Nursing management for Diabetic Ketoacidosis (DKA) supplement

Introduction

The management of Diabetic Ketoacidosis (DKA) has undergone enormous improvements over the years and with the development and regular review of the Joint British Diabetes Societies for Inpatient (JBDS-IP) this has become more straightforward and easy to follow. Like any guidelines, they are very useful but can be interpreted differently. This document is specifically designed to reflect the procedural aspects of nursing management for DKA. There are examples of DKA prescription chart, management chart or Integrated Care Pathways that are available that can be used or adapted locally. Explanation should be provided, and consent should be sought as appropriate before any intervention is performed on the individual.

In the management of DKA, and in any practice setting, nurses should always uphold the professional standards of practice clearly stipulated on the Nursing and Midwifery Council (NMC) Code including (reference):

Prioritise people

- Put the interests of people using or needing nursing or midwifery services first.
- Make their care and safety your main concern and make sure that their dignity is preserved, and their needs are recognised, assessed, and responded to.
- Make sure that those receiving care are treated with respect, that their rights are upheld and that any discriminatory attitudes and behaviours towards those receiving care are challenged.

Practise effectively

- Assess need and deliver or advise on treatment or give help (including preventative or rehabilitative care) without too much delay, to the best of your abilities, based on best available evidence.
- Communicate effectively, keeping clear and accurate records and sharing skills, knowledge, and experience where appropriate.
- Reflect and act on any feedback you receive to improve your practice.

Preserve safety

- Make sure that patient and public safety is not affected.
- Work within the limits of your competence, exercising your professional ‘duty of candour’ and raising concerns immediately whenever you come across situations that put patients or public safety at risk.
- Take necessary action to deal with any concerns where appropriate.

Promote professionalism and trust

- Always uphold the reputation of your profession
- Display a personal commitment to the standards of practice and behaviour set out in the Code.
- Be a model of integrity and leadership for others to aspire to. This should lead to trust and confidence in the professions from patients, people receiving care, other health and care professionals and the public.

1. Diagnosis

Ensure that the criteria for DKA are satisfied. This is to safeguard the use of the Fixed Rate Intravenous Insulin infusion (FRIII) only for patients who clinically require it. Using this protocol in patients without DKA could lead to unnecessary complications including increased risk of fluid overload, hypokalaemia, and hypoglycaemia. Conversely, managing DKA using inappropriate protocol could lead to delay in its resolution and may result to harm.

The ‘D’ is for Diabetes - a blood glucose concentration of >11.0mmol/L or known to have diabetes mellitus
The ‘K’ is for Ketonaemia or ketonuria - a capillary or blood ketone concentration of ≥ 3.0mmol/L or significant ketonuria (more than 2+ on standard urine sticks)
The ‘A’ is for Acidaemia/acidosis – a bicarbonate concentration of ≤15.0mmol/L and/or venous pH <7.3

Some individuals can be safely managed in the ward, but others may need Level 2 (High Dependency Unit) care. Patients with DKA should only be managed on the ward if safe nursing to patient ratios are in place to ensure the timely requirements of DKA treatment are met. If this is not the case, patients with DKA will need Level 2 (High Dependency Unit) care.
The severity of the DKA presentation will also provide a valuable clue in terms of where the individual should be appropriately managed. The presence of one or more of the following may indicate severe DKA.

- Blood ketones over 6.0mmol/L
- Bicarbonate level below 5.0mmol/L
- Venous/arterial pH below 7.0
- Hypokalaemia on admission (under 3.5mmol/L)
- GCS less than 12 or abnormal AVPU scale
- Oxygen saturation below 92% on air (assuming normal baseline respiratory function)
- Systolic BP below 90 mmHg
- Pulse over 100 or below 60 bpm
- Anion gap above 16 \[\text{Anion Gap} = (\text{Na}^+ + \text{K}^+) - (\text{Cl}^- + \text{HCO}_3^-)\]

If the individual exhibits any of these signs they should be reviewed by a consultant physician and considered for referral to a Level 2/HDU (High Dependency Unit) environment. It may also be necessary to consider other causes for the deterioration, including surgical. If surgery is required there will need to be an urgent senior multidisciplinary discussion on the optimum time to operate.

