1. Preconceptional and antenatal care
Diabetes is the most common pre-existing medical disorder complicating pregnancy in the UK. As the prevalence of diabetes is increasing, so the number of pregnancies complicated by pre-existing diabetes or gestational diabetes is also rising. Gestational diabetes, however, accounts for the majority of cases seen in our locality.

There are multidisciplinary clinics held in the antenatal clinic for the management of diabetes in pregnancy:
- Every Monday and Friday for gestational diabetes
- Every Tuesday for pre-existing diabetes (type 1 and 2) and endocrine conditions.

Diagnosis of Gestational Diabetes – Referral for Oral Glucose Tolerance Test based on current criteria to day assessment unit.

2. Organisation of Clinic Service and multidisciplinary team
Women with diabetes who are pregnant should be offered immediate contact with a joint diabetes and antenatal clinic. Antenatal care is provided by a Consultant Obstetrician, Consultant Diabetologist, Diabetes Specialist Nurse together with the midwife and dietitian.

Roles and responsibilities
Consultant Obstetrician with Diabetes speciality
It is the role of the Consultant Obstetrician to advise women with pre-existing or gestational diabetes and to decide upon a management plan for pregnancy, labour and the puerperium. The management plan must be clearly documented in the patient health record. The Consultant will also coordinate care within the multidisciplinary team.

Consultant Physician with Diabetes Specialty
It is the responsibility of the Consultant Physician to advise women with type 1 and 2 diabetes and to assist within the multidisciplinary team to ensure an appropriate management plan for pregnancy, labour and the puerperium is in place.

Dietitian
The Dietitian forms a key member of the multidisciplinary team and is responsible for providing women with diabetes who are planning to become pregnant or who are already pregnant and women with gestational diabetes with individualised dietary advice. This must form part of the documented management plan.
Diabetes Specialist Nurse
The diabetes specialist nurse forms a key member of the multidisciplinary team and is responsible for contributing towards an individualised, documented management plan. This must be undertaken in partnership with the woman and the MDT providing information, advice and support that will support the reduction of adverse pregnancy outcomes for mother and baby. The diabetes specialist nurse works independently in the gestational clinic alongside the Obstetrician.

3. Preconception

Women with diabetes who are planning to become pregnant should be informed that establishing good glycaemic control before conception and continuity throughout pregnancy will reduce the risk of miscarriage, congenital malformation, stillbirth and neonatal death.

Diabetes Specialist Nurse led service
- All women of childbearing potential should be given preconception advice.
- All women with diabetes planning pregnancy should be prescribed folic acid 5mg daily preferably for 3 months before conception because of their increased risk of neural tube defects.
- Rubella status should be checked and the opportunity taken to give general alcohol and smoking advice (referral to smoking cessation if appropriate).
- Attempts should be made to optimize glycaemic control prior to conception.
- Target HbA1c of 48 mmols/mol to reduce the risk of fetal abnormalities particularly cardiac and neural tube defects and miscarriage.
- Refer to Type 1 diabetes group education for carbohydrate counting if appropriate
- Consider insulin pump therapy if deemed appropriate
- Refer to consultant diabetologist if required
- For women with Type 2 diabetes review of oral hypoglycaemic agents. Metformin may be continued and they may require insulin.
- Assess diabetic complications, their likely impact on pregnancy and the effect of pregnancy on pre-existing complications.
- Liaise with Ocean Suite for women undergoing fertility treatment
- Patients found to be pregnant should be seen at the next diabetic antenatal clinic or more urgently if clinically indicated. Send referral to the antenatal clinic and phone to book for next available appointment.

4. Antenatal Management for women with diabetes

4.1a TYPE 1 AND 2

Scans and obstetric review are appropriate at the times shown in (appendix 1) and must be offered (please document this even if patient declines).

Medical
- Optimize glycaemic control as above. Patients are usually managed on basal bolus regimen – short acting insulin before meals and long acting analogue insulin before bed or a s/c insulin pump using their short acting insulin. These women will be self caring with their pumps and be competent carbohydrate counters. (see appendix 2 for management of insulin pumps in labour and elective caesarian section).
- Individualized dietary advice by a specialist diabetes dietitian
- Encourage consumption of low glycaemia index carbohydrate foods/reduce saturated fat.
- Women with a BMI >30 require advice regarding healthy eating in pregnancy and guidance to try to limit their weight gain during pregnancy
- Advise on management of hypoglycaemia because tight diabetic control will almost certainly increase the frequency of mild hypoglycaemia (Blood glucose < 4.0 mmol/l) and can lead to a loss of warning symptoms for hypoglycaemia. Consequently will be at
increased risk of a severe hypoglycaemic reaction (third party assistance required), particularly prevalent in the first trimester. (see appendix 3 for management of hypoglycaemia)

- Advise GP to issue s/c glucagon to women with type 1 diabetes due to increased risk of hypoglycaemia
- Direct access to diabetes nurse specialist for advice 01752 792962/ 07825 356928
- Out of hours: GP/A&E <20/40, Labour ward> 20/40.
- For women with Type 2 diabetes manage with metformin and/or insulin
- Assessment of diabetes complications as early as possible in pregnancy.
- Assessment of ischaemic heart disease risk should be undertaken in women with nephropathy and those with type 2 diabetes.
- As soon as pregnancy is confirmed HbA1c, U&Es, TFT and urine PCR should be performed.
- HbA1c at time of confirmation of pregnancy and monthly thereafter
- Urinalysis and blood pressure at each clinic visit.
- Aim for pre-meal blood glucose of 4 - 5.3mmol/l and post prandial <7.8mmol/l after one hour
- Blood glucose monitoring pre and post meal
- Retinal screening in each trimester. Diabetes Specialist Nurse will emial a referral to the eye screening office.
- Baseline urine for protein/creatinine ratio then to be repeated for patients with known diabetic nephropathy or patients with persistent proteinuria every trimester.
- Increased risk of VTE. Complete risk assessment.
- Particularly increased risk of PET and IUGR. Consider low dose 75mg aspirin from 10 weeks gestation.
- Document pre-pregnancy insulin regime in hand held notes.
- Women suspected of having diabetic ketoacidosis must be admitted immediately to a high dependency unit where they will receive both medical and obstetric care (appendix 4).
- Issue urinary ketone strips to all women with type 1 diabetes and advise them to test for ketones if their blood glucose is >10 mmols/l.

