Hospital Inpatient Management of Diabetes

Lead Author: Dr Angela Paisley
Additional author(s): Consultant Diabetes and Endocrinology
Division/ Department:: Salford Health Care
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It is your responsibility to check on the intranet that this printed copy is the latest version.
# 1. Overview (What is this guideline about?)

This policy is to advise on the management of in-patients with diabetes.

If you have any concerns about the content of this document please contact the author or advise the Document Control Administrator.

# 2. Scope (Where will this document be used?)

This document applies to all clinical staff working with adult in-patients in all directorates & divisions.

This policy provides practitioners with clear and safe guidance on the management of hyperglycaemia, hypoglycaemia, diabetic ketoacidosis, hyperosmolar, hyperglycaemia state, monitoring of patients with diabetes, patients started on steroids or enteral feeds, management of diabetes for patients undergoing surgery and patient self-management of diabetes in hospital.

# 3. Background (Why is this document important?)

People with diabetes occupy about 15% of acute hospital beds and this approaches 20–25% for certain high risk groups’ e.g. renal & cardiac disorders. 60% of these patients are emergency admissions mostly ‘with diabetes’ rather than ‘because of diabetes’. These figures will increase because the number of people with diabetes is growing at 5%/yr. In-patients with diabetes, especially those aged <60yr, have traditionally stayed in hospital longer and been less likely to have day-case treatment. Errors of insulin prescription and administration are among the commonest and most serious medication safety errors.

In-patients with diabetes are commonly unhappy about the standard of diabetes care they receive in hospital, due to loss of control over their own self-management, discomfort from uncontrolled hyperglycaemia, anxiety about uncontrolled hyperglycaemia and poor levels of staff knowledge and competence.

Historically, highly variable glucose control among diabetes inpatients has been accepted as inevitable but it has become clear that controlling hyperglycaemia in the acutely unwell patient reliably is practicable, improves clinical outcome and reduces Length of Stay.

This policy standardises the in-patient management of diabetes. It will have a positive impact on safety, experience of care, morbidity, mortality and length of stay.

# 4. What is new in this version?

This is an update of the previous version which also incorporates some new sections:

- Minor change to management of hypoglycaemia policy
- Addition of: Prescribing insulin on admission to hospital
- Addition of: Management of diabetes in palliative care patients
- Addition of Missed Insulin Dose recommendation
5. Guideline

5.1 BLOOD GLUCOSE MONITORING FREQUENCY

Check all patients with diabetes for an up-to-date HbA1c. If there has been no HbA1c measurement within past 3 months please repeat (NB this request can be added onto a FBC in the lab). If the result is >70mmol/mol refer to diabetes specialist team.

All in-patients with known diabetes should have their blood glucose checked and recorded on the In-Patient Capillary Blood Glucose Chart (stock code WZA 468 –G13020406):

- On admission & then before each meal & before bed for 48hrs.
- After the initial 48hours if not acutely unwell, or diabetes is stable*, the frequency of testing can be adjusted to:

<table>
<thead>
<tr>
<th>Patient Status</th>
<th>Minimum blood glucose testing frequency</th>
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<tbody>
<tr>
<td>Metformin or diet alone</td>
<td>Before breakfast</td>
</tr>
<tr>
<td>Sulphonylureas**, 2 or more oral diabetes agents, once or twice daily insulin</td>
<td>Before breakfast and before evening meal</td>
</tr>
<tr>
<td>Multiple Insulin injections or insulin pump, unwell patient or unstable diabetes</td>
<td>Before each meal &amp; before bed</td>
</tr>
<tr>
<td>VRII</td>
<td>Hourly</td>
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<td>Steroids</td>
<td>Any patient commencing steroids needs baseline Blood Glucose (BG) assessment plus pre- and one hour post-evening meal for 2 days. If BG is greater than 11mmol/L commence treatment (see STEROID section).</td>
</tr>
<tr>
<td>Enteral/Parenteral Feed</td>
<td>Any patient commencing a feed needs their BG monitoring every 4 hours for first 2 days (see FEED section)</td>
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*Stable diabetes is defined as:

- **No more than one blood glucose measurement above 11 mmol/L when reviewing last 4 measurements,**
- **and no blood glucose measurements less than 4 mmol/L,**

**Sulphonylureas = Gliclazide, Glimeperide, Glipizide, Repaglinide**
5.2 PATIENT SELF-MANAGEMENT OF DIABETES IN HOSPITAL

People with diabetes, especially those treated with insulin, are often very adept at managing their blood glucose. In all instances where they have capacity and are feeding themselves, people with diabetes should be encouraged to continue their usual self-management following discussion to agree a management plan that comprises as a minimum:

1. Recognition that if the patient normally measures their blood glucose (Type 1 and insulin treated Type 2) this is permissible using their own meters but if bedside blood glucose recording is still necessary for management of the admission illness parallel recordings will be made using ward equipment. (See Frequency Of Blood Glucose Monitoring section – 5.1)
2. Recognition that the staff may require the blood glucose to be checked at times other than those carried out by the patient
3. Recognition that if the ward recorded blood glucose levels are above target for treatment of the condition requiring admission to hospital a VRII (section 5.10) may be started to supplement the usual self-care

5.3 HYPERGLYCAEMIA (High Blood Glucose – High BG)

- Defined as:
  Pre-meal Blood Glucose (BG) >7mmol/L
  Post-meal Blood Glucose (BG) >12mmol/L

- Important in hospital because:
  - Compromises ACS/CVA recovery
  - Impedes bacterial infection management & wound healing

High BG in hospital should be managed according to the following guidance

1. HIGH BG – CHECK FOR KETONES

   If BG high (>15) check for urine ketones. If moderate ketones present (+++) need to check if patient is acidotic in Diabetic Ketoacidosis (DKA). If DKA present follow DKA guidance detailed below (DKA – Section 5.12).

2. HIGH BG WITH POSITIVE URINARY KETONES but not acidic:

   2.1. UNABLE TO TAKE NUTRITION (orally, enterally or parenterally) OR VOMITING
      - Prescribe Variable Rate Insulin Infusion (VRII – see section 5.11) in EPR with whatever IV fluids are appropriate.

   2.2. ABLE TO TAKE NUTRITION (orally, enterally or parenterally)
      - Review doses of usual diabetic medication and appropriateness – some medication may now be contraindicated by change to condition (e.g. acute deterioration of CKD,
end stage liver or heart failure)

- Give Actrapid according to BG level:

  BG >15 mmol/L give 4 units of Actrapid
  BG 19-21.9 mmol/L give 5 units of Actrapid
  BG 22+ mmol/L give 6 units of Actrapid

- Recheck after 1 hour: if blood glucose still above 15 and ketones still present repeat Actrapid®.

- If pt has had 3 lots of actrapid or patient is unwell, unable to eat / drink or is vomiting commence variable rate insulin infusion (see section 6.0), and refer to Diabetes Team

3.0 HIGH BG WITH NEGATIVE URINARY KETONES

3.1 If patient is unwell commence VRll (see section 5.11)

3.2 If patient is well consider Actrapid according to BG level:

  BG >15 mmol/L give 4 units
  BG >20 mmol/L give 6 units

3.3 If patient is well and the high glucose levels are a pattern review and increase usual medications. If on call request usual medical/surgical team to review medication at next WR.

3.4

4.0 CONTINUING DIABETES CARE

- Check HbA1c if there has been no measurement within past 3 months. If the result is >70 mmol/mol refer to diabetes specialist team.

- As soon as the patient is self-caring encourage diabetes self-management; basic blood glucose testing must still be continued and recorded on the ward chart.

- At discharge ensure that if the diabetes care-plan is different from admission, the changes are communicated clearly to the patient and GP

5.4 INSULIN PUMPS (10-20% of patients with Type 1 diabetes)

1. Prescribe insulin and insulin pump in EPR
2. Inform the diabetes specialist team who will check the pump
3. Insulin pumps deliver soluble (quick acting) insulin in two modes:
   a. Programmed basal insulin (rate regulated by the hour)
b. Self-activated bolus insulin given at mealtimes.

4. Disconnection causes negligible residual insulin in <60mins → DKA.

5. **Always continue** the programmed basal insulin (i.e. let pump run). This is equivalent to continuing the long acting basal insulin for patients who are on multiple injections.