2. Preparation

The individual with diabetes will need 2 large bore IV cannula, one for intravenous insulin management and substrate (via Y connector with a one-way, anti-siphon valve) and another for fluid replacement.

If the patient presents with DKA and using a continuous subcutaneous insulin infusion pump (CSII) then refer to local policy on management. In some instances where patients can continue to self-manage their pump it may be appropriate to leave it in place to allow the basal insulin delivery. If no local policy exists, escalate to the Drs, explain to the individual patient that their CSII needs to be removed and stored safely and replaced with subcutaneous basal insulin which the Drs should prescribe in line with local policy.

Ensure that the intravenous insulin regimen, rate of insulin infusion, fluid management protocol is all prescribed and dated, and appropriate care plan is used.

Ensure that the management plan is discussed by the medical team with the nursing staff in charge of the individual with DKA and agreed.

3. Fluid management

The table below outlines a typical fluid replacement regimen.

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9% sodium chloride 1L *</td>
<td>1000ml over 1st hour</td>
</tr>
<tr>
<td>0.9% sodium chloride 1L with potassium chloride</td>
<td>1000ml over next 2 hours</td>
</tr>
<tr>
<td>0.9% sodium chloride 1L with potassium chloride</td>
<td>1000ml over next 2 hours</td>
</tr>
<tr>
<td>0.9% sodium chloride 1L with potassium chloride</td>
<td>1000ml over next 4 hours</td>
</tr>
<tr>
<td>0.9% sodium chloride 1L with potassium chloride</td>
<td>1000ml over next 4 hours</td>
</tr>
<tr>
<td>0.9% sodium chloride 1L with potassium chloride</td>
<td>1000ml over next 6 hours</td>
</tr>
</tbody>
</table>

Seek medical clarification if the individual is a young adult, elderly, pregnant or has other serious co-morbidities including heart and renal failure.

In these situations, admission to a Level 2/HDU facility should be considered. Fluids should be replaced cautiously, and if appropriate, guided by the central venous pressure measurements.

4. Insulin management

Start a continuous fixed rate intravenous insulin infusion (FRIII) via an infusion pump. This is made of 50 units of human soluble insulin (Actrapid®, Humulin S®) made up to 50ml with 0.9% sodium chloride solution. An insulin syringe must always be used to measure and prepare insulin for an intravenous infusion.
The rate of infusion is calculated using 0.1 unit/kg/hr. Table below outlines the guide:

<table>
<thead>
<tr>
<th>WEIGHT in Kg</th>
<th>INSULIN DOSE PER HOUR (Units) at 0.1 units/Kg/hour if glucose ≥14mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59</td>
<td>5</td>
</tr>
<tr>
<td>60-69</td>
<td>6</td>
</tr>
<tr>
<td>70-79</td>
<td>7</td>
</tr>
<tr>
<td>80-89</td>
<td>8</td>
</tr>
<tr>
<td>90-99</td>
<td>9</td>
</tr>
<tr>
<td>100-109</td>
<td>10</td>
</tr>
<tr>
<td>110-119</td>
<td>11</td>
</tr>
<tr>
<td>120-130</td>
<td>12</td>
</tr>
<tr>
<td>130-139</td>
<td>13</td>
</tr>
<tr>
<td>140-150</td>
<td>14</td>
</tr>
<tr>
<td>&gt;150</td>
<td>15 (any dose higher than this should be on the advice of the Diabetes Specialist Team)</td>
</tr>
</tbody>
</table>

Once the glucose drops to <14mmol/L, in addition to adding a 10% dextrose infusion, the medical team may consider reducing the rate of intravenous insulin infusion to 0.05 units/kg/hr to avoid the risk of developing hypoglycaemia and hypokalaemia.