4.1b. Management of Gestational Diabetes

- Medical
- Abnormal GTT in pregnancy is fasting blood glucose ≥ 5.3 mmols/l or 2 hourly ≥7.8 mmols/l.
- After diagnosis of Gestational Diabetes a referral is made to antenatal clinic where a blood glucose meter will be issued. An appointment will be arranged for a growth scan and consultant/ diabetes nurse review. They will also be referred to the diettian for a group education session.
- Baseline HbA1c is performed. If this result is <48 mmols/mol then it is not repeated.
- Blood glucose targets are the same as for pre-existing diabetes which is 4-5.3mmols pre-meal and < 7.8 mmols one hour post meal.
- If blood glucose is not within target parameters then Metformin is prescribed (unless there are any contraindications to its use). Metformin is started at 500mg once a day and slowly titrated up to a maximum of 2g per day if required. In labour (if on metformin only) blood glucose levels should be monitored every 4 hours; increase the frequency of testing if blood glucose is ≥10 mmols/l.
- If Metformin is not tolerated or blood glucose levels are above 10mmols/l then insulin will be started. This is done by a member of the diabetes specialist nursing team.
- Women with Gestational Diabetes will be offered a growth scan every four weeks from 28 weeks gestation with a review in the joint antenatal/diabetes clinic.
4.2 Obstetric management of Type 1DM/Type 2DM/GDM

- Fetal heart should be auscultated at every non-scan visit by the midwife.
- Importance of awareness of fetal movements must be discussed.
- Women should be seen weekly for BP, urinalysis and FH, with CMW visits in between clinic visits from 34 weeks. (stated in appendix 1).
- Obstetric and neonatal risks of pregnancy and poor glycaemia control must be discussed and include:
  - Miscarriage, fetal malformations (pre-existing diabetes)
  - Antenatal monitoring
  - Macrosomia, PET, IUD
  - Induction of labour, instrumental delivery and caesarean section
  - Monitoring in labour, shoulder dystocia.
  - Admission to NICU, neonatal hypoglycaemia, breathing difficulties and jaundice.
- Women with macrosomia (EFW of > 4.5kg) should be counselled about clinical need for caesarean section
- Discuss feeding plan: breast-feeding is recommended. Women with type 1 diabetes will require a 25% reduction in their pre pregnancy insulin requirements when breastfeeding. A post natal plan will be made by the multidisciplinary team for diabetes medication.

4.3 In-patient antenatal intravenous insulin regime

Please see appendix 5 (management of blood sugars for women with diabetes in labour)

5. Timing of Delivery

- Delivery by 38+5/40 for women with pre existing diabetes. Induction at 37-38/40 if suboptimal control, macrosomia or mild polyhydramnios or reduced insulin requirements (consider earlier).
- Delivery between 38 weeks to term for gestational diabetes. Consider fetal size, glucose control and diabetes treatment
- Document and discuss risk of shoulder dystocia.
- Delivery before 38/40 and by elective caesarean section may be appropriate on clinical grounds such as microvascular disease, poor control in association with polyhydramnios, macrosomia or sudden acceleration in growth, fetal growth restriction or reduction of insulin requirements.
- Please ensure that NICU are aware of any planned early delivery prior to admission.
- Any planned or premature delivery before 36 weeks should receive antenatal steroids, betamethasone 12mg IM x 2 doses, 24 hours apart and admission for glycaemia control and fetal monitoring.
- All women with pre-existing diabetes will require an IV ‘top up sliding scale’ in addition to their usual s/c insulin regime whilst on steroids (see appendix 6). The infusion rate and blood glucose levels should be monitored every hour and the prescription adjusted if required to maintain their levels between 4-5.3 mmols/l. Their capillary blood ketone should be checked every hour (this is available on labour ward).
- If women develop ketones and blood glucose above 10 mmols they must have an urgent medical review and consideration of commencing the DKA protocol and a change in variable rate insulin infusion (see appendix 4).

6. Documentation

A clear, individualised management plan for pregnancy, labour and puerperium (6 weeks postnatal) must be recorded in the obstetric notes.
7. Postpartum follow-up
All women with pre-existing diabetes will be offered a diabetes consultant follow 6-8 week post-partum. They will continue to have diabetes specialist nurse support and be offered a home visit.

All women with gestational Diabetes will be advised to have a fasting plasma glucose at 6-13 weeks post-partum then annual follow up with HbA1c by their GP surgery. In future pregnancies they will require a GTT after their 12 week scan.
### Appendix 1

#### Antenatal and USS appointments for women with diabetes

<table>
<thead>
<tr>
<th>Appointment</th>
<th>Antenatal care</th>
<th>USS appointments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First appointment (joint diabetes and antenatal clinic)</strong></td>
<td>Offer information, advice and support in relation to optimising glycaemic control. Take a clinical history to establish the extent of diabetes-related complications. Review medications for diabetes and its complications. Consider the use of daily Aspirin, 75mg. Refer for retinal eye screening for women with pre-existing diabetes - every trimester. Baseline blood tests: U&amp;Es, TFTs, HbA1c, FBC.</td>
<td></td>
</tr>
<tr>
<td><strong>7–9 weeks</strong></td>
<td>Confirm viability of pregnancy and gestational age.</td>
<td>Early Viability Scan</td>
</tr>
<tr>
<td><strong>Booking appointment (ideally by 10 weeks)</strong></td>
<td>Discuss information, education and advice about how diabetes will affect the pregnancy, birth and early parenting (such as breastfeeding and initial care of the baby).</td>
<td></td>
</tr>
<tr>
<td><strong>12 weeks</strong></td>
<td>Continue to offer weekly appointments for diabetes review and management of medication. Repeat HbA1c.</td>
<td>Dating scan and Downs screening</td>
</tr>
<tr>
<td><strong>16 weeks</strong></td>
<td>Offer retinal assessment at 16–20 weeks to women with pre-existing diabetes. Repeat HbA1c.</td>
<td>Anomaly scan, including 4 chamber view and outflow tracts</td>
</tr>
<tr>
<td><strong>20 weeks</strong></td>
<td>Continue to see regularly in the joint clinic. Inform women of the increase in insulin requirements from this stage. Repeat HbA1c/TFTs if indicated.</td>
<td></td>
</tr>
<tr>
<td><strong>24 weeks</strong></td>
<td>Joint clinic review of diabetes control. HbA1c.</td>
<td></td>
</tr>
<tr>
<td><strong>31 - 32 weeks</strong></td>
<td>Offer ultrasound monitoring of fetal growth and amniotic fluid volume. Offer retinal assessment to women with pre-existing diabetes.</td>
<td>Growth and LV</td>
</tr>
<tr>
<td><strong>36 weeks</strong></td>
<td>Offer Ultrasound monitoring of fetal growth and amniotic fluid volume. Discuss Induction of labour with women with gestational diabetes if indicted for 38-40 weeks.</td>
<td>Growth and LV</td>
</tr>
<tr>
<td><strong>37 weeks</strong></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>38 weeks</strong></td>
<td>Review diabetes management and make plans for delivery.</td>
<td>Growth and LV. Confirm and arrange delivery plan</td>
</tr>
<tr>
<td><strong>39 weeks</strong></td>
<td>Review diabetes management and make plans for delivery in gestational diabetes.</td>
<td></td>
</tr>
<tr>
<td><strong>40 weeks</strong></td>
<td>Review any gestational diabetes women who have elected to deliver post term.</td>
<td></td>
</tr>
</tbody>
</table>