6. **If patient unwell prescribe VRII alongside insulin pump**

### 5.5 PRESCRIBING INSULIN ON ADMISSION TO HOSPITAL

It is important to continue the patient’s usual insulin when in hospital (unless there are contraindications). As part of the initial clerking it should be ascertained from the patient &/or his/her carer: what insulin the patient takes (trade name), what are the doses, what are the timing of the insulin(s), and who administers it (self-administration by patient or by a family member or district nurse).

Where a patient is able to confirm the above and is eating and drinking:

- Prescribe insulin as taken at home
- Prescribe Actrapid 4-6 units s/c prn every 4 hours
- Prescribe glucagon 1mg im prn

Where a patient is able to confirm the above but is unable to eat: NBM, DKA, HHS, severe sepsis:

- Start VRII (section 5.11)
- Continue basal insulin (or calculate amount of insulatard required if on a mixed insulin – see instructions in electronic VRII prescription)
- Prescribe glucagon 1mg im prn
- Refer to DSN

Where a patient is **UNABLE** to confirm their usual type &/or doses contact the pharmacy or DSN if in normal working hours.

**Outside normal working hours**, if the patient is eating and drinking:

- Type 1 prescribe Levemir 6 units s/c BD + NovoRapid 2 units s/c with each meal
- Type 2 prescribe Insulatard 8 units s/c with breakfast
- Prescribe glucagon 1mg im prn
- Prescribe Actrapid 4-6 units s/c prn every 4 hours
- Refer to DSN

If patient is unable to eat, NBM, DKA, HHS, severe sepsis

- Start VRII (section 5.11)
- Prescribe Levemir 6 units s/c BD
- Refer to DSN

See **PRESCRIBING INSULIN ON ADMISSION TO HOSPITAL Flowsheet and QRG**
5.6 DETECTING AND MANAGING STEROID-INDUCED HYPERGLYCAEMIA

For patients **not known** to have diabetes
- Check baseline BG
- Monitor BG pre & 1hr post evening meals for 48hr after first steroid dose
- Commence gliclazide 40mg at breakfast:
  - 2 BG levels >11mmol/L
  - 1 BG level >15mmol/L
- Commence VRII (section 5.11) if BG >20mmol/L and contact Diabetes Specialist Team
- Discontinue glucose lowering treatment at the end of the course of steroids

- For patients with known diabetes
  - Continue any usual diabetes treatment (diet, tablets, insulin)
  - Monitor BG pre & 1hr post evening meal for 24hr after first steroid dose (where appropriate continue to perform BG tests at other times in accordance with the SRFT in-patient guidelines)
  - If Pre Meal BG>11 mmol/L or Post Meal BG>15mmol/L use VRII and contact Diabetes Specialist team
  - If to be discharged on steroids refer to Diabetes Specialist Team
  - For patients experiencing hyperglycaemia the following information must be added to the discharge summary for the GP.
    During their in-patient stay your patient received steroids. Blood Glucose monitoring demonstrated hyperglycaemia requiring treatment with………Please arrange a fasting blood glucose and review within the next month with annual follow up thereafter to ensure they have not developed IGR/DM (This can be done using the acronym expansion named ‘steroids’ imported from Dr A Paisley).

For Palliative Care Patients who receive steroids please refer to the **Blood Glucose monitoring in palliative care patients commenced on corticosteroids document - section 5.15.**
*Flow sheets attached in appendices of this document*

5.7 MANAGEMENT OF PATIENT WITH DIABETES ON A FEED (ENTERAL OR PARENTERAL)

*All patients known to have diabetes should have their blood glucose levels monitored at the start of the feed and then every 4 hours for at least the first 48 hours*

Target BG 7-12 mmol/L during enteral feeding of people with diabetes

Patients with type 1 diabetes should continue their basal insulin at all times – whether receiving insulin via the subcutaneous or intravenous route

If BG > 12mmol/L for 2 consecutive occasions start VRII (section 5.11) & refer to Diabetes Specialist Nurse immediately. We should aim to minimise use of intravenous insulin infusions as far as possible & aim to establish patient on to subcutaneous insulin and/or glucose-lowering agents administered via the enteral feeding tube at the earliest opportunity
Once the patient is established on a feed & receiving regular diabetes medication they should have their BG measured:

- IF ON INSULIN Pre-feed and then 4-6 hourly when feed running & hourly if feed unexpectedly switched off.
- On METFORMIN only. Pre-feed

Involve Diabetes Specialist Nurse immediately in the event of hypoglycaemia or recurrent hyperglycaemia

**5.8 MANAGEMENT OF INSULIN IN PATIENTS FASTING FOR AN IN-PATIENT PROCEDURE**

Any patients required to fast for an in-patient procedure (scan/endoscopy etc) should have their insulin reduced as follows:

- If on a long acting basal insulin reduce the dose prior to the procedure by 20%
- If on a mixed insulin – if procedure to be performed in the morning omit dose and give 50% of the missed dose afterwards with lunch. If on afternoon list give 50% of the usual dose at breakfast.

Monitor patient blood glucose value hourly from time of missed meal and if <6mmol/L on 2 consecutive occasions, or <6mmol/L and about to go for procedure commence 5% glucose iv.

**5.9 MANAGEMENT OF PREGNANT PATIENTS WITH DIABETES**

It is essential that **all** patients with diabetes mellitus who are pregnant maintain optimal glycaemic control throughout the pregnancy as there is a clear link between high glucose levels and adverse birth outcomes. These include increased risk of pregnancy loss, high birthweight babies and perinatal deaths. Therefore, for any women with diabetes admitted to the trust that are known or found to be pregnant the following management plan should be followed:

1. Inform DM specialist team of patient admission **ASAP**
2. Perform regular BG monitoring both pre and 1-hour post meals
3. If BG >11mmol/L commence VR II (section 5.11)
4. Check HbA1c if not been done in last 4 weeks

**5.10 HYPERGLYCAEMIA IN ACS**

Hyperglycaemia is common in people admitted to hospital with ACS with approximately 65% of patients with acute myocardial infarction who were not known to have diabetes having impaired glucose regulation. Hyperglycaemia at the time of admission with ACS is a powerful predictor of poorer survival and increased risk of complications while in hospital, regardless of whether or not the patient has diabetes.

- For all patients presenting with suspected ACS check BG
- If raised commence VR II (section 5.11) and aim to keep BG levels <11.0 mmol/Litre whilst avoiding hypoglycaemia (check BG hourly) and refer to DM team
If not known to have DM and hyperglycaemia evident request fasting BG (no earlier than 4 days before discharge) and HbA1c.

For more information see in-patient policy “Hyperglycaemia in ACS”.

5.11 VARIABLE RATE INSULIN INFUSION (VRII)

In Salford Royal Hospital we have chosen to use VRII in all circumstances where IV insulin is required.

IV is insulin is required for patients admitted with:

- DKA or HHS
- Acutely unwell patient with hyperglycaemia e.g. sepsis, ACS,
- Patients with diabetes who are not eating or drinking (missing more than 1 meal)
- Rapid control of blood glucose levels is required e.g women with poor glycaemic control who are pregnant.

Things to remember

- Continue basal insulin (or basal insulin pump settings)
- Stop oral hypoglycaemic tablets and any quick acting insulin if not eating (or if contraindicated e.g metformin and AKI)
- IV fluids are not always necessary and may be contraindicated e.g. heart failure. The need for IV fluids is dictated by the patient’s condition.

The prescriber should:

- Choose the first insulin scale depending on the patient’s usual total daily dose (TTD) of insulin (TTD < 40units scale A, > 120units scale D)
- Sign the VRII sheet & prescribe VRII on EPR
- Prescribe basal insulin on EPR
- Prescribe IV fluids IF REQUIRED

Once the VRII has been prescribed the nurse then needs to prepare the IV insulin syringe and place in the syringe driver and connect to the patient. Check the blood glucose and set the insulin rate (match the blood glucose with the scale prescribed)

Monitor the blood glucose levels hourly for first 12 hours
• Once condition stable (i.e. blood glucose 4-10mmol/L for more than 4 hours) monitoring can reduce to every 2 hours.