<table>
<thead>
<tr>
<th>WEIGHT in Kg</th>
<th>INSULIN DOSE PER HOUR (Units) at 0.05 units/Kg/hour if glucose &lt;14mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59</td>
<td>2.5</td>
</tr>
<tr>
<td>60-69</td>
<td>3</td>
</tr>
<tr>
<td>70-79</td>
<td>3.5</td>
</tr>
<tr>
<td>80-89</td>
<td>4</td>
</tr>
<tr>
<td>90-99</td>
<td>4.5</td>
</tr>
<tr>
<td>100-109</td>
<td>5</td>
</tr>
<tr>
<td>110-119</td>
<td>5.5</td>
</tr>
<tr>
<td>120-130</td>
<td>6</td>
</tr>
<tr>
<td>130-139</td>
<td>6.5</td>
</tr>
<tr>
<td>140-150</td>
<td>7</td>
</tr>
<tr>
<td>&gt;150</td>
<td>7.5</td>
</tr>
</tbody>
</table>

The following targets should be considered:

- Reduction of the blood ketone concentration by 0.5mmol/L/hour
- Increase the venous bicarbonate by 3.0mmol/L/hour
- Reduce capillary blood glucose by 3.0mmol/L/hour
- Maintain potassium between 4.0 and 5.5mmol/L

If the targets are not achieved, then the rate of the FRII may need to be increased, see section 6 for more details. Ensure that ANY change in rate of insulin infusion is prescribed on the care plan or on the appropriate document used.

Insulin may be infused initially in the same line as the intravenous replacement fluid, provided that a Y connector with a one-way, anti-siphon valve is used.

Once CBG improves to <14 mmol/L, 10% dextrose infusion should be added to act as the substrate for the insulin, to prevent hypoglycaemia. It is preferable then to infuse the insulin and the substrate fluid in the same line with a Y connector, and the replacement hydration fluid in a separate line.

**Basal insulin should always be administered alongside the FRII.** If the individual normally takes basal insulin (e.g. Lantus®, Degludec®, Levemir®, or human isophane insulin such as Insulatard® or Humalin S®) continue this at the usual dose and usual time. If the patient is not normally on basal insulin (i.e., new diagnosis or usually takes mixed insulin), please refer to medical team and local guideline to commence it alongside the FRII as soon as possible.
5. Potassium replacement

Hypokalaemia and hyperkalaemia are life threatening conditions that are potential risks associated with DKA and its treatment. Serum potassium is often high on admission (although total body potassium is low) but falls precipitously upon treatment with insulin. Regular monitoring is mandatory. The table below outlines the guide for potassium replacement.

<table>
<thead>
<tr>
<th>Potassium level in first 24 hours (mmol/L)</th>
<th>Potassium replacement in mmol/L of infusion solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 5.5</td>
<td>Nil</td>
</tr>
<tr>
<td>3.5-5.5</td>
<td>40</td>
</tr>
<tr>
<td>Below 3.5</td>
<td>Senior review as additional potassium needs to be given</td>
</tr>
</tbody>
</table>

6. Monitoring

Monitor Capillary Blood Glucose hourly using Trust approved meter. If meter reads “over POCT QA range ie >27.8mmol/L” or “Hi”, venous blood should be sent to the laboratory hourly or measured using venous blood in a blood gas analyser.