**NB** - If growth scan results outside 3rd or 97th centile or liquor volume abnormal more frequent scans and/or clinic visits may be appropriate.
Appendix 2:

Guidelines for managing insulin pumps in hospitalised patients

1. Diabetic ketoacidosis (DKA) and the unconscious or incapacitated patient: p2 (appendix 1 for summary)
2. Insulin pumps and radiology investigations: p2
3. Pump management for surgery and procedures: p3 (appendix 2 for summary)
4. Pump management for women in labour: p4 (appendix 2 for summary)
5. Hypoglycaemia in patients on CSII: p5
6. Stopping and re-starting CSII: p5
7. Alternative insulin regimens for hospitalised patients unable to continue on CSII: p6

Overview of insulin pumps/Continuous Subcutaneous Insulin Infusion therapy (CSII)

CSII is used in people with type 1 diabetes to improve glucose control and/or reduce the risk of hypoglycaemia. CSII involves a continuous “basal” insulin infusion (the rate usually varies over the 24 hour period), in combination with meal-time bolus insulin. Both basal and bolus insulin are delivered by an insulin pump, which infuses short acting insulin (either novorapid or humalog lispro) through a catheter attached to a fine bore subcutaneous cannula (typically sited in the abdomen). The basal infusion rates are pre-programmed by the patient (or their diabetes nurse/doctor) and will continue to run until the insulin cartridge is empty; boluses are delivered under the patient’s direction, to cover food intake and to correct for high blood glucose levels. People on CSII do NOT take any long acting insulin so if there is any interruption to insulin delivery (e.g. if the cannula is blocked or dislodged) hyperglycaemia and then ketoacidosis can develop very quickly, unless the problem is identified and rectified, e.g. by re-siting the cannula, changing the tubing, or starting alternative insulin such as an intravenous infusion. The pump should only be adjusted by its owner (who has received extensive training) or a member of the Diabetes team in possession of the correct knowledge and skills. If the patient is unable to manage their pump, and no specialist advice immediately available, remove pump and start a conventional intravenous insulin infusion or SC basal bolus insulin regimen: see below. Insulin pumps are expensive and steps should be taken to ensure they are not lost when a patient is admitted to hospital. If a patient is unconscious or incapacitated ask a relative to look after the pump, store the pump in the patient’s medication locker if this is not possible. Document the location of the pump in the medical notes.

Please discuss all pump patients with a member of the Diabetes team: contact Diabetes specialist nurse team (ext 52963, bleep 0989) or or Diabetes consultant of the day via the Diabetes smartphone (via switchboard)
1. **Pump Management for DKA and unconscious/incapacitated patient**

(See appendix 1 for summary)

It is usually best for the patient to continue to self-manage their diabetes with the pump except:

- If unconscious, confused or incapacitated e.g. if illness/pain prevents self-management
- If undergoing major procedures under General Anaesthetic lasting >2 hours
- Diabetic ketoacidosis (DKA)

**The unconscious or incapacitated patient**

If patient unable to self-manage their pump (i.e. unconscious or incapacitated): remove cannula/detach pump. **Place pump in a safe place and document** - ask a relative to take the pump home for safe keeping if possible. Immediately start alternative insulin e.g. variable rate IV insulin (see Staffnet: “Guidelines for managing blood glucose in adults for Perioperative/fasting/unstable diabetes”) or sub cut insulin (see below: “alternatives to CSII”) unless hypoglycaemic. If hypoglycaemic, start alternative insulin *once* hypoglycaemia is treated. CSII can be restarted once patient recovered (see below: “stopping and restarting CSII”).

**Diabetic ketoacidosis (DKA):**

The altered tissue perfusion in DKA affects insulin absorption, making CSII unreliable. CSII should be temporarily discontinued in patients presenting in DKA: remove cannula/detach pump. For further management, follow standard DKA protocol (on Staffnet). CSII can be restarted once DKA treated (see below: “stopping and restarting CSII”). **All patients should have specialist diabetes input before discharge** to review CSII settings which may need adjusting to prevent subsequent DKA, and to re-enforce “sick day rules”.

2. **Pumps and radiology investigations**

The pump must be suspended and removed prior to MRI scanning, and should not be taken into the scanning room. Pump manufacturers also advise removing the pump prior to CT scan. For plain x-rays, there is no need to remove the pump, unless its position obscures the area of interest. The patient should reconnect the pump immediately following any radiological investigation. Pumps can be safely suspended/removed for up to an hour at a time without needing alternative insulin. A correction bolus may be needed on reconnecting the pump (see below: “starting and stopping CSII”).
3. **Pump management for procedures** (see appendix 2 for summary)

Fasting is not usually a problem for pump users, so being “nil by mouth” does not necessarily mean removal of the pump or need for IV insulin. Although the insulin pump is a “device”, most patients will be able to manage their pump post sedation/anaesthesia as safely as any patient using standard insulin therapy (MDI: multi-dose injections, i.e. an insulin pen) and are more likely to achieve stable glucose control. Hence it is not necessary to admit day-case patients overnight for variable rate IV insulin infusion simply because they manage their diabetes by CSII. However, some patients will feel unable to self-manage post-procedure and should discuss this with their diabetes pump team in advance; they may require alternative management such as prior conversion back to MDI insulin (see below: “alternatives insulin regimens”), or hospital admission. Pre-procedure, if continuing on CSII, patient should ensure SC pump cannula is sited away from operative site and accessible to healthcare team.

