CLINICAL GUIDELINE

Diabetes, People Receiving Enteral Nutrition

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

Version Number:	3
Does this version include changes to clinical advice:	No
Date Approved:	29th June 2017
Date of Next Review:	29th June 2019
Lead Author:	Emma Gibb
Approval Group:	Medicines Utilisation Subcommittee of ADTC

Important Note:

The Intranet version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

Guidelines for the Management of People with Diabetes Receiving Enteral Feeding in Hospital

When patients with diabetes mellitus are being artificially fed via the enteral route (e.g. nasogastric, nasojejunal, gastrostomy or jejunostomy) **glycaemic control can prove difficult**. This may complicate their medical condition and delay recovery. To maintain optimal glycaemic control while receiving enteral nutrition, patients may require alteration of their usual diabetes treatment. It is imperative that there is good communication between the Diabetes Team, the Dietitian, and the extended medical teams.

These guidelines are aimed at patients who:

1. are currently on pump or bolus feeding and intravenous insulin, and are being transferred to subcutaneous insulin.
2. have pre-existing diabetes and require enteral feeding, whether controlled on diet, oral hypoglycaemic agents (OHAs) or insulin.
3. develop hypergylcaemia while being enterally fed.

TARGET GLYCAEMIC CONTROL

For patients being enterally fed, the extremes of glycaemic control should be avoided. A target blood glucose reading should be between 6 and 12 mmol/l. These targets should be adjusted according to individual patient requirements.

DIABETES THERAPY

The majority of patients with diabetes will experience a rise in their blood glucose levels when they commence enteral nutrition. There are often other factors such as infection and recent surgery that will affect glycaemic control. The following principles should be adhered to:

- OHA may not provide adequate glyceamic control. In this instance the patient should usually be converted to insulin and the OHA should be discontinued.
- Initially, insulin should be introduced using a variable rate intravenous insulin infusion (VRIII) (Table 1).
- VRIII regimens need to be re-evaluated frequently as insulin doses may need to be adjusted to achieve target glycaemic control.
- Once the patient's blood glucose is stablised and feeding has been established, he / she should be converted to subcutaneous insulin injections.
- The intravenous infusion must be discontinued once the initial subcutaneous injection has been administered.
- Subcutaneous insulin dose can be calculated as follows:
    1. Take an average of the patient's 24 hour insulin requirements on the VRIII.
    2. Subtract 25% from this value and this will be their **TOTAL DAILY INSULIN DOSE**.
    3. This will usually be split into 2 injections, see section on feeding regimens.

- Retrospective treating with corrective doses of subcutaneous insulin should be avoided and the insulin doses should be increased prospectively i.e. **avoid boluses of short acting insulin.**

TABLE 1 – VRIII Regimen

Add 50 units of soluble insulin (Actrapid or Humulin S) to 50mls of 0.9% Saline in a 50ml syringe. Infuse IV using a pump and adjust according to the following regimen:

CBG (mmol/L)	Insulin infusion rate (units per hour)
<4	0
4.1-7.0	1
7.1-9.0	2
9.1-11.0	3
11.1-14.0	4
14.1-17.0	5
17.1-20.0	6
>20	seek medical advice

Check capillary blood glucose hourly initially then 2 hourly.

Note: If blood glucose regularly outwith range of 6-12mmol/l, insulin doses should be reassessed.

MAINTAINING GLYCAEMIC CONTROL

- If the feed stops unexpectedly and patient is nil by mouth, blood glucose levels should be closely monitored, as patients are at risk of hypoglycaemia. If necessary, an intravenous glucose infusion should be commenced until feeding can be resumed.
- If feed is stopped electively the patient may require to recommence intravenous insulin and glucose, depending on length of fast.