Monitor blood ketones hourly using Trust approved meter until <0.6 mmol/L

Assess the resolution of ketoacidosis:

- If blood ketone measurement is available and blood ketones are not falling by at least 0.5mmol/L/hr call a prescribing clinician to increase the insulin infusion rate by 1.0 unit/hr increments hourly until the ketones are falling at target rates (also check infusion**)
- If blood ketone measurement is not available, use venous bicarbonate. If the bicarbonate is not rising by at least 3.0mmol/L/hr call a prescribing clinician to increase the insulin infusion rate by 1 unit/hr increments hourly until the bicarbonate is rising at this rate**
- Alternatively use plasma glucose. If the glucose is not falling by at least 3.0mmol/L/hr call a prescribing clinician to increase the insulin infusion rate by 1.0 unit/hr increments hourly until glucose falls at this rate. Glucose level is not an accurate indicator of resolution of acidosis, so the acidosis resolution should be verified by venous gas analysis**

** If ketones and glucose are not falling as expected always check the insulin infusion pump is working and connected and that the correct insulin residual volume is present (to check for pump malfunction)

7. Resolution

Ensure that the clinical and biochemical parameters are improving or have normalised.

Resolution of DKA is defined as ketones less than 0.6mmol/L, and venous pH over 7.3.

Ensure that the rapid-acting insulin (e.g., Novorapid®, Trurapi®, Humalog®, Apidra®, FiAsp®) is prescribed appropriately.

Stopping intravenous insulin infusion: not able to eat and drink?

Move to a variable rate intravenous insulin infusion (VRIII) as per local guidelines or following the JBDS guideline: A guideline for the use of variable rate intravenous insulin infusion in medical inpatients.

Stopping intravenous insulin infusion: eating and drinking reliably

If they were on basal bolus insulin

- If the person was previously on a basal insulin once or twice a day (e.g., Lantus®, Semglee®, Abasaglar®, Degludec®, Levmir®, or human isophane insulin such as Insulatard® or Humalin®) this should have been continued and thus the only action should be to restart their normal short acting insulin at the next meal
- If the basal insulin had been stopped in error, the insulin infusion should not be stopped until some form of basal
insulin has been given. If the basal insulin was normally taken once daily in the evening and the intention is to convert to subcutaneous insulin in the morning, give half the usual daily dose of basal insulin as isophane (i.e. Insulatard®, Humulin I®, Insumen basal®) in the morning. This will provide essential basal insulin until the usual basal can be recommenced. Check the blood ketone and glucose levels regularly.

- There should be an overlap between the insulin infusion and first injection of rapid acting insulin (e.g. Novorapid®, Trurapi®, Humalog®, Apidra®, FiAsp®). The rapid acting insulin should be injected with the meal and the intravenous insulin and fluids discontinued 30 to 60 minutes later.

If they were on twice daily fixed-mix insulin (e.g., Novomix 30®, Humalog Mix 50®, Humalin M3®)

- Re-introduce the subcutaneous insulin before breakfast or before the evening meal. Do not change at any other time. Maintain the insulin infusion for 30 to 60 minutes after the subcutaneous insulin was given
- Ensure any additional basal insulin started alongside FRII have been stopped once the usual mixed insulin recommenced

If they were on CSII:

- Ensure availability of insulin and other necessary supplies/consumables
- Ensure patient has been assessed competent in resuming pump therapy use
- Ensure review with pump trained member of the diabetes team to review if any pump rate changes are required and for detailed advised on transitioning off intravenous insulin infusion to CSII
- Transition from FR/II to CSII is not recommended at bedtime in case of set failure. CSIII can be recommenced as basal only alongside FR/II with transition taking place at a mealtime

If they were newly diagnosed and/or insulin naïve:

The medical team, or the Diabetes Specialist Team will be able to provide calculations based on several factors including the individual’s sensitivity to insulin, degree of glycaemic control, insulin resistance, weight, and age.

8. Referral to the Diabetes Specialist Team

If they are not already involved, the local diabetes team should be informed and the person with diabetes reviewed within 24 hours of admission. Diabetes team input is important to allow re-education, to reduce the chance of recurrence, and to facilitate appropriate follow up.

9. Documentation

Ensure that all interventions are clearly documented on the individual’s medical notes. All investigations, including any monitoring done should be recorded on the dedicated ICP, prescription or management chart. Regular documentations of any care processes, or any changes to the individual’s condition should also be completed.