**Major surgical procedures (>2 hours duration and/or unlikely to eat/drink within 2-3 hrs post-op):**

Patient removes pump and hands over to family/friend for safe-keeping. Once pump removed, start variable rate IV insulin infusion immediately (use “Guidelines for managing blood glucose in adults for perioperative/fasting/unstable diabetes” on Staffnet). CSII can be restarted once patient recovered and able to manage pump (see: “stopping and restarting CSII”).

**Minor procedures (<2 hours and expected to eat/drink within 2-3hrs) under general anaesthetic or sedation:**

Patient should ensure blood glucose in the acceptable range pre-procedure i.e. 4-12 mmol/l (if not, start variable rate IV insulin as for major surgical procedures using “Guidelines for managing blood glucose in adults for perioperative/fasting/unstable diabetes” on Staffnet). Whilst on CSII (or VRII), the healthcare team must monitor patient’s capillary glucose levels at least hourly; start VRII insulin infusion if any reading >12 mmol/l. Post procedure, the patient on CSII should also use a correction bolus if capillary glucose >10 mmol/l.

If the pump alarms during the procedure, do not attempt to rectify; monitor blood glucose every 30 mins and start IV insulin if >12 mmol/l. If the pump alarm becomes intrusive, remove pump plus cannula, allow pump to continue to run (the amount of insulin “lost” is minimal) and store safely in a suitable receptacle. **Do not misplace the pump!**

If variable rate IV insulin used during procedure, see below for transferring back to CSII (“stopping and restarting CSII”); a correction bolus is less likely to be required in this situation.

**Minor procedures without sedation:**

The insulin pump can be continued with regular glucose monitoring as for any person with diabetes.
4. **Pregnant women with Type 1 Diabetes on CSII admitted in labour**

(See appendix 3 for summary)

Women may continue to use their pump during labour or elective caesarean section provided their blood glucose levels are within the **target range of 4 – 7 mmol/L** and patient/partner able to manage insulin pump. Insert IV cannula in case variable rate IV insulin/dextrose is required. Measure and record blood glucose levels hourly using approved hospital blood glucose meter. Patient should continue her usual basal infusion rates, aiming to keep blood glucose levels between 4 - 7 mmol/L. Bolus correction doses (see below) should be made by the patient via the insulin pump to maintain target blood glucose levels 4 to 7mmol/l.

**If patient/partner unable to manage the pump, or if blood glucose rising >7mmol/l for >2 hours despite correction doses (see below and appendix 3), switch from CSII (remove pump and place in suitable container; no need to turn off pump nor to remove SC cannula) to standard IV insulin/dextrose infusions: see Staffnet “Guideline for the management of blood sugars for women with diabetes in labour”**.

**Correction doses during labour:**

If blood glucose greater than 7mmol/L, advise a correction bolus dose, aiming for a blood glucose of 5mmol/L, using a patient’s personal correction dose (also known as “ISF” = insulin sensitivity factor) or if not known, calculate 1 unit of insulin to reduce blood glucose levels by 2.5mmol/L e.g. if blood glucose 10.0 mmol/L, give 2 units bolus. After 1 hour, if that correction bolus is ineffective i.e. blood glucose still above 7.0 mmol/L, give another correction bolus dose (using the same calculation advice as above). After a further ½ hour, if blood glucose levels still not below 7.0 mmol/L then switch to IV insulin as above.

**Hypoglycaemia during labour:**

If blood glucose < 4.0mmol/L treat hypoglycaemia as per hospital policy. Suggest using either glucose tablets or glucose in water as quick-acting carbohydrate, in the first instance.

If the woman has **more than one** hypoglycaemic event, ask her to reduce her basal rate on the pump to 50% using a temporary basal rate setting. The basal rate setting should then continue as this throughout the remainder of the labour, and should not be increased back to the full 100% basal rate.

**Post delivery**

Towards the end of pregnancy, in conjunction with the diabetes team, the patient should have made a record of her planned post delivery basal profile: typically the same as her pre-pregnancy basal profile, or if pump started during pregnancy, 50% of pre-delivery basal rates. This post-partum basal profile can be entered into the pump memory in advance, prior to labour, ready for post-delivery. If breastfeeding, rates may need reducing by a further 10-20%.

**Inform Diabetes Specialist antenatal team of any woman using pump therapy admitted to hospital.**
5. **Hypoglycaemia in patients on CSII**

Patients able to manage their pump:
Treat hypoglycaemia with rapid acting carbohydrates (e.g. dextrose tablets, lucozade). Unlike patients on long acting insulin, follow-up with long acting carbohydrates is not usually needed. Pump infusion rates may need adjustment, especially if history of recurrent hypoglycaemia: **consult diabetes team.**

The unconscious/incapacitated patient:
Initial treatment of hypoglycaemia is as standard hospital policy. If persistent hypoglycaemia, remove cannula and pump. Once normoglycaemic, re-start insulin, either CSII if patient now alert and able to self-manage, or alternative regimen (see below); this is needed to prevent the development of ketoacidosis.

6. **Stopping and re-starting CSII**

Stopping:
The pump/tubing may be removed leaving the SC cannula in place, unless cannula site is infected or in surgical field. It is important not to cut pump tubing or disconnect the pump from the tubing as the remaining insulin in the tube may infuse quickly risking hypoglycaemia. Place the pump into a suitable container and do not attempt to turn off; the amount of insulin “lost” into the container will be minimal. Document where the pump is stored or to whom it has been given. The insulin in a pump is very short acting therefore **alternative insulin must be started immediately i.e. within an hour** (see below) to avoid risk of ketoacidosis. If the patient is able to do so, he/she should make a record of their current basal and bolus settings, as this data may be lost if the pump is stopped for any significant length of time.

Restarting:
If pump has been only temporarily removed or suspended (i.e. no IV insulin infusion has been required) and SC cannula still in position, patient should perform a “fixed prime” to refill the dead space within the tubing, then simply reconnect pump, and restart basal infusion. If capillary glucose >10mmol/l, he/she should bolus a correction dose once pump re-connected, using their personal correction ratio or ISF (insulin sensitivity factor). If transferring from IV insulin infusion: ask patient to insert new cannula and re-start pump after performing a fixed prime (there is no need to wait until a meal); wait 30 minutes before discontinuing IV insulin.

