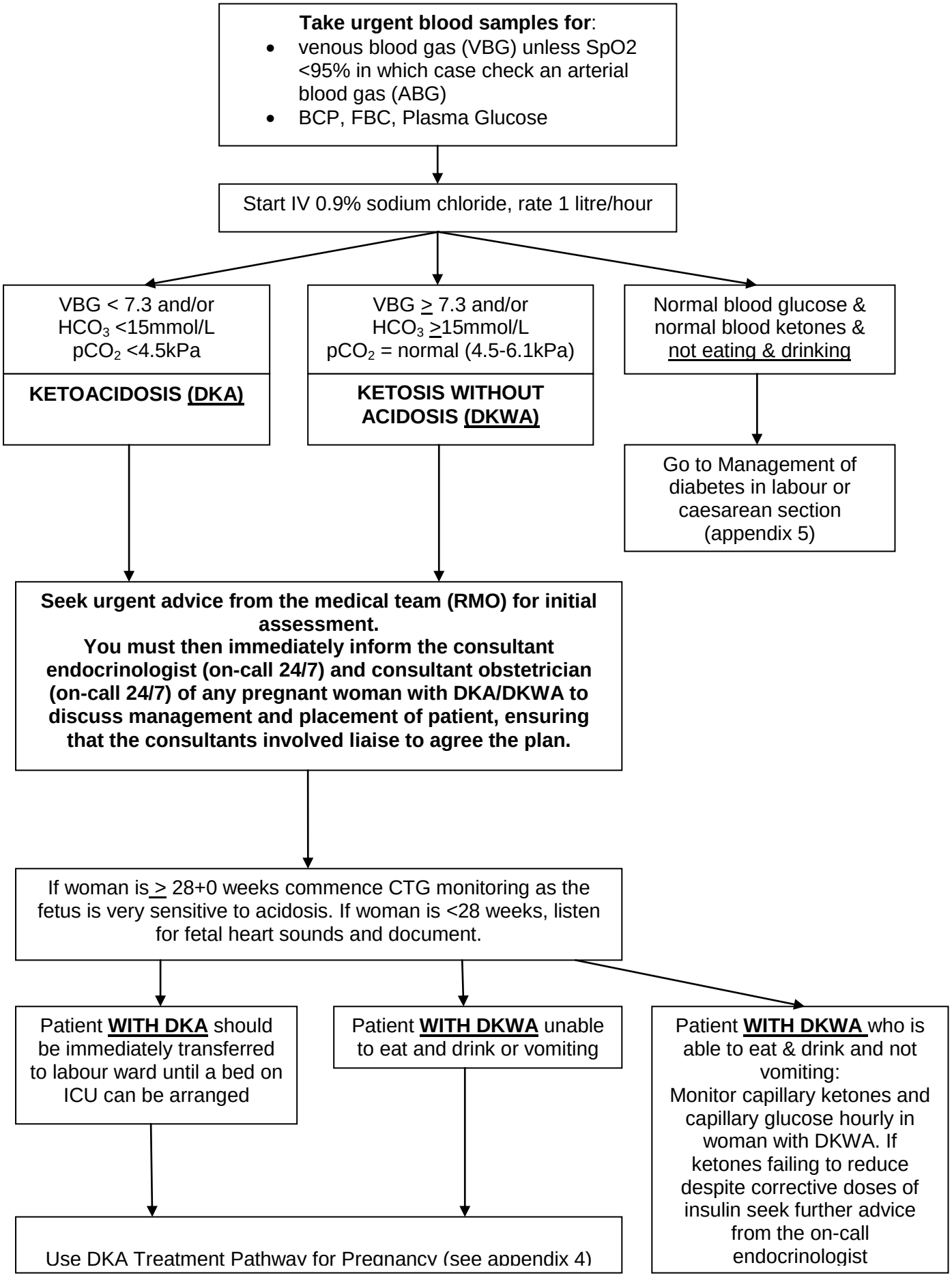
- All pregnant women with diabetes should have their capillary blood glucose, blood ketones & urine ketones checked on admission
- Thereafter a minimum of 4 (pre-meal and bed) capillary blood glucose tests daily simultaneously with blood ketones (or urine ketones checked at each void if no access to capillary ketone meter)

If a woman with diabetes is/has any one of the following:

- Symptomatic of raised blood glucose levels
- Generally unwell
- Vomiting
- Not eating or drinking
- When capillary blood glucose levels are >7mmol/L
- Capillary blood glucose levels persistently >7mmol/L and rising whilst using insulin pump therapy
- Capillary blood glucose >13mmol/L following antenatal steroid therapy and not responding to corrective doses of insulin
- Blood ketones persistently ≥1.5mmol/L (or urine ketones ≥+++)

URGENTLY ASSESS FOR DKA as per flowchart below

DKA Assessment flowchart



APPENDIX 4

Pregnancy Diabetic Ketoacidosis Care Pathway

Name:
DOB:
Address:

Patient details or sticker

Hosp/A&E No:

[November 2015]

DIAGNOSTIC CRITERIA

Diabetic Ketoacidosis (DKA)

The presence of all of the following criteria is required to make a diagnosis of DKA:

- Hyperglycaemia*
- Venous bicarbonate <15mmol/L and/or pH <7.3
- Ketonaemia >3mmol/L (blood ketone fingerprick test) or Ketonuria (+++/++++)

N.B. Normoglycaemic ketoacidosis* (glucose can be normal)

Initial Blood Gas

	ABG or	VBG
Time		
pH		
pCO_2		
pO_2		
HCO_3^-		
BE		
K^+		
Glu		
Lactate		
FiO_2		

Guidelines Blood Ketones

Blood ketones mmols/L		Blood Ketones during DKA treatment
Less than 0.6 (urine:negative)	No Concern If blood glucose > 10mmols May need dose adjustment	Resolved
0.6 to 0.9 (urine: trace)	Minor concern May need dose adjustment	
1.0 to 1.4 (urine: +)	Concerned Will need extra fast acting insulin Check in 2hours	
1.5 to 3 (urine: .++)	Concerned Will need extra fast acting insulin / May need IVI's and admission Check in 2hours	
Greater than 3 (urine; +++/++++)	At RISK of DKA Venous Blood Gas If DKA follow pathway If not DKA see above	During DKA treatment expect blood ketones level to fall by 0.5 to 1.0 mmols /hour

Glucose and Potassium monitoring

	O hours	2 hours	4 hours
Time			
Lab Glucose			
Na^+			
$*K^+$			
Cl^-			
HCO_3^-			

* **ALWAYS obtain a baseline laboratory biochemical profile**. It is acceptable to request venous gas potassium levels at 2 and 4 hours. If result discordant with previous reading **ALWAYS** request a lab BCP to confirm accuracy of gas result.

Blood Gas Measurement

Information for potassium and bicarbonate can be sufficiently obtained from **VENOUS** blood sampled in the blood gas machine **i.e. venous blood gas (VBG).** This can be used for immediate management of K^+ replacement until laboratory results available. Arterial blood gases (ABG's) are NOT indicated unless patient has respiratory compromise (SaO_2<95%) or has decreased conscious level (GCS<13).

Doctor	Initials	Bleep	Signature

Diabetic ketoacidosis

Diagnostic criteria in pregnancy:

- **Hyperglycaemia***
- **Venous bicarbonate <15mmol/L and/or pH <7.3**
- **Ketonuria / Ketonaemia ≥3mmol/L**

N.B. *Normoglycaemic ketoacidosis (glucose can be normal especially in pregnancy)

Where should the patient be managed?

All pregnant women with DKA should be managed jointly in critical care by the obstetric and endocrine team. Contact Medical Registrar & Outreach. In women >28 weeks gestation, fetal monitoring by CTG is required no less than 6 hourly. In women <28 weeks gestation, fetal heart rate auscultation twice daily. Inform Consultant Obstetrician on-

Consultant Endocrinologist on-call MUST be informed of any patient with DKA IMMEDIATELY 24/7

ASSESSMENT

Step 1- hour 0 to1

Doctor

1) IV Cannula **x 2** .....❑
2) BCP, Lab Blood glucose, FBC, CRP..❑
3) **Venous Blood Gas** (if SaO_2<95% then perform Arterial Blood Gas)
4) **ECG**
5) Consider Nasogastric tube if protracted vomiting
6) Inform RMO1 (Bleep 404) .....❑

Nurse/Midwife

Monitor ½ hourly to hourly dependent on patients condition and severity of shock

-TPR, BP, O_2 Sats, GCS.....❑

-Capillary BG. .....❑

-Fluid balance .....❑

-Blood ketones.....❑

Step 2 - hours 2 to 4

1) **Repeat U & E's and lab blood glucose** (the latter only if baseline blood glucose >26mmol/L)