10. Competency

A training programme should be put in place for all healthcare staff (including medical staff) expected to prescribe, prepare and administer insulin (e.g. the safe use of insulin and the safe use of intravenous insulin e-learning packages from NHS Improving Quality). Use the template provided to assess competency in the various management aspects of DKA.

11. Educational resources

Appendix 1: One page nursing supplement
Appendix 2: Example competency pack for nurses
Appendix 3: NMC reflective accounts form
Appendix 4: Insulin prompt cards
Appendix 1

Diabetic Ketoacidosis: A practical guide to the nursing care processes

**For full details refer to the full nursing DKA supplement and JBDS guideline**

The ‘D’ is for **Diabetes**- a blood glucose concentration of > 11.0mmol/L or known to have diabetes mellitus

The ‘K’ is for **Ketonaemia** or ketonuria - a capillary or blood ketone concentration of > 3.0mmol/L or significant ketonuria (more than 2+ on standard urine sticks)

The ‘A’ is for **Acidaemia/acidosis** – a bicarbonate concentration of ≤ 15.0mmol/L and/or venous pH <7.3

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**What you will need**

- Patient will require TWO large bore cannulas one for intravenous insulin management and another for fluid replacement
- Infusion pump for fluids
- Infusion pump for IV insulin
- Point of care glucose and ketone testing equipment
- Access to venous blood gas testing/ labs sampling
- Access to equipment required for vital sign monitoring

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**Immediate actions**

- Baseline point of care glucose and ketone test results
- Baseline VBG for acidosis and potassium (K+)
- Baseline vital signs
- Ensure IV fluids prescribed and commenced
- Ensure FIXED rate intravenous insulin infusion (FRIII) prescribed and commenced
- Ensure basal insulin prescribed subcutaneously alongside FRIII; If patient usually takes basal insulin, ensure this is prescribed and continued otherwise refer to local guideline for commencing basal insulin
- If not already done, escalation to primary medical team
- Ensure admitted to approapriate area i.e. ward vs critical care
- Assessment of patient for wearable diabetes teschnology i.e. insulin pump or glucose sensor and inform medical team

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**Monitoring**

- Hourly point of care glucose (Lab if ‘HI’) and ketone testing
- VBG for pH, bicarbonate and potassium at 60 minutes; 2 hours and 2 hourly thereafter
- Ensure that all interventions are clearly documented in line with local practice
- If ketones and glucose are not falling as expected always check the insulin infusion pump is working and connected and that the correct insulin residual volume is present (to check for pump malfunction)

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**When to call Dr for help**

- If the blood ketone concentration does not reduce by 0.5mmol/L/hour
- If there is NOT an increase the venous bicarbonate by 3.0mmol/L/hour
- If the capillary blood glucose remains > 14 mmol/L and does not reduce by 3.0mmol/L/hour
- If the potassium is not maintained between 4.0 and 5.5mmol/L
- Change in cognition or concerns in relation to fluid balance

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**Who to refer to**

- Urgent Referral to the diabetes specialist team (if not primary medical team)
- Referral to diabetes inpatient specialist nurses in accordance with local pathway
- If the patient used an insulin pump always refer to the diabetes inpatient specialist nurse
- Psychological wellbeing if appropriate

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**Actions on resolution**

- Resolution of DKA is defined as ketones less than 0.6mmol/L, and venous pH over 7.3
- Eating: There should be an overlap between the insulin infusion and first administration of rapid acting/ mixed insulin (preferably via the patients usual method i.e. injection or insulin pump)
- Not eating once DKA has resolved: move to a VRIII as per local guidelines
- If the person was previously on a basal insulin this should have been continued
- If the basal insulin had been stopped in error, the insulin infusion should not be stopped until some form of basal insulin has been given
- Ensure education provided as required by the appropriate teams (such as DSN/dietititians) prior to discharge
- Ensure they have required consumables including new insulin pens, cartridges or vials (if on CSII), BG and ketone meter with strips, needles
- Ensure follow up arranged with the diabetes team or usual diabetes care provider post discharge