If transferring from subcutaneous insulin: patient inserts new cannula, performs a fixed prime and re-starts pump. Pump settings may need to be re-programmed. Patient may need to temporarily reduce background insulin infusion rate (e.g. drop to a 70% temporary basal rate for 24hrs) while long acting subcutaneous insulin is still active - increased glucose monitoring may be required. No further sub cut insulin doses should be required once CSII restarted. Contact pump team via diabetes centre for further advice.
7. Alternative insulin regimens for hospitalised patients unable to continue on CSII

All the guidelines below can be found in the Diabetes section of Clinical Guidelines on Staffnet.

The appropriate alternative insulin regimen depends on the clinical scenario:

For **patients with DKA**, use a fixed rate IV insulin infusion as per “Guidelines for Diabetic ketoacidosis”.

For **patients who are fasted and/or have unstable glucose levels** (but not DKA), use a variable rate IV insulin infusion (VRIII) as per “Guidelines for managing blood glucose in adults for perioperative/fasting/unstable diabetes”.

For **women in labour**, use “Guideline for the management of blood sugars for women with diabetes in labour”.

For **patients who are unable to self manage their insulin pump, but do not have unstable blood glucose levels** and are not NBM, a basal-bolus insulin regimen is preferable to VRIII.

Calculate appropriate starting doses based on the patient’s recent (e.g. 7 day) average total daily insulin dose (TDD); this information can be obtained by the patient or DSN from the pump.

Prescribe 50% of the TDD as once daily levemir insulin.

For meal-time insulin (novorapid) dose: 50% of TDD/3 plus a safety adjustment (e.g. minus 30%) to minimise risk of hypoglycaemia. Titrate doses according to response. Alternatively, if the patient is able to continue to carbohydrate count, prescribe a variable novorapid dose for self administration.

- e.g. a patient’s average pump insulin TDD for last 7 days is 48 units/day.
- 50% of 48 units = 24 units as once daily levemir insulin.
- 50% of 48 units/3 = 8 units of novorapid insulin with each meal: after safety adjustment = 6 units
Appendix 1: Emergency admissions and pump management

Patient using Insulin pump (CSII) admitted acutely unwell/incapacitated/unconscious?

- Patient in diabetic ketoacidosis?
  - Start standard fixed rate IV insulin infusion using Trust DKA protocol.
  - Remove CSII cannula/pump
  - Place pump in suitable container
  - If pump removed, give to relative for safe keeping; if not possible, place with patient and document location. (Pumps cost ~£4000 to replace)

- Patient hypoglycaemic (BG<4mmol/l)?
  - Immediate hypoglycaemia treatment. Remove pump and tubing; leave cannula in situ
  - Recheck BG after 10 mins

- Assessment should include blood glucose, blood or urine ketones, +/- arterial pH

- Not in DKA nor hypoglycaemic, but otherwise unwell and/or not eating/drinking
  - Remove CSII cannula and pump. Place pump in suitable container.
  - Start alternative insulin (IV or SC)

- Still hypoglycaemic?
  - Further hypo treatment

- Patient now fully recovered & BG >4?
  - Restart CSII; patient to review pump settings with Diabetes team

Please discuss all pump patients with a member of the Diabetes team.
Contact Diabetes specialist nurse team (ext 52963, bleep 0989) or diabetes doctors via Diabetes smartphone.
Appendix 2: Pump management for elective procedures under sedation or anaesthesia

Elective procedure without sedation?

- Continue CSII at usual basal rate.
- Ensure cannula sited away from operative site and pump accessible.
- Check blood glucose hourly.

Post procedure, patient to take correction bolus if blood glucose > 10 mmol/l.

Elective procedure under sedation/general anaesthesia.

Will patient miss more than one meal?

- Blood glucose in acceptable range (4-12 mmol/l)?

  - No
  - No
  - Blood glucose in acceptable range (4-12 mmol/l)?
  - Yes
    - Continue on CSII through procedure at usual basal rates.
    - Ensure cannula sited away from operative site and pump accessible to healthcare team.
    - Monitor blood glucose at least hourly.

  - Yes
    - Ask patient to turn off/remove pump just before going to theatre and hand over for safekeeping.
    - Advise patient to make a note of current pump settings prior to switching off pump.

- Start standard variable rate IV insulin infusion (VRII) immediately.

If blood glucose < 4, follow hypoglycaemia protocol; re-test every 30 mins. Leave pump in place and do not attempt to adjust settings.

If pump alarms during procedure, don’t try to rectify; leave pump in place, monitor blood glucose every 30 mins.

If alarm becomes intrusive, or patient has more than one hypo, remove pump and cannula (do not attempt to switch off pump), place in suitable container for safekeeping and start VRII.

Please discuss all pump patients with a member of the Diabetes team.
Appendix 3: Guidance for management of insulin pumps (CSII) during labour or for elective caesarean section

Woman using CSII admitted in labour or for elective caesarian section

Patient/partner happy to continue on CSII during labour/delivery?

Switch to standard IV insulin protocol
Remove pump/tubing and place in suitable container
SC cannula may remain in situ

BG>7 on 2 consecutive hourly readings despite 2 correction doses?

- Continue CSII on current settings
- Insert IV cannula in case IV insulin/fluids required
- Measure capillary blood glucose (BG) at least hourly
- Target BG between 4-7 mmol/l

BG<4mmol/l?

- Standard hypo treatment e.g. 2-3 dextrose tablets
- Recheck BG after 30 mins, then at least hourly
- Further hypo (BG<4)? Reduce basal rates by 50% for remainder of labour

BG>7 mmol/l?

- BG on target? 4-7 mmol/l
- Continue CSII
- BG <?
- BG >?

BG >7 on 2 consecutive hourly readings despite 2 correction doses?

- Patient/partner to deliver correction dose using pump

BG>7? 

- BG <?