AND

2) **VENOUS blood gas**

…….At **end of hours 2 and 4**

3) Consider precipitants
   - **a.** CXR
   - **b.** MSSU
   - **c.** Blood cultures
   - **d.** Stool M,C & S

Consider inserting a urinary catheter if not passed urine after 2 hours

Step 3 - hour 5 & beyond

U & E's for HCO_3- twice daily until >19mmol/L

- Allow oral intake if bowel sounds present
- Vital signs stable & improving consider monitoring 4 hourly

-Prescribe patient's usual insulin - suspend whilst on IV insulin infusion

UNLESS pt. on basal insulin 'BI' (e.g.Insulatard/Humulin I/Lantus/Levemir/Insuman Basal/Tresiba) in which case give as normal alongside IV insulin.

If woman fails to improve or deteriorates within first 4 hours contact the on call consultant

TREATMENT

FLUIDS

BAG

1st - 0.9% saline, 500ml STAT

2nd - 0.9% saline, 500ml over 30 mins

3rd - 0.9% saline, 500mls over 1 hour

BAG

4th - 0.9% saline, 500mls over 1 hour

5th - 0.9% saline, 500mls over 1 hour

6th - 0.9% saline, 500mls over 2 hour

Add potassium unless anuric.

Continue with

-0.9% saline 500ml over 2 hours **until** - HCO_3 > 15mmol/L **then:-**

- 0.9%saline 500ml over 4 hours **until** HCO_3 ≥ 20mmol/L.

INSULIN (simultaneously with fluids)

1) 50 units Actrapid in 50ml 0.9% saline via syringe driver.
2) Set rate at 6ml/hour I.V. **until or if** CBG is below 14mmol/L **then change** over to labour ward protocol. **If CBG is <7mmol/L initially ('euglycaemic ketoacidosis') do not commence insulin infusion - instead start I.V. 5% dextrose 100ml/hour to run concurrent with saline via separate I.V. line. When CBG >7mmol/L on 2 separate occasions 1 hour apart convert to labour ward protocol.**
3) Target CBG: 7 - 11mmol/L.; avoid drop in CBG>5mmol/**CEREBRAL OEDEMA risk (↓GCS)**

WHEN TO CHANGE TO S/C INSULIN

Convert back to usual subcutaneous insulin when HCO_3^- ≥20mmol/L, blood ketones <0.6mmol/L and pt. is eating and drinking reliably. Stop insulin infusion 30 minutes **after** administration of usual s/c insulin

POTASSIUM REPLACEMENT: cardiac monitoring if K^+ out of range

Venous K+	KCl per 500ml bag of 0.9% saline
> 5.5mmol/L	nil
3.5 – 5.5mmol/L	20 mmol
< 3.5mmol/L	senior review/GHDU for treatment

Do not give more than 40mmol KCl per hour and use large vein

INTRAVENOUS FLUID PRESCRIPTION

(VIA INFUSION PUMP)

Name:
DOB: **Age:**
Address:

Patient details or sticker

Hosp. No:
Consultant: **Ward:**

PRESCRIPTION						ADMINISTRATION				
Date	**Fluid Type**	**Vol**	**Additives**	**Rate**	**Signature**	**Batch No.**	**Start Time**	**Signature** **Witness**	**End time**	**Volume Infused**
	0.9% Sodium chloride	**500ml**		**Stat**						
	0.9% Sodium chloride		**mmol KCL**	**500mls over 30 mins.**						
	0.9% Sodium chloride		**mmol KCL**							
	0.9% Sodium chloride		**mmol KCL**							
	0.9% Sodium chloride		**mmol KCL**							

APPENDIX 5

MANAGEMENT OF DIABETES IN LABOUR OR CAESAREAN SECTION

Commence

1. Dextrose 5% at 125mls per hour via infusion pump
2. Actrapid Insulin 50 units made up to 50mls with normal saline via syringe driver (= 1unit in 1ml)

Insulin requirements

Plan to give half the present 24-hour insulin requirement over 24 hours

Calculate the present 24-hour insulin requirement.