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Appendix 2

Assessment of Clinical Competencies in the administration of Intravenous Insulin Infusion for the management of Diabetic Ketoacidosis (DKA)

Name:  
Role/Post:  
Ward/Area:  
Date Safe Use of Insulin Training attended:  

Competency Statement:
This will aim to demonstrate the participant’s clinical knowledge and skills, both in the rationale for, as well as the practicalities of, the safe and effective use of intravenous insulin in the management of diabetic ketoacidosis, without requiring assistance or direct supervision. These knowledge and skills should be assessed by a Registered Nurse who can demonstrate competence at level 4 or above (see guide: Levels of Competency Rating Scale).

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Assessment method</th>
<th>Level achieved</th>
<th>Date achieved</th>
<th>Assessor of competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate knowledge on the rationale for intravenous insulin use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The participant will be able to:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe the clinical indications for the use of fixed rate vs variable rate intravenous insulin in DKA</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify the type of insulin use for intravenous insulin infusion</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe the symptoms of hypoglycaemia and actions required should this happen, in terms of hypoglycaemia management</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe the symptoms of hypoglycaemia and actions required should this happen, in relation to the treatment of DKA</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the value of hourly blood glucose and ketone monitoring and recording</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the value of VBG testing in line with guidance</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the normal range of glycaemia in hospital and report readings outside this range to the appropriate person.</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpret blood ketone results, assess other parameters, and take appropriate, timely action.</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the rationale for not using abbreviations i.e., “U” and the need to write the word “units”</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the difference between intravenous fluid substrate and intravenous fluid for hydration during intravenous insulin infusion</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the importance of intravenous fluid substrate when patient is receiving intravenous insulin infusion</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the normal range for potassium and the importance of potassium level monitoring and replacement during intravenous insulin infusion</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the importance continuing basal insulin whilst on fixed rate intravenous insulin in DKA treatment (for patients on established basal-bolus regimen prior to admission) or commencing this for insulin naïve patients</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the criteria for escalation of care and who to escalate to</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the associated referrals required as part of DKA management and why</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the importance of using insulin syringes (not IV syringes) when drawing up insulins from vials</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the rationale why insulin SHOULD NOT be drawn up from prefilled insulin pen devices or insulin cartridges</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain the importance of ensuring that the insulin and the regime is prescribed, signed, and dated</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify criteria for the safe discontinuation of fixed rate intravenous insulin infusion</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify criteria for the safe discontinuation of variable rate intravenous insulin infusion</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe the process of appropriate intravenous insulin infusion discontinuation</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe the required actions upon resolution and prior to discharge</td>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Demonstrate practical skills in the intravenous administration of insulin

<table>
<thead>
<tr>
<th>Assessment method</th>
<th>Level achieved</th>
<th>Date achieved</th>
<th>Assessor of competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Wash hands and prepare necessary equipment</td>
<td>Observation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On prescription chart check:
- 6 R’s
  - Right Patient
  - Right Time
  - Right Route
  - Right Dose
  - Right Insulin
  - Right Device
- Allergies
- Any additional instructions

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On the vial of insulin, check:
- Insulin name
- Insulin strength
- Expiry date
- Visual confirmation of the insulin product to ensure it has not been tampered with
- Insulin was stored as recommended

Use of correct insulin syringe

Use of NaCl 0.9% 49.5 mls

Blood glucose level checked in line with local policy and information used appropriately

Blood ketone level checked in line with local policy and information used appropriately

Clarify and ensure correct intravenous insulin infusion regime is prescribed according to the clinical indication

Insertion of 2 large bore IV cannula, one for intravenous insulin management and substrate (via Y connector with a one-way, anti-siphon valve) and another for fluid replacement

Use of 3-way, non-return valve for the intravenous insulin infusion and the intravenous fluid substrate

Correct set up of intravenous infusion in line with local policy, including the correct rate

Equipment disposed safely and hand hygiene performed

Intravenous insulin preparation and administration signed and dated on the prescription chart, and witnessed and countersigned by appropriate staff

Correctly identifies when the next glucose and ketone check is required for rate review

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### Statement of Assessment and Performance

Name: ___________________________
Signature: _________________________

I hereby confirm that I have assessed the above named individual and can verify that he/she demonstrates competency in the subcutaneous administration of insulin.