Post delivery, patient/partner to reduce basal rates back to pre-pregnancy settings, or by 50% if CSII started during pregnancy

Please discuss all pump patients with a member of the Diabetes team.
Contact Diabetes specialist nurse team (ext 52963, bleep 0989) or diabetes doctors via Diabetes smartphone
### APPENDIX 3 TREATMENT of HYPOGLYCAEMIA (HYPO) in ADULTS with DIABETES (<4mmol)

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient is conscious, oriented and able to swallow.</td>
<td>Patient is confused, uncooperative or aggressive but able to swallow, or has enteral feeding tube in situ confirmed safe to use.</td>
<td>CHECK ABC &amp; FAST BLEEP DOCTOR IF UNCONSCIOUS or HAVING / HAD A SEIZURE, then follow the steps below.</td>
</tr>
<tr>
<td><strong>STEP 1 GLUCOSE TREATMENT</strong></td>
<td><strong>STEP 1 GLUCOSE TREATMENT</strong></td>
<td><strong>STEP 1 GLUCOSE TREATMENT</strong></td>
</tr>
<tr>
<td>GIVE 15-20g quick acting carbohydrate. For example, give ONE of the following:</td>
<td>GIVE 15-20g quick acting carbohydrate. For example, give ONE of the following:</td>
<td>If your patient is unconscious, having/had a seizure, very aggressive, Nil by Mouth (NBM), or has enteral feeding tube in situ but NOT confirmed safe to use then:</td>
</tr>
<tr>
<td>5-7 dextrose sweets or 4-5 Glucotabs</td>
<td>25-35ml Polycal</td>
<td>• For patients with IV access, GIVE:</td>
</tr>
<tr>
<td>25-35ml Polycal</td>
<td>1.5-2 tubes of GlucoGel/Dextrogel (orally only)</td>
<td>150-200ml 10% Glucose over 15 minutes</td>
</tr>
<tr>
<td>4-5 heaped teaspoons of sugar dissolved in water (not for patients taking Acarbose)</td>
<td>4-5 heaped teaspoons of sugar dissolved in water (not for patients taking Acarbose) OR 1mg Glucagon IM (once only)</td>
<td>• If NO IV access, GIVE 1mg Glucagon IM (once only) This is less effective in malnourished, NBM patients</td>
</tr>
<tr>
<td>TEST blood glucose after 10-15 minutes. If still less than 4mmol, REPEAT TREATMENT.</td>
<td>TEST blood glucose after 10-15 minutes. If still less than 4mmol, REPEAT TREATMENT.</td>
<td>TEST blood glucose after 10-15 minutes. If still less than 4mmol, contact Doctor</td>
</tr>
<tr>
<td>If blood glucose still less than 4mmol after 3 cycles of treatment or 30-45 minutes, contact Doctor.</td>
<td>If blood glucose still less than 4mmol after 3 cycles of treatment or 30-45 minutes, contact Doctor.</td>
<td>If blood glucose still less than 4mmol after 3 cycles of treatment or 30-45 minutes, contact Doctor.</td>
</tr>
<tr>
<td><strong>DO NOT PROCEED BELOW THIS LINE UNTIL BLOOD GLUCOSE IS 4mmol OR MORE</strong></td>
<td><strong>DO NOT PROCEED BELOW THIS LINE UNTIL BLOOD GLUCOSE IS 4mmol OR MORE</strong></td>
<td><strong>DO NOT PROCEED BELOW THIS LINE UNTIL BLOOD GLUCOSE IS 4mmol OR MORE</strong></td>
</tr>
<tr>
<td><strong>STEP 2 RECOVERY</strong></td>
<td><strong>STEP 2 RECOVERY</strong></td>
<td><strong>STEP 2 RECOVERY</strong></td>
</tr>
<tr>
<td>IF EATING AND DRINKING - give 20g long acting carbohydrate, for example, give ONE of the following: 2 biscuits OR 1 slice of bread/toast OR 200ml milk &amp; 1 biscuit OR have normal meal if due (it must contain some carbohydrate e.g. bread, potato, rice, pasta)</td>
<td>IF RECEIVING IV INSULIN - Restart IV insulin once blood glucose over 4mmol with appropriate IV fluids according to IV insulin guideline</td>
<td><strong>ADDITIONAL NOTES</strong></td>
</tr>
<tr>
<td>IF NIL BY MOUTH - consider continuing IV 10% Glucose infusion at 100ml/hour until reviewed by Doctor</td>
<td>IF RECEIVING ENTERAL FEED/PARENTERAL FEED - restart feed or consider continuing IV 10% Glucose infusion at 100ml/hour until reviewed by Doctor</td>
<td><strong>Patients given Glucagon injection require more long acting carbohydrate so DOUBLE the amount above i.e 40g long acting carbohydrate</strong></td>
</tr>
<tr>
<td>IF USING INSULIN PUMP - Once normoglycaemic, restart insulin, either by pump (if patient able to self-manage) or start IV insulin/sub cut insulin. These patients do not always need to follow up with long acting carbohydrate - ask the patient what they usually do.</td>
<td></td>
<td><strong>Be aware that if hypo due to long acting insulin or sulphonylurea tablets (e.g. Gliclazide) then risk of hypo may persist for up to 36 hours, especially in CKD patients</strong></td>
</tr>
<tr>
<td>IF RESOLUTION OF HYPOGLYCAEMIC EPISODE DO THE FOLLOWING:</td>
<td>ON RESOLUTION OF HYPOGLYCAEMIC EPISODE DO THE FOLLOWING:</td>
<td>1. If insulin injection is due, DO NOT OMIT but discuss with Doctor and consider dose reduction</td>
</tr>
<tr>
<td>3. Monitor blood glucose pre-meal, pre-bed +/- once overnight for 48 hours, or more frequently if severe hypoglycaemic event</td>
<td>3. Monitor blood glucose pre-meal, pre-bed +/- once overnight for 48 hours, or more frequently if severe hypoglycaemic event</td>
<td>3. Monitor blood glucose pre-meal, pre-bed +/- once overnight for 48 hours, or more frequently if severe hypoglycaemic event</td>
</tr>
<tr>
<td>4. Give hypo education to patient, or refer to Diabetes Team on 52963 or bleep 0989 to provide education</td>
<td>4. Give hypo education to patient, or refer to Diabetes Team on 52963 or bleep 0989 to provide education</td>
<td>4. Give hypo education to patient, or refer to Diabetes Team on 52963 or bleep 0989 to provide education</td>
</tr>
</tbody>
</table>

E. Green, Diabetes Specialist Nurse, K. Evans Consultant Diabetologist, I. Montague Consultant Obstetrician January 2017; review December 2019

CLI.MAT.GUI.723.4 Pre existing and Gestational Diabetes Mellitus Management of Pregnancy
## Appendix 4 DIABETIC KETOACIDOSIS

### Management recommendations for diabetic ketoaciddosis

- Discuss with medical SpR on call for advice
- Request ICU review if pH < 7 or not improving after 2 hours, persistent low systolic BP < 100, urine output < 0.5 ml/kg/hour for 3 hours, Glasgow coma scale <12 or falling. All pregnant patients suspected of diabetic ketoacidosis should be referred to ICU team.
- Continue basal insulin glargine (Lantus) or detemir (Levemir) if already on basal insulin
- Potassium replacement – essential to maintain between 3.5-5.5 mmol/L
  - If > 5.5 mmol/L - No potassium
  - If 3.5-5.5 mmol/L - need 20-40 mmol/L
  - If < 3.5 mmol/L - need 40 mmol over 1 hour with cardiac monitoring
**DO NOT add potassium if in renal failure (eGFR <15) - discuss with renal team first **
- Monitor electrolytes on blood gas analyser
- Prescribe prophylactic heparin if no contra-indications
- Recommended targets: ketone reduction by 0.5 mmol/L/hr, glucose reduction by 3 mmol/L/hr, venous HCO₃ increase by 3 mmol/L/hr