**Hypoglycaemia** is a frequent side effect of iv insulin

• Can be prevented with regular BG monitoring  
• If BG <3.9mmol/L treat and step down to scale below

**Titration** of dose

• If blood glucose >10mmol/L for 3 consecutive readings step up to next scale e.g from scale B to scale C. The nurse does not need this new scale prescribing, although safe practice is to consult with another nursing or medical colleague prior to changing scale.

**Discontinuing** iv insulin can be very high risk process - iv insulin disappears from circulation very quickly. The half-life of iv insulin is 3-5 minutes, and so will disappear within 5 minutes of stopping VRID

• **Discontinue** when eating (preferably earlier in the day); at least one hour after giving s/c insulin if normally due, or oral diabetes agents.

### 5.12 MANAGEMENT OF DIABETIC KETOACIDOSIS (DKA)

DKA is a serious, life threatening, acute metabolic complication of diabetes.

Death may ensue from:

• Hypovolaemic Shock  
• Aspiration Pneumonia  
• Hypokalaemic arrhythmia  
• Pulmonary Embolism  
• Cerebral Oedema  
• A precipitating illness

The resolution of DKA depends upon the suppression of ketonaemia. SRFT does not currently have ward ketone meters and so it is imperative that urinary ketones are monitored alongside pH & bicarbonate levels.

**DIAGNOSIS**

• DKA = BG >11mmol/L + metabolic acidosis (Bicarbonate low, <15 mmol/L and/or pH <7.30) + ketosis (urinary ketones ++++, or blood ketones ≥3mmo/L).  
• NB patients with diabetes may have detectable ketones without having DKA; however they will have:  
  • Normal EWS (will be abnormal if DKA)  
  • Normal pH, bicarb, BE (check only if really believe might be DKA)  
    o Management of Hyperglycaemia + Ketones (not DKA) = insulin and carbohydrate
INITIAL EVALUATION of Patient with DKA

1. Conscious level
2. Haemodynamic/volume status
3. Possible precipitating event

- If GCS ≤ 8 or Systolic BP ≤ 90 mm Hg, seek urgent senior medical advice.

INITIAL INVESTIGATIONS

1. Plasma glucose
2. pH/Bicarbonate
3. Urea, Creatinine, Na⁺, K⁺
4. CRP
5. FBC
6. Urinalysis for ketones or blood ketone measurement
7. Calculated osmolality (= 2 [Na⁺ + K⁺] + [Urea] + [glucose])
8. ECG
9. CXR
10. Other tests as indicated by the clinical presentation to identify precipitating factor (e.g. septic screen, troponin, amylase).

MANAGEMENT

1. Insulin
   1.1. Start VR1 (section 5.11)
   1.2. Prescribe and give basal insulin (pre-admission dose if known, if basal insulin not known or never previously been on insulin prescribe Levemir 6 units BD)

2. Fluids
   2.1. If SBP < 90 mm Hg use rapidly infused IV plasma expander/saline until SBP > 90 mm Hg
   2.2. When SBP > 90 mm Hg control rate and type of infused fluid as follows:
      2.2.1. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 1 hr
      2.2.2. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 2 hrs
      2.2.3. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte +/- K⁺ 20-60 mmol over 2-6 hrs
      (rate determined by BP & renal function)
   2.2.4. If SBP > 90 mm Hg do not infuse fluid at > 4 L/24 hr to minimise risk of cerebral oedema
   2.3. Start 4% Glucose + 0.18% Sodium Chloride when BG < 15 mmol/L

3. GCS < 8 pass a naso-gastric tube to prevent aspiration/ protect airway

4. If present commence treatment of inter-current precipitating illness (infection etc)

5. Commence Thromboprophylaxis unless contraindicated

NB Bicarbonate is not indicated in most patients and is potentially dangerous (can exacerbate tissue hypoxia, CNS acidosis and hypokalemia). Only consider if severe acidosis with a pH of less than 6.9 causing impaired tissue perfusion due to impaired cardiac contractility.
MONITORING TREATMENT RESPONSE

DKA treatment requires frequent clinical and biochemical monitoring in the initial stages to detect complications, especially hypokalaemia.

Minimum monitoring:
- Every hour measure capillary glucose
- At 2hr, 6hr & 12hr measure
  - Venous Bicarbonate (pH only if bicarbonate falling)
  - Urea, Creatinine, Na⁺, K⁺
    - Use added Potassium chloride to maintain normal serum potassium
      - K⁺ > 5.0 no KCl
      - K⁺ 3.6-5.0mmol/L add 20mmol/L KCl
      - K⁺ < 3.5mmol/L add 40mmol/L KCl
- GCS
  - If GCS falls suspect cerebral oedema
- Urine output
  - If no urine passed within 2hrs or incontinent consider urinary catheter

TRANSITION TO SC INSULIN
- Continue VRII and fluids till acidosis is resolved (Bicarbonate >18 mmol/L, urinary ketones <++) or blood ketones <0.6) and the patient is eating and drinking.
  - Use pre admission insulin (or in the case of patients with T2 DM & HHS pre admission tablets)
  - If newly diagnosed seek diabetes specialist team advice on initial treatment.

REFER ALL PATIENTS WITH DKA TO THE DIABETES SPECIALIST TEAM

5.13 MANAGEMENT OF HYPER-OSMOLAR HYPERGLYCAEMIC STATE (HHS)

HHS is a serious, life threatening acute metabolic complication of diabetes.

Death may ensue from:
- Hypovolaemic Shock
- Aspiration Pneumonia
- Hypokalaemic arrhythmia
- Pulmonary Embolism
- Cerebral Oedema
- A precipitating illness

DIAGNOSIS
- HHS = severe hyperglycaemia (BG usually >50 mmol/L) + hyperosmolality (Serum osmolality usually >350mosmol/kg) + little or no acidosis.

GOALS OF TREATMENT

The goals of treatment of HHS are to treat the underlying cause and to gradually and safely:
- Normalise the osmolality
- Replace fluid and electrolyte losses
- Normalise blood glucose
Other goals include prevention of:
• Arterial or venous thrombosis
• Other potential complications e.g. cerebral oedema/ central pontine myelinolysis
• Foot ulceration

INITIAL EVALUATION

1. Conscious level
2. Haemodynamic/volume status
3. Possible precipitating event

• If GCS ≤8 or Systolic BP ≤90mmHg, seek urgent senior medical advice.

INITIAL INVESTIGATIONS

1. Plasma glucose
2. pH/Bicarbonate
3. Urea, Creatinine, Na⁺, K⁺
4. CRP
5. FBC
6. Urinalysis for ketones
7. Calculated osmolality (= 2 [Na⁺ + K⁺] + [Urea] + [glucose])
8. ECG
9. CXR
10. Other tests as indicated by the clinical presentation to identify precipitating factor (e.g. septic screen, troponin, amylase).

MANAGEMENT

• Fluids
  o If SBP<90mmHg use rapidly infused IV plasma expander/saline until SBP>90mmHg
  o When SBP>90mmHg control rate and type of infused fluid as follows:
    ▪ 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 1hr
    ▪ 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 2hrs
    ▪ 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte +/- K+ 20-60mmol over 2-6hrs (rate determined by BP & renal function)
    ▪ If SBP>90mmHg do not infuse fluid at >4L/24hr to minimise risk of cerebral oedema
• GCS <8 pass a naso-gastric tube to prevent aspiration/ protect airway
• If present commence treatment of intercurrent precipitating illness (infection etc)
• Commence Thromboprophylaxis unless contraindicated
• The fall in blood glucose should be no more than 5 mmol/L/hr. **Insulin (VRII scale A only – section 5.11)** should only be commenced once the blood glucose is no longer falling with IV fluids alone or immediately if there is significant ketonaemia (blood ketones greater than 1 mmol/L or urine ketones greater than 2+).

MONITORING TREATMENT RESPONSE

HHS treatment requires frequent clinical and biochemical monitoring in the initial stages to detect warning signs of complications, especially hypokalaemia.
• Minimum monitoring:
  o Every hour measure capillary glucose
  o At 2hr, 6hr & 12hr measure
    ▪ Urea, Creatinine, Na⁺, K⁺
      • Use added Potassium chloride to maintain normal serum potassium
        o K⁺ > 5.0mmol/L no KCl
        o K⁺ 3.6-5.0mmol/L add 20mmol/L KCl
        o K⁺ < 3.5mmol/L add 40mmol/L KCl
  ▪ GCS
    • If GCS falls suspect cerebral oedema
  ▪ Urine output
    • If no urine passed within 2hrs or incontinent consider urinary catheter

TRANSITION TO SC INSULIN (only if VRII required)

• Continue VRII and fluids until the patient is eating and drinking.
  o Restart pre-admission insulin or pre-admission tablets
  o If newly diagnosed seek diabetes specialist team advice on initial treatment.

