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 straight forward 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 $\geq$ 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 above16 **[Anion Gap = $(Na^+ + K^+) – (Cl^- + HCO_3^-)$]**

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.

Fluid	Volume
0.9% sodium chloride 1L *	1000ml over 1st hour
0.9% sodium chloride 1L with potassium chloride	1000ml over next 2 hours
0.9% sodium chloride 1L with potassium chloride	1000ml over next 2 hours
0.9% sodium chloride 1L with potassium chloride	1000ml over next 4 hours
0.9% sodium chloride 1L with potassium chloride	1000ml over next 4 hours
0.9% sodium chloride 1L with potassium chloride	1000ml over next 6 hours

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:

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

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 0.05units/kg/hr to avoid the risk of developing hypoglycaemia and hypokalaemia.

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

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 FRIII. 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 FRIII 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.

Potassium level in first 24 hours (mmol/L)	Potassium replacement in mmol/L of infusion solution
Over 5.5	Nil
3.5-5.5	40
Below 3.5	Senior review as additional potassium needs to be given

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®, Levemir®, or human isophane insulin such as Insulatard® or Humalin I®) 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®, Insuman 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 FRIII/VRIII to CSII is not recommended at bedtime in case of set failure. CSIII can be recommenced as basal only alongside FRIII/VRIII 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

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

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

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)

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

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

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/dietitians) 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

Appendix 2

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

Name: Ward/Area:
Role/Post: 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).

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

2. Demonstrate practical skills in the intravenous administration of insulin	Assessment method	Level achieved	Date achieved	Assessor of competency
a. Wash hands and prepare necessary equipment	Observation			
On prescription chart check: • 6 R's Right Patient Right Time Right Route Right Dose Right insulin Right Device • Allergies • Any additional instructions	Observation			

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	Observation			
Use of correct insulin syringe	Observation			
Use of NaCl 0.9% 49.5 mls	Observation			
Blood glucose level checked in line with local policy and information used appropriately	Observation			
Blood ketone level checked in line with local policy and information used appropriately	Observation			
Clarify and ensure correct intravenous insulin infusion regime is prescribed according to the clinical indication	Observation			
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	Observation			
Use of 3-way, non-return valve for the intravenous insulin infusion and the intravenous fluid substrate	Observation			
Correct set up of intravenous infusion in line with local policy, including the correct rate	Observation			
Equipment disposed safely and hand hygiene performed	Observation			
Intravenous insulin preparation and administration signed and dated on the prescription chart, and witnessed and countersigned by appropriate staff	Observation			
Correctly identifies when the next glucose and ketone check is required for rate review	Questioning			

Statement of Assessment and Performance

Name: Role:
Signature: Date:

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): Role:
Signature: Date:

Review dates	Competent: Yes / No	Staff Signature	Assessor's Signature	Comments

Level of Competency Rating Scale*

Practitioner	Level of achievement	Level
Novice	Cannot perform this activity satisfactorily to the level required to participate in the clinical environment	0
	Can perform this activity but not without constant supervision and assistance	1
	Can perform this activity with a basic understanding of theory and practice principles, but requires some supervision and assistance	2
Competent Practitioner	Can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision	3
	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 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	4
	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. 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	5
Expert Practitioner	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. 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	6

*Adapted from: Herman GD, Kenyon RJ (1987) Competency-Based Vocational Education. A Case Study, Shaftsbury, FEU, Blackmore Press, cited in Fearon, M. (1998) Assessment and measurement of competence in practice, *Nursing Standard* 12(22), pp43-47

Appendix 3

REFLECTIVE ACCOUNTS FORM

Nursing & Midwifery Council

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

Appendix 4

Insulin Prompt Cards

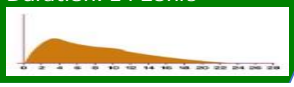
Insulin Prescribing and Administration Guide