ENTERAL FEEDING REGIMENS

For inpatients with diabetes, the enteral feeding regimen will be recommended by the dietitian to meet the individual's nutritional requirements. In some cases, where the patient is nil by mouth, the enteral feed will be required to meet all nutritional needs. In other cases, when the patient can have oral feeds, enteral feeds may be used as a method of nutritional supplementation. To maximise glycaemic control, we suggest using the following regimens:

Pump feeding –

1. This may commence at varying times and be of variable duration (minimum 8 hours, maximum 24 hours)
2. The Total Daily Insulin Dose is calculated as above. (i.e. average 24 hour intravenous requirements minus 25%)
3. For feeds of duration $\geq$16 hours, 2/3 of the dose is administered as pre-mixed 30/70 insulin (Humulin M3) at the start of the feed. The intravenous insulin should be discontinued one hour after the first subcutaneous insulin has been administered.The other 1/3 of the dose is administered as isophane (either Humulin I or Insulatard) after 12 hours.

4. For feeds of duration ≤12 hours, all of the dose is administered as pre-mixed 30/70 insulin (Humulin M3) at the start of the feed.
5. For feeds of duration between 12 and 16 hours, 3/4 of the dose is administered as pre-mixed 30/70 insulin (Humulin M3) at the start of the feed. The other 1/4 of the dose is administered as isophane (either Humulin I or Insulatard) after 10 hours.

Bolus feeding –

1. The feed is divided into at least 4 boluses, ensuring the carbohydrate intake is evenly distributed throughout the day, to mimic breakfast, lunch, dinner, supper and between meal snacks.
2. The Total Daily Insulin Dose is calculated as above. (i.e. average 24 hour intravenous requirements minus 25%)
3. 2/3 of the dose is administered as pre-mixed 30/70 insulin (Humulin M3) before the breakfast bolus. The intravenous insulin should be discontinued one hour after the first subcutaneous insulin has been administered.
4. The other 1/3 of the dose is administered as pre-mixed 30/70 insulin (Humulin M3) 9-10 hours later before the dinner bolus.

The above advice is a rough guide to starting off with insulin dosing. But regimens will need to be adjusted according to individual need, depending on circumstances eg if patient able to feed orally, if patient starts steroids, if patient develops sepsis etc. Glycaemic control should be closely monitored eg prior to pump or bolus feed, 2 hours after starting pump or bolus feed, at end of pump feed. Insulin doses should be adjusted accordingly, and if advice on insulin adjustment is required, contact the Inpatient Diabetes Team via Trakcare.

KEY POINTS

- **Hypoglycaemia is a medical emergency and should be treated urgently**. If the patient is on IV insulin, stop the infusion immediately. If patient nil by mouth, treat hypoglycaemia by giving bolus of 170ml of lucozade or 60ml of Glucojuice (available from ward hypobox or pharmacy) via the feeding tube. If the patient can safely take by mouth, similar amounts of lucozade or glucojuice can be given. Follow the algorithm found in the hypobox until patient's blood glucose is stable. If the patient is nil by mouth, you must always follow up with another feed bolus or by re-commencing the pump feed to prevent the blood glucose falling again. If able to take by mouth, follow the hypobox algorithm. Consider adjusting the insulin doses. If the tube has been dislodged or the patient is unconscious you will need to gain IV access and follow the 'severe hypoglycaemia' algorithm found in the hypobox.

- For patients receiving enteral nutrition, extremes of glycaemia should be avoided and target blood glucose levels should be between 6 and 12 mmol/l. All patients with type 1 diabetes with blood glucose levels >14 mmol/l must have their ketones checked (blood or urine).

- Patients with diabetes who are commenced on enteral feed will usually require an increase in their diabetes medication or conversion into insulin.

- If a patient on enteral nutrition becomes hyperglycaemic, then the diabetes therapy needs adjusting, rather than a reduction in nutrition. This usually requires an increase in the insulin dose.

- Communication between the Diabetes Team and all of the healthcare professionals looking after the patient is vital, and the targets for blood glucose control should be established for the individual patient, avoiding hypoglycaemia.

- As the patient's clinical condition improves and their activity levels increase, insulin requirements may reduce significantly. If the patient comes off enteral feeding and returns to normal eating, they should usually return to their pre-illness diabetes regimen, if still appropriate.

If further advice is required please contact the Diabetes Team via Trakcare. Advice can often be given over the telephone.

Out of hours, Medical Registrar On Call Page: via switchboard

For advice regarding feeding regimens contact the dietitian.