### Investigations

<table>
<thead>
<tr>
<th>First 60 min</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnose, resuscitate and treat</td>
<td>- iv insulin- fixed rate based on body weight</td>
</tr>
<tr>
<td></td>
<td>- iv 0.9% saline - 1 litre over 60 min</td>
</tr>
<tr>
<td></td>
<td>- K replacement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>60 min- 6 hours</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm metabolic response to treatment, monitor K</td>
<td>- iv insulin at fixed rate</td>
</tr>
<tr>
<td></td>
<td>- iv 0.9% saline</td>
</tr>
<tr>
<td></td>
<td>1 litre / 2 hr</td>
</tr>
<tr>
<td></td>
<td>1 litre / 2 hr</td>
</tr>
<tr>
<td></td>
<td>1 litre / 4 hr</td>
</tr>
<tr>
<td></td>
<td>- K replacement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6 hr -24 hr</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure clinical and biochemical parameters improving, and resolved by 24 hr</td>
<td>- iv insulin at fixed rate</td>
</tr>
<tr>
<td></td>
<td>- iv 0.9% saline</td>
</tr>
<tr>
<td></td>
<td>1 litre / 4 hr</td>
</tr>
<tr>
<td></td>
<td>1 litre / 6 hr</td>
</tr>
<tr>
<td></td>
<td>1 litre / 6 hr</td>
</tr>
<tr>
<td></td>
<td>- K replacement</td>
</tr>
<tr>
<td></td>
<td>- iv 10% dextrose if glucose &lt;14</td>
</tr>
</tbody>
</table>

- After 24 hours- if not eating/drinking, and ketones < 0.3, change over to ‘peri-operative/unstable diabetes’ variable rate insulin protocol
Appendix 5

Plymouth Hospitals NHS Trust

Guideline for the management of blood sugars for
WOMEN WITH DIABETES IN LABOUR.

Patient details (affix label)
Surname:
First name:
Hospital number:
NHS number:
DOB:

General Principles

Glucose control
- Monitor blood glucose 1 hourly.
- **Continue patient's usual long acting insulin** (e.g. Levemir, Lantus).
- Maintain the patient’s blood glucose between 4 and 6 mmol/l, adjust insulin infusion to achieve this.
- Test for capillary ketones if blood glucose >10 mmols/l. Notify doctor if above 1.5 mmol/l.
- If capillary glucose <4mmol/l, treat as hypoglycaemia, as per standard Trust guideline.

Transfer to subcutaneous insulin
- For women with **Gestational diabetes** discontinue regime once delivered.
- For women with **pre-existing diabetes**, once delivered, continue with the regime until eating and drinking normally. Then return to pre-pregnancy doses of insulin and discontinue intravenous insulin.
- The first subcutaneous dose should be given before a meal and the IV sliding scale discontinued 30 minutes after the meal.

NB Betamethasone, if given, can increase insulin requirements substantially and the prescription for insulin should be adjusted accordingly to maintain control.

Insulin sliding scale and intravenous fluid recommendations

**Insulin:** See below for preparation of insulin infusion

**IV fluids**
- IV Fluids must be prescribed on the IV prescription sheet on the back of the main prescription chart.
- 500ml of 10% glucose with 10mmols of potassium to be infused every 8 hours via a volumetric pump. In renal impairment discuss with renal specialist.

**Connections**
- Connect the insulin line to the glucose administration set with a suitable Y-connector.
- This connector must contain anti-reflux and anti-syphon valves.
- Do not give other intravenous drugs through the insulin cannula without first checking their stability with a pharmacist.

**Insulin sliding scale prescription**

Prepare a solution of 50 units of Human Actrapid or Humulin S insulin with 49.5ml of 0.9% NaCl (i.e. 1 unit per ml). Infuse using a syringe driver at a rate according to the table below. Prescription valid for 24 hours.

For advice contact labour registrar bleep 311, diabetes specialist nurse available on bleep 989.

<table>
<thead>
<tr>
<th>Blood glucose (mmol / l)</th>
<th>Insulin infusion rate (units / hour)</th>
<th>Alternative prescription (If blood glucose &gt; 8 mmols over 4 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3.0</td>
<td>0.5 units per hour and inform doctor</td>
<td></td>
</tr>
<tr>
<td>3.1 – 6.0</td>
<td>1 units per hour</td>
<td></td>
</tr>
<tr>
<td>6.1 – 10.0</td>
<td>2 units per hour</td>
<td></td>
</tr>
<tr>
<td>10.1 – 15.0</td>
<td>4 units per hour</td>
<td></td>
</tr>
<tr>
<td>&gt;15.0</td>
<td>6 units per hour and inform doctor</td>
<td></td>
</tr>
</tbody>
</table>
### Infusion preparation

Any insulin remaining after 24 hours must be discarded and a fresh solution prepared.

<table>
<thead>
<tr>
<th>Date prepared:</th>
<th>Type of insulin:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time prepared:</td>
<td>Batch No. insulin:</td>
</tr>
<tr>
<td>Time discontinued:</td>
<td>Batch No.of N/S:</td>
</tr>
<tr>
<td>Nurse signature:</td>
<td>Witness signature:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date prepared:</th>
<th>Type of insulin:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time prepared:</td>
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</tr>
<tr>
<td>Time discontinued:</td>
<td>Batch No.of N/S:</td>
</tr>
<tr>
<td>Nurse signature:</td>
<td>Witness signature:</td>
</tr>
</tbody>
</table>

### Administration details

<table>
<thead>
<tr>
<th>TIME</th>
<th>BLOOD GLUCOSE (MMOL/L)</th>
<th>INSULIN INFUSION RATE (ML/HR)</th>
<th>CHANGE TO RATE (↑↓ML/HR)</th>
<th>VOLUME OF INSULIN INFUSED (ML)</th>
<th>VOLUME OF IV FLUID INFUSED (ML)</th>
<th>INITIALS</th>
</tr>
</thead>
</table>
Guidelines for the management of blood glucose for pregnant women with unstable diabetes:

“Top up” variable rate intravenous insulin infusion
(formerly known as 'sliding scale')

USED IN ADDITION TO SC INSULIN REGIMEN

Patient details (affix label)
Surname:
First name:
Hospital number:
NHS number:
DOB:

General Principles

This guideline is to be used for pregnant women with diabetes (whether type 1, type 2 or gestational diabetes) who have unstable blood glucose levels despite their usual subcutaneous insulin regimen. This may occur due to intercurrent illness or steroid treatment.