REFER ALL PATIENTS WITH HHS TO THE DIABETES SPECIALIST TEAM

5.14 HYPOGLYCAEMIA

DEFINITION: For the purposes of people with diabetes who are hospital inpatients, any blood glucose less than 4.0mmol/L

Hypoglycaemia is common in patients treated with insulin or a sulphonylurea. The risk is increased by:
  • Altered daily routine
  • Kidney or liver failure
  • Altered appetite and/or mobility
  • Changed medication.

Each ward will have a “Hypo Box” which should be kept stocked with dextrose tablets, glucogel and IV dextrose.
See QRG - http://intranet/policies-resources/trust-policy-documents/trust-wide-clinical/gen/twcg4112hypo/
Glucagon is kept in the ward fridge.

Suspect hypoglycaemia if a diabetic patient develops:
<table>
<thead>
<tr>
<th>Autonomic symptoms</th>
<th>Neuroglycopenic symptoms</th>
<th>Non-Specific symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tremor</td>
<td>Confusion</td>
<td>Headache</td>
</tr>
<tr>
<td>Palpitation</td>
<td>Odd behaviour or sudden</td>
<td>Nausea</td>
</tr>
<tr>
<td>Sweating</td>
<td>change in behaviour</td>
<td></td>
</tr>
<tr>
<td>Hunger</td>
<td>Visual disturbance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speech difficulties</td>
<td></td>
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<tr>
<td></td>
<td>Incordination</td>
<td></td>
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<tr>
<td></td>
<td>Drowsiness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of consciousness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convulsions</td>
<td></td>
</tr>
</tbody>
</table>

**Treat if BG <4.0mmol/L with or without** hypoglycaemic symptoms

Loss of hypoglycaemia warning symptoms is common in:
- People with Type 1 diabetes duration >10yr
- People having frequent episodes of symptomatic or asymptomatic hypoglycaemia.

If hypoglycaemia suspected test BG level and treat if BG <4.0mmol/L
If hypoglycaemia discovered on routine BG monitoring, treat

**Management of Hypoglycaemia**
- Conscious & swallowing – Dextrose tab 10g x 6
- Conscious & uncooperative – 2 tubes Glucogel (gum)

**AT 10 minutes**
If the patient does not start to recover or feel better and/or the blood glucose is still less than 4.0mmol, please repeat the above procedure.

  - If dextrose tablets/glucogel has been given 3 times and the blood glucose is still less than 4.0mmol/L call doctor

- **Unconscious or NBM**
  - Give Glucagon 1mg IM + Call Doctor
  - After 15 minutes if blood glucose has not improved, give 150-200mls IV Glucose 10% over 15 minutes (eg:600-800mls/hr)
  - Monitor every 15min until consciousness regained
- **Patients fluid restricted**
  - Give Glucagon 1mg IM + Call Doctor
  - After 15 minutes if blood glucose has not improved, give 75-100mls IV Glucose 20% over 15 minutes (eg:300-400mls/hr)
  - Monitor every 15min until consciousness regained

- **Patients with ESKD/Dialysis**
  - If patients are on dialysis simultaneously give 1mg glucagon injection IM plus 20% glucose 100ml over 15 minutes
  - After 15 minutes if blood glucose has not improved, give further 20% glucose 100ml over 15 minutes
  - Monitor every 15min until consciousness regained

- **NOTE glucagon cannot be used twice within a 24hr period – see important notes below.**
- If patient responds and becomes alert but BG still low eg: 2.7 – revert to usual management of hypoglycaemia

**Further action – once BG >4**
- If able to eat, follow up with meal if due, otherwise 2 plain biscuits, a piece of fruit or a slice of bread/toast
- If NBM consider ongoing iv infusion of 10% glucose at 100ml/hr
- Repeat blood glucose hourly until 7mmol/L or above
- Identify the cause of the hypoglycaemia. Adjust insulin/ tablets if required (NB the insulin dose that caused the hypo should be reduced by 10- 20%).
- If an insulin dose is due at the time of the hypoglycaemic event, give the insulin minus 4 units, or reduce the usual dose by 10% (whichever is the greater), immediately after the meal or long acting carbohydrates.
  - eg Insulatard insulin 22units due at breakfast but patient hypo prior to breakfast. Treat hypo according to above policy & then give Insulatard 18units immediately after breakfast
  - Document the hypoglycaemic episode and treatment in EPR
- If there is more than one episode of hypoglycaemia, or glucagon, is required refer to the Diabetes Specialist Team

**Important Notes**
- Glucagon will not work in liver failure and/or glycogen depletion e.g. malnutrition
- Alcohol related hypoglycaemia may be resistant to glucagon because of malnutrition and inhibition of glycogenolysis
- Glucagon cannot be given twice within a 24hr period as will be ineffective
- Patients who have sulphonylurea-induced hypoglycaemia and those on long acting insulin may remain at risk of recurrent hypoglycaemia for up to 24hr.
- In above circumstances consider 200mls 10% glucose over 15 minutes/longer if necessary (600-800mls/hr)

Conscious, dysphagic patients with nasogastric (NG) or percutaneous endoscopic gastrostomy (PEG) feeding

BG 2.5- 4.0 mmol/L
- Stop feed if running, flush tube until clear with sterile water
- Crush & dissolve 5 dextrose tablets with 20mls sterile water
- Syringe through the feed tube and flush again with sterile water
- Review in 10min; if BG is above 4.0mmol/L
  - Restart the feed if there is at least 1-hour left to run.
  - If the feed is finished commence 10% IV glucose at 100mls/hr until next feed starts.
  - Repeat capillary blood glucose hourly until above 7mmol/L
- If there is no improvement repeat Dextrose tablets up to 3 times
- If the BG still below 4.0 mmol/L inform doctor

BG less than 2.5mmol/L
- Give Glucagon 1mg IM
- Repeat blood glucose after 20minutes
- If after Glucagon BG remains below 4.0mmol/L consider 150-200ml IV 10% Glucose over 15 minutes (set rate at 600-800ml/hr)
- When patient starts to recover and/or capillary blood glucose rises to 4.0mmols/l or above, restart feed.
- If feed not running commence IV 10% glucose set at 100ml/hr until feed restarts and/or capillary blood glucose >7mmol/L.

*See flowsheet at end

5.15 END OF LIFE CARE IN DIABETES

See algorithm below and separate stand-alone policy on intranet.

Discuss changing the approach to diabetes management with the patient and/or family if not already discussed

1. T1DM – Continue patient’s usual basal insulin (or prescribe Abasaglar (glargine)) at the same dose as usual basal total daily dose od in the morning and refer to the DM team
   a. Check BG levels daily
      i. If <8mmol/L reduce insulin by 10-20%
      ii. If >20mmol/L increase insulin by 10-20% to reduce symptoms of ketosis
2. T2DM/Steroid induced DM on diet or metformin – can stop monitoring BG levels

3. T2DM/Steroid induced DM on other tablets and/or insulin/GLP1 agonist – stop tablets and GLP1 agonist. Consider stopping insulin depending on dose (<30 units) and refer to the diabetes team:
   a. If insulin stopped
      i. check BG levels if patient becomes symptomatic (unexplained persistent agitation)
      ii. If BG >20 mmol/L give 6 units actrapid
      iii. If patient requires >2 doses actrapid consider 10 units isophane insulin (eg: insulatard) or abasaglar (glargine) od
   b. If insulin continued
      i. Prescribe daily morning dose of Insulatard insulin or Abasaglar (glargine) based on 25% less than previous days total daily dose
      ii. If <8 mmol/L reduce insulin by 10-20%
      iii. If >20 mmol/L increase insulin by 10-20% to reduce symptoms of ketosis

Keep tests to a minimum but it may be necessary to perform some tests to ensure unpleasant symptoms do not occur due to low or high BG levels, particularly if a patient appears agitated.