Name (Assessor): ___________________________
Signature: _________________________

### Level of Competency Rating Scale*

<table>
<thead>
<tr>
<th>Practitioner</th>
<th>Level of achievement</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Cannot perform this activity satisfactorily to the level required to participate in the clinical environment</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Can perform this activity but not without constant supervision and assistance</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Can perform this activity with a basic understanding of theory and practice principles, but requires some supervision and assistance</td>
<td>2</td>
</tr>
<tr>
<td>Competent</td>
<td>Can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision</td>
<td>3</td>
</tr>
<tr>
<td>Practitioner</td>
<td>Can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision, at an appropriate pace and adhering to evidence-based practice</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>At this level competence will have been maintained for at least 6 months and/or is used frequently (2-3 times /week) The practitioner will demonstrate confidence and proficiency and show fluency and dexterity in practice This is the minimum level required to be able to assess practitioners as competent</td>
<td></td>
</tr>
<tr>
<td>Expert</td>
<td>Can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision, at an appropriate pace and adhering to evidence-based practice.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>At this level the practitioner will be able to adapt knowledge and skill to special/ novel situations where there may be increased levels of complexity and/or risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision, at an appropriate pace and adhering to evidence-based practice.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Demonstrate initiative and adaptability to special problem situations, and can lead others in performing this activity At this level the practitioner can co-ordinate, lead and assess others who are assessing competence. Ideally, they will have a teaching and/or mentor qualification</td>
<td></td>
</tr>
</tbody>
</table>


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Nursing management for Diabetic Ketoacidosis (DKA) V1.0 12th December 2022
Appendix 3

REFLECTIVE ACCOUNTS FORM

You must use this form to record five written reflective accounts on your CPD and/or practice-related feedback and/or an event or experience in your practice and how this relates to the Code. Please fill in a page for each of your reflective accounts, making sure you do not include any information that might identify a specific patient, service user or colleague. Please refer to our guidance on preserving anonymity in Guidance sheet 1 in How to revalidate with the NMC.

Reflective account:

What was the nature of the CPD activity and/or practice-related feedback and/or event or experience in your practice?

What did you learn from the CPD activity and/or feedback and/or event or experience in your practice?

How did you change or improve your practice as a result?

How is this relevant to the Code?
Select one or more themes: Prioritise people – Practise effectively – Preserve safety – Promote professionalism and trust
### Insulin Prompt Cards

#### Insulin Prescribing and Administration Guide

**Analogues**

<table>
<thead>
<tr>
<th>Analogue</th>
<th>When to prescribe/administer</th>
<th>Onset/peak action/duration of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Acting (analogue)</td>
<td>Prescribe/Give JUST BEFORE or JUST AFTER a meal (ideally 15 minutes before a meal) Normally given 3 times a day with meals</td>
<td>Onset: 10-20 mins Peak: 1-3 hrs Duration: 2-5 hrs</td>
</tr>
<tr>
<td>Long acting (analogue)</td>
<td>Prescribe/Give ONCE or TWICE daily Times should be in line with patient history &amp; advice of healthcare team</td>
<td>Onset: 1-2 hrs Duration: up to 24 hrs</td>
</tr>
<tr>
<td>Biphasic (analogue)</td>
<td>Prescribe/Give JUST BEFORE or JUST AFTER a meal (ideally 15 minutes before a meal) Normally given twice a day with breakfast &amp; evening meal Can be given with each meal</td>
<td>Onset: 10-20 mins Peak: 1-4 hrs Duration: up to 24 hrs</td>
</tr>
</tbody>
</table>