INSULINS PRESCRIBING

Analogues	When to prescribe/administer	Onset/peak action/duration of action
Rapid Acting (analogue) Apidra HumALOG (100 units/ml & 200 units/ml) NovoRAPID FiAsp	Prescribe/Give JUST BEFORE or JUST AFTER a meal (ideally 15 minutes before a meal) Normally given 3 times a day with meals	Onset: 10-20mins Peak: 1-3hrs Duration: 2-5hrs 
Long acting (analogue) Lantus (Glargine) Levemir (Detemir) Tresiba (Degludec) 100 units/ml & 200 units/ml (ONCE DAILY) Toujeo 300 units/ml (ONCE DAILY) Abasaglar(Biosimilar)	Prescribe/Give ONCE or TWICE daily Times should be in line with patient history & advice of healthcare team	Onset: 1-2 hrs Duration: up to 24hrs 
Biphasic (analogue) HumALOG Mix25 HumALOG Mix50 NovoMIX 30	Prescribe/Give JUST BEFORE or JUST AFTER a meal (ideally 15 minutes before a meal) Normally given twice a day with breakfast & evening meal Can be given with each meal	Onset: 10-20mins Peak: 1-4 hrs Duration: up to 24hrs 

Insulin Prescribing and Administration Guide

INSULINS PRESCRIBING

Human	When to prescribe/administer	Onset/peak action/duration of action
Short Acting (Soluble/Human) HumULIN S Actrapid InsUMAN Rapid	Prescribe/Give 15-30 minutes BEFORE a meal Normally given 3 times a day with meals	Onset: 30 mins Peak: 2-4 hrs Duration: up to 8 hrs 
Intermediate (human) HumULIN I InsulATARD InsUMAN Basal	Prescribe/Give ONCE or TWICE daily Times should be in line with patient history & advice of healthcare team	Onset: 1-2hrs Peak: 4-12hrs Duration: up to 24hrs 
Biphasic (Human) HumULIN M3 InsUMAN COMB 15 InsUMAN COMB 25 InsUMAN COMB 50	Prescribe/Give 30 minutes BEFORE a meal Normally given twice a day before breakfast & evening meal	Onset: 30mins Peak: 2-8 hrs Duration: 14-20hrs 

Insulin Prescribing and Administration Guide

INSULINS DEVICES

Rapid Acting (analogue)
- Apidra (10ml vial; 3ml cartridge; Solostar prefilled pen)
- HumALOG (10ml vial; 3ml cartridge; Kwikpen prefilled pen for 100units/ml; Kwikpen prefilled pen for 200 units/ml)
- NovoRAPID (10ml vial; 3ml cartridge; Flexpen or Flextouch prefilled pen)
- FiAsp (10ml vial; 3ml cartridge; Flextouch prefilled pen)

Long acting (analogue)
Lantus (Glargine) (10ml vial; 3ml cartridge; Solostar prefilled pen)
Levemir (Detemir) (3ml cartridge; Flexpen and Innolet prefilled pen)
Tresiba (Degludec) (3ml cartridge and Flextouch prefilled pen for 100units/mL; Flextouch prefilled pen 200units/mL)
Toujeo(300 units/ml Solostar prefilled pen)
Abasaglar(Biosimilar Glargine) (3ml cartridge; Kwikpen prefilled pen)

Biphasic (analogue)
HumALOG Mix25 (10ml vial; 3ml cartridge; Kwikpen prefilled pen)
HumALOG Mix50 (10ml vial; 3ml cartridge; Kwikpen prefilled pen)
NovoMIX 30 (3ml cartridge; Flexpen prefilled pen)

Insulin Prescribing and Administration Guide

INSULINS DEVICES

Short Acting (Soluble/Human)
HumULIN S (10 ml vial; 3ml cartridge)
Actrapid (10 ml vial)
InsUMAN Rapid InsUMAN Rapid (3ml cartridge)

Intermediate (human)
HumULIN I (10ml vial; 3ml cartridge; Kwikpen prefilled pen)
InsulATARD (10ml vial; 3ml cartridge; Innolet prefilled pen)
InsUMAN Basal(5 ml vial; 3ml cartridge; Solostar prefilled pen)

Biphasic (Human)
HumULIN M3 (10ml vial; 3ml cartridge; Kwikpen prefilled pen)
InsUMAN COMB 15 (3ml cartridge)
InsUMAN COMB 25 (5 ml vial; 3ml cartridge; Solostar prefilled pen)
InsUMAN COMB 50 (3ml cartridge)