5.16 MISSED INSULIN DOSES IN PEOPLE WITH DIABETES (appendix 10)

- Always monitor BG levels
- Suspected missed insulin (medium/long acting)
  o If BG level rises >15 mmol/L over 3-4 hours consider other cause of hyperglycaemia eg: DKA
  o If patient eating and drinking and well ensure usual dose resumed at prescribed time
  o A “stat” dose of Actrapid can be given if appropriate (see section 5.3)
  o If hyperglycaemia sustained consider short term VRII
- Confirmed missed insulin dose (medium/long acting)
  o If BG >4.1 mmol/L and patient eating and drinking give 30% of usual dose if the next dose is more than 6 hours away
- Consider Actrapid if levels continue to rise (see section 5.3)
- If insulin or usual dose not known refer to Prescribing insulin on admission to hospital QRG**
- If patient has OD Tresiba (Degludec) this is ultra-long acting therefore dose can be given at any time unless clinical indication to adjust dose
- If hyperglycaemia sustained consider short term VRII

- Confirmed missed rapid, short or mixed insulin
  - Only give if within 2 hours of a meal (otherwise risk of hypoglycaemia)
  - These insulins must be given with food and never before bed
  - Monitor BG levels and resume usual insulin at next prescribed time
  - A “stat” dose of Actrapid can be given if BG above 15.0mmol/L (see section 5.3)
  - Consider VRII if BG persistently >15mmol/L (see section 5.11)

5.17 ELECTIVE SURGERY IN PEOPLE WITH DIABETES

See standalone policy on intranet: “Diabetes management for patients undergoing surgery”

Recommendations for the pre-operative assessment and peri-operative management of people with diabetes undergoing elective surgery are detailed below.

**Basic principles for pre-operative assessment and management of elective surgical patients with diabetes**

The aim is to ensure that people with diabetes have the same opportunities for and outcomes from surgery as people without diabetes.

1. Where possible patients with diabetes should omit one meal only. Try to put people with diabetes first on the list, and if possible on morning lists.

2. Optimise glucose control before surgery. Use HbA1c as the diabetes control measurement for planning:
   
   To minimise diabetes related surgical risk HbA1c should ideally be less than 70 mmol/mol before proceeding with elective surgery.
If HbA1c is 70mmol/mol or greater consider postponing elective surgery to optimise diabetes control. The decision to postpone or proceed with surgery should be taken on an individual basis after consultation with the surgical and anaesthetic teams and will depend upon:

- HbA1c result
- Urgency of Surgery
- Nature of surgery
- Previous diabetic control

3. If the HbA1c is 70mmol/mol or greater but surgery cannot be postponed, contact DSN for advice

4. Simplify management of insulins and diabetes medication

5. High random blood glucose on the day of surgery is not a reason to cancel.

6. Signs of infection may lead to rescheduling of surgery.

7. The target fasting blood glucose on the day of surgery is 6 – 10mmol/l. However CBG 4 – 12 is acceptable

8. It is essential that type 1 diabetes patients continue their long acting/basal insulin even when fasting.

9. Hypoglycaemia (CBG <6.0 mmol/L and symptomatic; or CBG <4mmol/L).
   - Conscious: 6x dextrose tablets/2x glucogel tubes/Start 10% glucose at 100mls/hr
   - Unconscious/anaesthetised: Glucagon 1mg im if no iv access/100ml 20% glucose iv/10% glucose at 100mls/hour
   - Recheck at 10 minutes and inform anaesthetist

10. Hyperglycaemia (CBG >12mmol/L)
    - Test for ketones. If significant and DKA defer surgery if possible and treat as per DKA guidelines (section 5.11)
    - Is self-medicating patient to administer usual correction dose
    - If anaesthetised/not self-medicating:
      - T1 – Administer actrapid (BG 12-15 : 1 unit; BG 16-18 : 2 units; BG 19-21 : 3 units)
      - T2 – Administer actrapid (BG 12-17 : 2 units; >17 : 6 units OR commence VRII (section 5.10)
11. VRII should be avoided if possible for elective and day-case patients

Emergency Surgery Patients (or other patients who have not been through pre-op clinic).

When patients with diabetes are admitted for emergency surgery, please ensure blood glucose, serum HbA1c and urinalysis is checked on admission.

A VRII (section 5.11) should be considered for patients with blood glucose greater than 12 or HbA1c greater than 70 mmol/mol OR when fasting times are unpredictable and the patient could be fasted for 2 meals or more.

Early referral to the DSN for advice should be sought, and referral to the hyperglycaemia flow chart (page 11) if blood glucose greater than 12.

6. Roles & responsibilities

The Trust Board has overall responsibility for developing, implementing and monitoring the effectiveness of this policy.

The Chief Executive is accountable to the Trust Board for ensuring that:
- This policy is developed and implemented across the Trust
- Implementation is monitored and that any deficiencies are highlighted to the Trust Board

The Diabetes Specialist Team has responsibility for:
- Developing and supporting safe implementation
- Continuous education, training and support of staff in the appropriate use of in-patient hyperglycaemia management tools
- Monitoring the effectiveness of the policy and implementing changes when indicated.

The Executive Nurse and Managing Directors will be responsible for:
- Ensuring systems are in place on admission to identify those patients who require to be commenced on the in-patient hyperglycaemia management pathway
- Keeping the policy under review, and where deficiencies are identified, recommending changes.
- Ensuring adequate provision of training and support to staff in relation to the requirements of the policy, the monitoring of bedside blood glucose, and the preparation and administration of the insulins used in the policy
- Ensuring all deviations from policy are identified via the adverse incident system

The Executive Medical Director, Associate Medical Directors, Clinical Directors and Consultants will be responsible for:
- Ensuring the inpatient diabetes management systems are used by all medical staff in accordance with the policy

Lead Nurses, Matrons and Ward Managers will, within their areas of control:
- Ensure systems are in place at admission to identify those patients who have hyperglycaemia in accordance with the standards (section 2)
- Ensure appropriate staff develop and maintain basic professional competence in using the policy (appropriate monitoring of blood glucose and preparation and administration of insulin)
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- Ensure staff develop and maintain an appropriate level of knowledge about the hyperglycaemia policy
- Ensure that any deviations from policy are reported via the adverse incident system
- Pharmacy is responsible for
  - Ensuring that all prescriptions of insulin are in accordance with the policy
  - Ensuring that ward stock levels of appropriate insulins are maintained

7. Monitoring document effectiveness

The diabetes specialist team will monitor the implementation and effectiveness of the policy. Adherence to this policy will be audited yearly in the critical events analysis. Where shortcomings are identified, these will be fed back to relevant clinical areas using existing governance structures such as the alcohol link nurses, departmental clinical leads and lead nurses and by using the trust adverse incident reporting system (DATIX). An annual report will be submitted to Diabetes & Endocrinology clinical governance to support ongoing assurance of the policy.

8. Abbreviations and definitions

Terms explained in document.

9. References

JBDS Inpatient care Group – Management of DKA in Adults September 2013.

JBDS Inpatient care Group – Hospital management of Hypoglycaemia in Adults with Diabetes Mellitus. 3rd edition. April 2018.


JBDS Inpatient care Group – Management of HHS. August 2012.

JBDS Inpatient care Group – Steroid Use For Inpatients With Diabetes. October 2014


National Service Framework for Diabetes. Dec 2001 DOH

National Diabetes Inpatient Audit 2013. Healthcare Quality Improvement Partnership (HQIP)

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It is your responsibility to check on the intranet that this printed copy is the latest version.
11. Equality Impact Assessment (EqIA) tool

- The below tool must be completed at the start of any new or existing policy, procedure, or guideline development or review. **N.B.** For ease, all documents will be referred to as 'Policy*'. The EqIA should be used to inform the design of the new policy and reviewed right up until the policy is approved and not completed simply as an audit of the final Policy itself.
- All sections of the tool will expand as required.
- EqIAs must be sent for review prior to the policy* being sent to committee for approval. Any changes made at committee after an EqIA has been sign off must result in the EqIA being updated to reflect these changes. Policies will not be published without a completed and quality reviewed EqIA.