#### Human Insulin

<table>
<thead>
<tr>
<th>Analogue</th>
<th>When to prescribe/administer</th>
<th>Onset/peak action/duration of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Acting (analogue)</td>
<td>Prescribe/Give 1-2 hrs minutes BEFORE a meal Normally given 3 times a day with meals</td>
<td>Onset: 30 mins Peak: 2-4 hrs Duration: up to 8 hrs</td>
</tr>
<tr>
<td>Long acting (analogue)</td>
<td>Prescribe/Give ONCE or TWICE daily Times should be in line with patient history &amp; advice of healthcare team</td>
<td>Onset: 1-2 hrs Peak: 4-12 hrs Duration: up to 24 hrs</td>
</tr>
<tr>
<td>Biphasic (Human)</td>
<td>Prescribe/Give 30 mins minutes BEFORE a meal Normally given twice a day before breakfast &amp; evening meal</td>
<td>Onset: 30 mins Peak: 2-8 hrs Duration: 14-20 hrs</td>
</tr>
</tbody>
</table>

#### Insulin Prescribing and Administration Guide

**Rapid Acting (analogue)**

- Apidra (10ml vial; 3ml cartridge; Solostar pre-filled pen)
- HumALOG (10ml vial; 3ml cartridge; Kwikpen pre-filled pen for 100 units/ml; Kwikpen pre-filled pen for 200 units/ml)
- NovoRapid (10ml vial; 3ml cartridge; FlexTouch pre-filled pen)
- FiAsp (10ml vial; 3ml cartridge; FlexTouch pre-filled pen)

**Long acting (analogue)**

- Lantus (Glargine) (10ml vial; 3ml cartridge; Solostar pre-filled pen)
- Levemir (Detemir) (3ml cartridge; Flexpen and Innolet pre-filled pen)
- Tresiba (Degludec) (3ml cartridge and FlexTouch pre-filled pen for 100 units/ml; FlexTouch pre-filled pen for 200 units/ml)

**Biphasic (analogue)**

- HumALOG Mix25 (10ml vial; 3ml cartridge; Kwikpen pre-filled pen)
- HumALOG Mix50 (10ml vial; 3ml cartridge; Kwikpen pre-filled pen)
- Abasaglar (Biosimilar Glargine) (3ml cartridge; Kwikpen pre-filled pen)
- NovoMIX 30 (3ml cartridge; Flexpen pre-filled pen)

#### Insulin Prescribing and Administration Guide

**Short Acting (Soluble/Human)**

- HumULIN S (10 ml vial; 3ml cartridge)
- Actrapid (10ml vial)
- InsUMAN Rapid InsUMAN Rapid (3ml cartridge)

**Intermediate (human)**

- HumULIN I (10ml vial; 3ml cartridge; Kwikpen pre-filled pen)
- InsuATARD (10ml vial; 3ml cartridge; Innolet pre-filled pen)
- InsUMAN Basal (5 ml vial; 3ml cartridge; Solostar pre-filled pen)

**Biphasic (Human)**

- HumULIN M3 (10ml vial; 3ml cartridge; Kwikpen pre-filled pen)
- HumULIN M5 (10ml vial; 3ml cartridge; Kwikpen pre-filled pen)
- InsUMAN COMB 15 (3ml cartridge; Kwikpen pre-filled pen)
- InsUMAN COMB 25 (5 ml vial; 3ml cartridge; Solostar pre-filled pen)
- InsUMAN COMB 50 (3ml cartridge)

#### Nursing management for Diabetic Ketoacidosis (DKA)

Appendix 4

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**Nursing management for Diabetic Ketoacidosis (DKA)** V1.0 12th December 2022

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