Example 1: 96 units per day = 48 units over 24 hours = 2 units/mls per hour

Example 2: 68 units per day = 34 units over 24 hours = 1.4mls/units per hour

If the calculation for insulin requirements or less than 1 unit per hour then this should be discussed with the medical staff

Management for labour and birth

- Offer oral fluids only
- Perform hourly blood glucose monitoring (or more frequently if the dose requires adjustment)
- Aim to maintain the blood glucose level between 4 and 7mmol/l

Increase or decrease the insulin infusion rate by 0.5 units per hour increments to maintain the above values

If hypoglycaemia accidentally induced

- Maintain insulin infusion at 0.5 units per hour
- Give supplemental IV 150-200ml 5% glucose or 150-200mls oral glucose (fresh juice, lucozade or dextrose drink), then continue to titrate as above.

Management following birth

Diet, tablet or incretin mimetic injections

↓

Resume usual diabetes treatment after delivery when patient is eating and drinking normally
Monitor capillary blood glucose 2-4 hourly

Insulin-treated

↓

Insulin requirements will be approximately halved immediately following the birth (IV dose of insulin reduced by half)
e.g. prior to birth 48 units over 24 hours following the birth 24 units over 24 hours

- Record blood glucose 2-4 hourly for 24 hours
- When eating and drinking recommence the pre pregnancy doses of subcut insulin and discontinue IV insulin approximately 30 mins after starting the meal

NB: If a woman is on an insulin pump (CS11) she may continue to use it for labour or LSCS providing her or her partner are able to continue to adjust it. Immediately post delivery the rate should be adjusted to pre-pregnancy settings

Inform Diabetes team if blood glucose persistently over 9mmol/L post delivery

APPENDIX 6

Blood Glucose (BG) Monitoring Chart

Patient Name……………………………………………….. **Ward**…………….. **Hospital**…………….

Date of Birth…………………………………**Unit Number**…………………………………..

Monitoring instructions in DKA:

BG hourly whilst on 50:50 insulin pump
During GKI consider 2hrly. monitoring but only when BG levels are 7 - 11mmol/L and stable.
Blood Ketones: hourly for first 4 hours (expect ketones to fall by 0.5-1.0mmol per hour). Then monitor 4 hourly until blood ketones are less than 0.6mmol/L.

CHECK KETONES if there are any interruptions in IV insulin therapy or if BG >14 and rising for 2 consecutive readings

		Blood	Blood	Insulin		Comments or Continuous		
Date	Time	Glucose	Ketones	Type	Units	Infusion	Rate	Signature

Guidance for management of women with diabetes on insulin pump therapy during labour and delivery

Labour and Caesarean Section

Stable blood glucose on insulin pump

Women with stable blood glucose levels in range on insulin pump therapy may prefer to use the insulin pump whilst in labour or during caesarean section.

Most typically the woman will self-manage their pump with assistance from their partner as required. They will use correction boluses and/or temporary basal rate changes to maintain optimal glycaemic control.

The woman's insulin pump should remain in place on the basal settings to allow safe transition to her post-natal regimen.

The insulin pump settings can be changed to post-partum doses by the woman or her partner just before the start of surgery.

Unstable blood glucose or unable to manage the insulin pump or problem with the insulin pump

Start the labour ward protocol (variable rate intravenous insulin infusion (VRIII) and 5% dextrose intravenously) and switch off the insulin pump if:

1. the woman is unable to manage her insulin pump/pump malfunction or
2. blood glucose >7.0 mmol/L on two consecutive occasions or
3. urinary ketones ≥++ or capillary blood ketones > 1.5mmol/L

Exclude diabetic ketoacidosis (DKA) – see appendix 3

Remember that the patient's insulin pump MUST be resumed BEFORE stopping the labour ward protocol as there is a risk that ketones will develop if the transition to subcutaneous insulin is not managed correctly. If the woman's insulin pump is malfunctioning or not attached to the woman, then a basal insulin will need to be administered subcutaneously by insulin pen as an alternative until the problem with the insulin pump can be corrected. **SEEK ADVICE FROM THE CONSULTANT ENDOCRINOLOGIST ON-CALL 24/7 in this situation.**

Women using continuous glucose monitoring (CGM) should also be reminded that capillary glucose tests are more accurate during labour and delivery.

Any Diabetic Woman presenting with a h/o vomiting or not eating/drinking or unwell

MUST have all of the following performed with in 30mins of decision to admit:-

On Admission complete all of the below	IF RESULT IS:-	URGENT Action
Blood Ketones	**≥1.5mmol/L** or	**Venous Blood Gas** Performed and an Obstetric review within the next 30mins
Blood Glucose	**>7** or	
Ward Urinalysis	**Ketones ≥+++** or	
MEoWS	**Scoring**	**Follow Escalation**