**Help and guidance available:**
- Click here for the [Policy*EqIA Tips for Completion QRG](#)
- Email the Group EDI Team: eqia@pat.nhs.uk for advice or training information.
- Submission of policy* documents requiring EqIA sign off to: eqia@pat.nhs.uk, Allowing an initial four week turnaround.
- Where there is a statutory or significant risk, requests to expedite the review process can be made by exception to the Group Equality & Inclusion Programme Manager tara.hewitt@pat.nhs.uk

| 1. Possible Negative Impacts |  |  |
| Protected Characteristic | Possible Impact | Action/Mitigation |
| Age | No impact |  |
| Disability | Patient with a learning disability may not have capacity where needed | Capacity assessment and best interest meeting in line with NCA 2005 and Trust policy |
| Ethnicity | Possible language barrier | Use of interpretation services referenced within relevant sections of protocol |
| Gender | No impact |  |
| Marriage/Civil Partnership | No impact |  |
| Pregnancy/Maternity | No impact |  |
| Religion & Belief | No impact |  |
| Sexual Orientation | No impact |  |
| Trans | No impact |  |
| Other Under Served Communities (Including Carers, Low Income, Veterans) | No impact | Carers involved in all communication |

<p>| 2. Possible Opportunity for Positive Impacts |  |  |
| Protected Characteristic | Possible Impact | Action/Mitigation |
| Age | No impact |  |
| Disability | Communication | Use of Hospital Communication Book |
| Ethnicity | No impact |  |
| Gender | No impact |  |</p>
<table>
<thead>
<tr>
<th>Protected Characteristic</th>
<th>Name of Source</th>
<th>Summary of Areas Covered</th>
<th>Web link/contact info</th>
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</thead>
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<td>Age</td>
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<tr>
<td>Disability</td>
<td>Safeguarding team in Salford</td>
<td>Wording given on when a patient lacks capacity and when assessments are needed in these instances</td>
<td>Adult safeguarding team Salford</td>
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</tr>
<tr>
<td>Gender</td>
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</tr>
<tr>
<td>Marriage/Civil Partnership</td>
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<td></td>
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<tr>
<td>Pregnancy/Maternity</td>
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<tr>
<td>Religion &amp; Belief</td>
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<tr>
<td>Sexual Orientation</td>
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<tr>
<td>Trans</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other Under Served Communities (Including Carers, Low Income, Veterans)</td>
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<td></td>
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</tr>
</tbody>
</table>
5. EqIA Update Log
(Detail any changes made to EqIA as policy has developed and any additional impacts included)

<table>
<thead>
<tr>
<th>Date of Update</th>
<th>Author of Update</th>
<th>Change Made</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

6. Have all of the negative impacts you have considered been fully mitigated or resolved? (If the answer is no please explain how these don’t constitute a breach of the Equality Act 2010 or the Human Rights Act 1998)

This policy has been circulated to relevant teams involved and feedback incorporated, impact mitigated as stated in sections 1 & 2

7. Please explain how you have considered the duties under the accessible information standard if your document relates to patients?

As stated in sections 1 & 2

The policy will be available to staff in different formats, including large print, enlarged on computer screen and/or on different colour paper. This would also include all Appendices

8. Equality Impact Assessment completed and signed off? (Insert named lead from EDI Team below). Please also add this information within Section 11.

Name: ___________________________  Date: 11/01/2021
12. Appendices

Appendices should provide the reader with any supplementary information for example, sample forms or letters.

Please list the appendices here and also list on the contents page and referenced as appropriate in the body of your document to minimise the risk of them being overlooked.

Separate files must not be “embedded” as they will not be accessible once this document has been uploaded; instead the item(s) should be included in full for readers to view. For large documents you may wish to include a link instead that takes the reader to another site (but this will not be available to readers working from a paper version of the guideline).

It may be appropriate to devise an accompanying QRG to be published on the intranet.

Please use the header bars below and insert a page break between each appendix.
Appendix 1

DETECTING AND MANAGING STEROID-INDUCED HYPERGLYCAEMIA

Any in-patient commencing/increasing dose to:
- Dexamethasone (any dose)
- Methylprednisolone (any dose)
- Prednisolone (20mg/higher daily)
- Hydrocortisone (50mg tds/higher)

For patients **not known** to have diabetes

- Check baseline blood glucose (BG)
- Monitor BG pre & 1hr post evening meals for 48hr after first steroid dose

**Compliance gliclazide 40mg om** if:
- 2 BG levels >11mmol/l
- 1 BG level >15mmol/l

Commence VRll if BG >20mmol/l, request HbA1c and contact Diabetes Specialist Team

Discontinue treatment at the end of the course of steroids

For patients **known** to have diabetes

- Continue any usual diabetes treatment (diet, tablets, insulin) and monitoring
- In addition monitor BG pre & 1hr post evening meal for 24hr after first steroid dose (where appropriate continue to perform BG tests at other times in accordance with the SRFT in-patient guidelines)

If Pre Meal BG>7mmol/l or Post Meal BG>11mmol/l use VRll and contact Diabetes Specialist Team

If to be discharged on steroids refer to Diabetes Specialist Team

Upon Discharge the following should be copied into the discharge summary for the GPs attention:

"During their in-patient stay your patient received steroids. Blood glucose monitoring demonstrated hyperglycaemia requiring treatment with .......... Please can you arrange to review the patient in one week’s time with annual follow up thereafter to ensure they have not developed IGR/DM." (This can be done using the acronym expansion name ‘steroids’).

Any patient receiving long-term steroids:

- Ensure a fasting glucose or HbA1c measurement has been performed in the last 6 months
- If FBG >7 mmol/L or HbA1c >48mmol/mol repeat and if still elevated contact DM team
Appendix 2  Diabetic Ketoacidosis (DKA)

**DKA Confirmed?**
BG >11mmol/L + metabolic acidosis (Bicarbonate low, <15 mmol/L and/or pH <7.30) + ketosis (urinary ketones ++++, or blood ketones ≥3mmol/L).

**Initial Evaluation**
1. Conscious level
2. Haemodynamic/volume status
3. Possible precipitating events
If GCS ≤ 8 or Systolic BP ≤ 90 mm Hg, seek urgent senior medical advice

**1. Serum glucose**
2. pH/Bicarbonate
3. Urea, Creatinine, Na+, K+
4. CRP
5. FBC
6. Urinalysis for ketones or blood ketone measurement
7. Calculated osmolality ( = 2 [Na+ + K+] + [Urea] + [glucose])
8. ECG
9. CXR
10. Other tests as indicated by the clinical presentation to identify

**2. Fluids**
If SBP<90mmHg use rapidly infused IV plasma expander/saline until SBP>90mmHg.
Use added Potassium chloride to maintain normal serum potassium >5.0 no KCl
3.6-5.0mmol/L add 20mmol/L KCl
<3.5mmol/L add 40mmol/L KCl
1. When SBP>90mmHg control rate and type of infused fluid as follows 1. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 1hr
2. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 2 hrs
3. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte +/- K+ 20-60mmol over 2-6hrs (rate determined by BP & renal function)
4. Once SBP>90mmHg do not infuse fluid at >4L/24hr to minimise risk of cerebral oedema
5. Start Dextrose Saline when BG < 15mmol/L
NB Bicarbonate is not indicated in most patients and is potentially dangerous. The use of bicarbonate should always be discussed with a senior medical colleague before it is used.