CONTINUE THE PATIENT’S USUAL SUBCUTANEOUS INSULIN REGIMEN AS PRESCRIBED:
Short-acting insulin with each meal (typically novorapid) plus once daily (sometimes twice daily) long-acting insulin (e.g Levemir insulin or Insulatard or Humulin I or Lantus at bedtime).

NO INTRAVENOUS FLUID REQUIRED unless indicated for other reasons e.g. dehydration secondary to vomiting

Glucose control

- Monitor blood glucose 1 hourly and adjust insulin infusion rate (see details over) as required, to maintain the blood glucose between 4 - 7.8 mmol/L
- Inform doctor if capillary blood glucose > 10 mmol/l for >2 hrs: IV insulin doses will need increasing
- Test for capillary ketones if blood glucose >10 mmols/l. Notify doctor if above 1.5 mmol/l.
- If capillary glucose <4mmol/l, treat as hypoglycaemia, as per standard Trust guideline.

Preparation

- 50 units of Human Actrapid insulin with 49.5ml of 0.9% Normal Saline (1 unit = 1 ml).
- Insulin MUST be drawn up using an insulin syringe
- Infuse using a syringe driver at a rate according to the table overleaf
- Any insulin remaining after 24 hours must be discarded and a fresh solution prepared

Infusion rates

- Infusion rates vary according to capillary blood glucose level and TIME SINCE LAST MEAL
- Use table overleaf
- The infusion rates are only a guide; may need adjustment to satisfy the individual requirements
- Obstetric team to review within two hours of starting then every 4-8 hours to ensure blood glucose is to target and if not, doctor to adjust infusion rate.
- For further advice, contact the diabetes antenatal team

Discontinuation of IV insulin infusion

- IV insulin infusion to be stopped as directed by the doctor-in-charge, once blood glucose levels stabilised and SC insulin doses adjusted as needed
# Insulin sliding scale prescription

<table>
<thead>
<tr>
<th>Blood glucose (mmol/L)</th>
<th>Insulin infusion rate LESS THAN 4 HRS SINCE LAST ATE (units / hour)</th>
<th>Blood glucose (mmol/L)</th>
<th>Insulin infusion rate MORE THAN 4 HRS SINCE LAST ATE (units / hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>call doctor</td>
<td>&lt;2</td>
<td>Call doctor</td>
</tr>
<tr>
<td>2.1 – 7.7</td>
<td>0</td>
<td>2.1 – 5.4</td>
<td>0</td>
</tr>
<tr>
<td>7.8 – 8.9</td>
<td>1</td>
<td>5.5 – 6.9</td>
<td>1</td>
</tr>
<tr>
<td>9.0 – 9.9</td>
<td>2</td>
<td>7.0 – 8.9</td>
<td>2</td>
</tr>
<tr>
<td>10.0 – 10.9</td>
<td>3</td>
<td>9.0 – 11.9</td>
<td>3</td>
</tr>
<tr>
<td>11.0 – 12.9</td>
<td>4</td>
<td>12.0 – 13.9</td>
<td>4</td>
</tr>
<tr>
<td>13.0 – 14.9</td>
<td>5</td>
<td>14.0 – 16.9</td>
<td>5</td>
</tr>
<tr>
<td>15.0 – 17.9</td>
<td>6</td>
<td>17.0 – 19.9</td>
<td>6</td>
</tr>
<tr>
<td>18.0 – 20.9</td>
<td>7</td>
<td>20.0 – 23.9</td>
<td>7</td>
</tr>
<tr>
<td>21.0 – 27.9</td>
<td>8</td>
<td>24.0 – 27.9</td>
<td>8</td>
</tr>
<tr>
<td>&gt;28</td>
<td>9</td>
<td>&gt;28</td>
<td>9</td>
</tr>
</tbody>
</table>

Doctor’s signature:

Date:

### Insulin Infusion preparation

<table>
<thead>
<tr>
<th>Date of preparation:</th>
<th>Type of insulin:</th>
<th>Human Actrapid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of preparation:</td>
<td>Batch № &amp; expiry date of insulin:</td>
<td></td>
</tr>
<tr>
<td>Time discontinued:</td>
<td>Batch № &amp; expiry date of N/S:</td>
<td></td>
</tr>
<tr>
<td>Nurse signature:</td>
<td>Witness signature:</td>
<td></td>
</tr>
</tbody>
</table>

### Administration details / blood glucose monitoring

| Date: | |
| Time: | |
| Blood glucose (mmol/L): | |
| Insulin infusion rate: | |
| Total volume of insulin infused (ml): | |
| Initials: | |
Monitoring and Audit

Auditable standards
Evidence of multi-professional involvement in care
Appropriate antenatal appointments
USS performed at 20/40 that includes 4 chamber view and outflow tracts

Please refer to audit tool, location: ‘Maternity on cl2-file11’, Guidelines

Reports to:
Clinical Effectiveness Committee – responsible for action plan and implementation of recommendations from audit

Frequency of audit:
2 yearly

Responsible person:
Emma Green- Diabetes Specialist Nurse

Cross references

Antenatal guideline 13 – Screening for Impaired Glucose Tolerance (IGT) and Gestational Diabetes Mellitus (GDM): Diagnosis and care for women diagnosed with IGT and GDM
Antenatal Guideline 31 - Maternity Hand Held Notes, Hospital Records and Record Keeping
Antenatal Guideline 35 – Risk assessment and identification of low- and high-risk antenatal care pathways
Antenatal Guideline 44 – Guideline development within the maternity services.
Intrapartum Guideline 2 – Admission criteria for critical care (CDS)

References


Author
Mrs E Green, Dr K Evans, Dr I Montague

Work Address
Diabetes centre, Derriford Hospital, Plymouth, Devon, PL6 8DH

Version
4

Changes
Review of guideline 13 – no changes required for pre-existing diabetes

Date Ratified
February 2017

Valid Until Date
December 2019