**5. HAT**
Commence thromboprophylaxis unless contraindicated

**4. Precipitating illness?** If present commence treatment e.g. antibiotics for infection

**3. GCS**
If GCS < 8 pass an NG tube to prevent aspiration/protect airway if falling consider cerebral oedema and call senior advice

**Monitoring Treatment Response**
Every hour measure capillary glucose
At 2hr,6hr & 12hr measure Venous bicarbonate Urea, Creatinine , Na, K
GCS - if falling consider cerebral oedema
Urine output - if no urine passed within 2 hrs or incontinent consider urinary Urine output - if no urine passed within 2 hrs or incontinent consider urinary catheter catheter

**Transition to sc insulin**
Continue VRHII + Fluids until acidosis resolved (bicarb > 18mmol/L OR urinary ketones < ++ ) AND the patient is eating and drinking.
Use pre-admission diabetes treatments (insulin and/or tablets) REFER ALL PATIENTS WITH DKA TO THE DIABETES SPECIALIST TEAM WITHIN 12HRS OF ADMISSION

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Appendix 3 HYPER-OSMOLAR HYPERGLYCAEMIC STATE (HHS)

HHS Confirmed?
BG usually >50mmol/l + serum osmolality > 350 with little or no acidosis
Calculated osmolality = 2(Na + K) + urea + glucose

Initial Evaluation
1. Conscious level
2. Haemodynamic/volume status
3. Possible precipitating events
   If GCS ≤ 8 or Systolic BP ≤ 90 mm Hg, seek urgent senior medical advice

Initial Investigations
1. Serum glucose
2. pH/Bicarbonate
3. Urea, Creatinine, Na+, K+
4. CRP
5. FBC
6. Urinalysis for ketones
7. Calculated osmolality
8. ECG
9. CXR
10. Other tests as indicated by the clinical presentation to identify precipitating factor (e.g. septic)

1. Fluids
   If SBP<90mmHg use rapidly infused IV plasma expander/saline until SBP>90mmHg
   When SBP>90mmHg control rate and type of infused fluid as follows boosting K+ if plasma K+<3.5:
   1. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 1hr
   2. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte over 2 hrs
   3. 1 Litre normal saline (0.9%), Hartmann’s, Plasmalyte +/- K+ 20-60mmol over 2-6hrs
      (rate determined by BP & renal function)

2. GCS
   If GCS < 8 pass an NG tube to prevent aspiration/protect airway
   If falling consider cerebral oedema and call senior advice

3. Precipitating illness?
   If present commence treatment e.g. antibiotics for infection

4. HAT
   Commence thromboprophylaxis unless contraindicated

5. Insulin
   VRUI if ketotic or BG levels stop falling
   If pt on insulin prior to admission prescribe basal insulin

Transition to sc insulin
Continue VRUI + Fluids until the patient is eating and drinking.
Use pre-admission diabetes treatments (insulin and/or tablets)
REFER ALL PATIENTS WITH HHS TO THE DIABETES SPECIALIST TEAM WITHIN 12 HOURS OF ADMISSION

Monitoring Treatment Response

Every hour measure capillary glucose

At 2hr,6hr & 12hr measure
Venous bicarbonate
Urea, Creatinine, Na, K
GCS - if falling consider cerebral oedema
Urine output - if no urine passed within 2 hrs or incontinent consider urinary catheter

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### Appendix 4  Blood Glucose Monitoring in Palliative Care Patients Commenced on Corticosteroids (Steroids)

#### When a palliative patient is discharged on steroids

<table>
<thead>
<tr>
<th>Is your patient a palliative patient?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

**For patients experiencing hyperglycaemia the following information must be added to the discharge summary for the GP.**

During their in-patient stay your patient received steroids. Blood Glucose monitoring demonstrated hyperglycaemia requiring treatment with …….

Please arrange a fasting blood glucose and review within the next month with annual follow up thereafter to ensure they have not developed IGR/DM (This can be done using the acronym expansion named ‘steroids’).

**For palliative care patients discharged on steroids**

- Blood Glucose (BG) monitoring should be continued as per community protocol for palliative care patients
- For patients that need the District Nurse (DN) to monitor BG levels -
  - complete a DN treatment sheet
  - obtain a BG monitor for the patient to take home *(see below for where BG meters can be obtained from)*
  - Ensure the General Practitioner (GP) is aware that their patient is being discharged on steroids and the DN will monitor BG levels.
- For patients who will monitor their own BG levels –
  - Obtain a BG monitor for the patient to take home (BG monitors can be obtained from the diabetes specialist nurse)
  - Give the patient a Patient Information Leaflet - Glucose monitoring for palliative care patients commenced on steroids
  - Ensure the GP is aware that their patient is going home on steroids and they will continue to monitor BG levels independently and have been advised to contact the GP if their BG levels rise above 15mmols/l for advice.

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**For Palliative patients BG monitors can be obtained from:**

- Diabetes CNS; EAU discharge bulk store room; Discharge assessment Team/patient flow; Palliative Care Team (for palliative care patients).

Out of hours Evening District Nursing Services (Based in the hospital)

At the weekend monitors can be obtained from the Palliative Care Team (8.30 – 16.30).

This is in keeping with recent published guidance by the Joint British Diabetes Societies for inpatient care: Management of Hyperglycaemia and steroid (glucocorticoid) therapy. October 2014. (http://www.diabetologists-abcs.org.uk/JBDS/JBDS IP Steroids. Pdf)

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- In-patient blood glucose monitoring should be initiated in all patients commenced on steroids
- Monitoring should occur prior to first dose of steroids in all patients to identify those at risk of developing steroid induced hyperglycaemia (Diabetes UK 2012).
- Blood glucose testing should be carried out at least daily. This should be after the evening meal when the glycaemic effects of morning steroids dosing, is likely to be greatest (Diabetes UK 2012).
Appendix 5  Management of diabetes in palliative patient requiring Steroids

Is the patient a palliative care patient?

Yes: Follow Policy ‘Glucose Monitoring in Hospital In-patients Receiving Steroids’ - Palliative care patients.

Note: If patient is being supported by an End of Life Plan BG monitoring should be stopped

Note: If patient is being supported by an End of Life Plan BG

For palliative patients not known to have diabetes
- If blood glucose levels <15mmols post meal on 2 consecutive occasions, blood glucose monitoring can be reduced to weekly for the duration of steroid therapy
- If BG levels are >15mmols/l, post evening meal, repeat within 24hours
- If BG levels are >15mmols/l on 2 consecutive occasions, contact the Diabetes Team or Medical Team.

For palliative patients with known diabetes (Type 1)
- Continue usual diabetes treatment
- Monitor blood glucose levels prior to each insulin injection NB blood glucose target now 7-15mmol/L.

For palliative patients with known diabetes (Type 2)
- If blood glucose levels <15mmols post meal on 2 consecutive occasions, blood glucose monitoring can be reduced to 3 x weekly for the duration of steroid therapy
- If BG levels are >15mmols/l, post evening meal, repeat within 24hours
- If BG levels are >15mmols/l on 2 consecutive occasions, the Diabetes Team or Medical Team should be informed.

No: - Follow Policy ‘Glucose Monitoring in Hospital In-patients Receiving Steroids’
Appendix 6  Management of Diabetes in End of life

- Discuss changing the approach to diabetes management with patient and/or family if not already discussed
- If patient remains on insulin please complete electronic referral for inpatient diabetes specialist nurse

Type 2 diabetes/steroid induced diabetes-and continuing steroids
Diet controlled or metformin treated

Stop monitoring blood sugars

If insulin to continue
- Prescribe daily morning dose of insulatard insulin or
- Abasaglar (glargine) based on 50% less than previous days total daily dose

If insulin stopped
- Check BG levels if patient becomes symptomatic – i.e unexplained persistent agitation
- If BG over 15.0 mmol/L give 4 units of rapid acting insulin

If patient requires rapid acting insulin (Actrapid) more than twice consider Isophane insulin or Abasaglar (glargine) once daily

Type 2 diabetes on other tablets and/or insulin/GLP Agonist

Stop tablets and GLP 1 injections
Stop Insulin if patient is on less than 50 units daily

Type 1 diabetes always on insulin

Continue usual basal insulin once daily with reduction in dose - half of previous dose

Check BG levels once a day at evening meal
If below 8.0mmols/L reduce insulin by 10-20%
If above 15.0 mmols/L increase insulin by 10-20% to reduce symptoms of ketosis

End of life care Strategy (2018) 3rd Edition. Diabetes UK. The changes made to this document have been made with consideration of the insulin used within the trust.
For queries relating to the diabetes flow chart please contact the diabetes specialist nurses for queries relating to palliative care please contact the palliative care team.
Aim to confirm the following with the **patient** or **person who administers** where possible:

- **Type(s)** of insulin – by BRAND
- **Dose(s)** if patient carbohydrate counts then record their usual dose per 10g of carbohydrate (e.g. Humalog 1 unit for 10g)
- **Time** pay particular attention to insulins that are with meals
- **Record** all this information in the admissions clerking

### Able to confirm usual doses and type of insulin –

<table>
<thead>
<tr>
<th>Patient is well and eating and drinking:</th>
<th>Patient is unwell and unable to take usual dose (e.g.: NBM, in DKA/HHS, unable to tolerate usual diet, sepsis):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prescribe insulin as taken at home</td>
<td>• Start a variable rate insulin infusion</td>
</tr>
<tr>
<td>• Prescribe Actrapid 4-6units prn every 4 hours</td>
<td>• Prescribe usual basal (long acting insulin) in <strong>ALL PATIENTS</strong> alongside VRII</td>
</tr>
<tr>
<td>• Prescribe glucagon 1mg prn</td>
<td>• If the patient is on a mixed insulin calculate the total daily dose and then give 50% split in to 2 equal doses as Insulatard (isophane insulin). See example at bottom of VRII prescription sheet</td>
</tr>
</tbody>
</table>

### Unable to confirm usual doses/type of insulin –

**In normal working hours (8am – 4pm Mon to Fri):**

- Contact pharmacy (62813 if EAU, 65369 otherwise) to confirm doses **OR** contact the specialist diabetes nurses team (07623 602889) if it isn’t possible to confirm.

<table>
<thead>
<tr>
<th>Outside of working hours</th>
</tr>
</thead>
</table>

#### If eating and drinking:

- Type 1 - **Prescribe Levemir** (insulin detemir) 6units BD (morning and night) + NovoRapid 2units with each meal
- Type 2 - **Prescribe Insulatard** (isophane insulin) 8units with breakfast
- Complete specialist diabetes nurse referral on EPR
- **Prescribe Actrapid** 4-6units prn no more than 4 hourly
- **Prescribe glucagon** 1mg

#### If not (e.g.: NBM, in DKA/HHS, unable to tolerate usual diet, sepsis)

- **Start variable rate infusion – scale B**
- **Prescribe Levemir** 6units twice a day
- Complete specialist diabetes nurse referral on EPR
- **Prescribe glucagon** 1mg prn
DEFINITION: For the purposes of people with diabetes who are hospital inpatients, any blood glucose less than 4.0mmol/L. Hypoglycaemia is common in patients treated with insulin or a sulphonylurea.

NOTE: Glucagon will be ineffective if used within the last 24hrs or liver failure/alcoholics/severe malnutrition therefore omit Glucagon step and commence 10% glucose immediately.

**BG <4mmol/L**
(with/without hypo symptoms)

<table>
<thead>
<tr>
<th>Conscious and Swallowing</th>
<th>Conscious and Uncooperative</th>
<th>Conscious; NG or PEG</th>
<th>Unconscious</th>
</tr>
</thead>
</table>
| Dextrose tab 10g x 6     | 2 tubes glucogel (gum) 10g x 6 | 1. Stop feed, flush tube until clear with sterile water  
2. Crush & dissolve 5 dextrose tablets with 20mls sterile water  
3. Syringe through the feed tube and flush again with sterile water | Glucagon 1mg IM  
Call Doctor  
If patient on dialysis:  
Simultaneously give 1mg  
150-200mls iv glucose 10% over 15 minutes (600-800ml/hour)  
ESKD/dialysis patients - 20% glucose 100ml over 15 minutes  
Monitor every 15min until consciousness regained |
| Repeat blood glucose after 10 minutes  
If no improvement repeat above | Repeat blood glucose after 10 minutes  
BG >4mmol/L:  
Restart feed  
If finished commence 10% I.V Glucose at 100mls/hr until next feed starts  
BG <4mmol/L:  
Rpt Dextrose tablets up to 3 times  
If still <4 inform doctor |
| If dextrose/glucogel given 3 times and BG still <4.0mmol/L call doctor | If BG still <2.5mmol/L  
Give Glucagon 1mg IM  
If remains <4 start 150-200ml IV 10% Glucose over 15 mins (600-800ml/hr)  
If patient loses consciousness 75-100mls IV 20% Glucose over 15mins (300-400ml/hr)  
Restart feed once BG >4mmol/L OR Commence IV 10% Glucose at 100ml/hr until feed restarts and/or capillary blood glucose >7mmol/L |
| FURTHER ACTION  
If able to eat follow up with meal/2 biscuits/slice of toast  
Please Note – If insulin due at time of hypo, proceed to give the insulin minus 4units, or 10% (whichever is greater) immediately after meal/carbohydrate intake |
Appendix 9  Hyperglycaemia and ACS

All patients presenting with suspected ACS need capillary blood glucose monitoring (CBG)

- A CBG above 11.0 mmol/l commenced VRII and send plasma glucose
- Aim for CBG of 6.0-12.0

Refer to Diabetes Team

- If CBG 6.0-11.0 mmol/l monitor levels to ensure < 11.0 mmol/l
- Fasting CBG 4.0 mmol/l > 4 days after ACS onset
- HbA1c before discharge
- Lifestyle advice

- All patients with hyperglycaemia not known to have a diabetes diagnosis
- HbA1c before discharge
- Fasting CBG 4.0 > 4 days after onset of ACS
- Lifestyle recommendations as in MI secondary prevention

Hyperglycaemia in Acute Coronary Syndrome: NICE Guideline CG 130
**Appendix 10  Recommendations for Missed Insulin Doses**

Missed insulin = Hyperglycaemia and risk of DKA/HHS therefore the priority is to resume usual insulin regime as soon as clinically appropriate

**Suspected missed insulin (medium or long acting)**

- Always monitor BG levels
- If BG rises above 15mmol/L over 3-4hrs consider other cause of hyperglycaemia eg: DKA
- If patient eating and drinking and well ensure usual dose resumed at prescribed time
- A “stat” dose of Actrapid can be given if appropriate (see in-patient policy for diabetes management under “management of hyperglycaemia”)*
- If hyperglycaemia sustained consider short term VRII

**Confirmed missed insulin (medium or long acting)**

- Always monitor BG levels
- If BG >4.1mmol/L and patient eating and drinking give 30% of usual dose if the next dose is more than 6 hours away
- Consider Actrapid if levels continue to rise (see in-patient policy for diabetes management under “management of hyperglycaemia”)*
- If insulin or usual dose not known refer to Prescribing insulin on admission to hospital QRG**
- If patient has OD Tresiba (Degludec) this is ultra-long acting therefore dose can be given at any time unless clinical indication to adjust dose
- If hyperglycaemia sustained consider short term VRII

**Confirmed missed rapid, short acting or mixed insulin**

- Only give if within 2 hours of a meal (otherwise risk of hypoglycaemia)
- These insulins must be given with food and never before bed
- Monitor BG levels and resume usual insulin at next prescribed time
- A “stat” dose of Actrapid can be given if BG above 15.0mmol/L (see in-patient policy for diabetes management under “management of hyperglycaemia”)*
- Consider VRII if BG persistently >15mmol/L (see in-patient policy for diabetes management under “management of hyperglycaemia”)*

*These insulins must be used according to special patient guidelines

**Hospital Inpatient Management of Diabetes**

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Hospital Inpatient Management of Diabetes

**Prescribing insulin on admission to hospital QRG**

http://intranet.srht.nhs.uk/EasysiteWeb/getresource.axd?AssetID=330718&type=full&servicetype=Attachment

<table>
<thead>
<tr>
<th>Medium/Long Acting Insulin</th>
<th>Short/Rapid Acting Insulin</th>
<th>Mixed insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tresiba</td>
<td>• Novorapid</td>
<td>• Novomix 30</td>
</tr>
<tr>
<td>• Toujeo</td>
<td>• Humalog</td>
<td>• Humulin M3</td>
</tr>
<tr>
<td>• Lantus/Abasaglar</td>
<td>• Apidra</td>
<td>• Humalog Mix 25</td>
</tr>
<tr>
<td>• Levemir</td>
<td>• Fiasp</td>
<td>• Humalog Mix 50</td>
</tr>
<tr>
<td>• Humulin I</td>
<td>• Actrapid</td>
<td>• Inuman Comb 15</td>
</tr>
<tr>
<td>• Insulatard</td>
<td>• Humulin S</td>
<td>• Inuman Comb 25</td>
</tr>
<tr>
<td>• Inuman Basal</td>
<td></td>
<td>• Inuman Comb 50</td>
</tr>
</tbody>
</table>

This is not an extensive list, however covers those frequently prescribed