GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol Bae Abertawe
Swansea Bay University Health Board

THINKGLUCOSE™
Inpatient care for people with diabetes

Glycaemic management during the inpatient enteral feeding of patients with diabetes

When patients with diabetes are being artificially fed via the enteral route, achieving optimal glycaemic control can prove difficult. This may complicate their medical condition and delay recovery. Patients may require alteration of their usual diabetes treatment to achieve optimal glycaemic control while receiving enteral feeding. This guidance aims to assist multidisciplinary teams (MDT) including extended medical teams, junior doctors, nursing staff, dietitians and nutrition teams.

This summary relates to the management of glucose control in patients with diabetes who are being fed via the enteral route. These are adapted for local use from the Joint British Diabetes Societies for Inpatient Care guidance for the 'Glycaemic management during the inpatient enteral feeding of stroke patients with diabetes' (2019) accessible via the link below: -

https://abcd.care/sites/abcd.care/files/site_uploads/JBDS_Guidelines_Current/JBDS_05_Enteral_Feeding_Updated_060720.pdf

1. Nursing a patient on the ward with an enteral feed

A multidisciplinary approach to managing the patient with enteral feeding is advocated. It is advantageous to include the Diabetes specialist team to plan the diabetes treatment once the enteral feed regimen is recommended by the dietitian or nutrition team. Medical teams should be mindful of refeeding syndrome in those patients in whom feeding is delayed.

General Medical Team and Nursing staff need to have a good understanding of:

- Capillary blood glucose (CBG) monitoring
- The definition of hyperglycaemia and hypoglycaemia
- The duration of action of different insulin products
- Knowledge of the circumstances in which the Diabetes Team should be consulted
- The ability to titrate and stop feed when required
- Managing hypoglycaemia in an appropriate and timely manner

2. Blood glucose targets

For patients receiving enteral nutrition, the extremes of glycaemic control should be avoided.

- A target CBG 5 - 8 mmol/l in the fasting/ pre-feed state
- A target CBG 6 - 12 mmol/l during enteral feeding
- If CBG < 4 mmol/l or persistently > 12 mmol/l on two consecutive occasions or evidence of Ketonaemia/ketonuria, then follow the inpatient guidelines on the management of hypoglycaemia **(CID208)** and management of hyperglycaemia **(CID2512)** on COIN

3. Blood glucose monitoring

Frequency of bedside blood glucose monitoring depends on whether feed is continuous, intermittent or bolus.

- If patient receiving continuous feed, monitor blood glucose pre-feed and then 4 - 6 hourly during feed
- If patient receiving intermittent feed, monitor blood glucose pre-feed, 4 - 6 hourly during feed and 2-hour post feed
- If patient receiving bolus only feeding, monitor blood glucose pre-feed, 2-hour post feed and 4 - 6 hourly during prolonged intervals between feeds
- Monitor blood glucose hourly if patient receiving VRIII

4. Management of blood glucose

For patients with type 1 diabetes

- Continue basal insulin (e.g. Glargine/ Detemir) in regimen.
- Consider bolus doses of soluble or rapid acting insulin at start, 6 and 12 hours into feed as required
- Involve Diabetes Specialist Team at earliest opportunity
- Avoid unnecessary use of intravenous insulin infusion/ VRIII
- If patient on continuous subcutaneous insulin pump, this should be stopped and subcutaneous insulin commenced

For patients with type 2 diabetes

- Treat if CBG persistently > 12 mmol/l
- Involve patient and Diabetes Specialist Team at the earliest opportunity
- Commence subcutaneous insulin aiming for CBG 6 - 12 mmol/l
- Minimise the use of VRIII
- Metformin powder for re-suspension administered via NGT may be useful as sole treatment for mild hyperglycaemia (CBG up to 12 mmol/l) or as an adjunct in patients with uncontrolled type 2 diabetes
- Crushing oral hypoglycaemic agents for administration via NGT is not recommended

Strategies for commencing insulin in patients with diabetes receiving enteral feed:

- Involvement of Diabetes Specialist Team: this is likely to be the most efficient way of initiating subcutaneous insulin
- Calculate insulin dose according to a weight based equation and carbohydrate intake in the enteral feed. See Appendix 1: Calculating insulin dose

Options available for choice of insulin:

- Isophane insulin (or) Insulin Detemir at the start of feed and, if necessary, the midpoint of feed
- A pre-mixed human insulin (e.g. Humulin M3) or a pre-mixed analogue insulin (e.g. Humalog mix 25 and 50, Novomix 30) at the start of feed, with the second dose at the midpoint of the feed. 50% of the required insulin can be administered with each dose
- Soluble human insulin (e.g. actrapid) administered 20 minutes prior to the bolus feed. Basal insulin should be continued for those with type 1 diabetes or those with type 2 diabetes established on basal insulin
- Continuation of basal bolus insulin regime already prescribed. The basal insulin should be administered at start of feed and bolus doses of soluble or rapid-acting analogue insulin (e.g. Novorapid, Apidra, Humalog) may be administered at 6 and 12 hours into the feed, if required

5. Actions to undertake if feed stopped

The risk of hypoglycaemia is high in people who have been administered subcutaneous insulin if the feed is stopped because the insulin already administered will continue to drive blood glucose down.

- Monitor for signs and symptoms of hypoglycaemia
- Monitor CBG hourly (more frequently up to every 15 minutes, if symptoms or signs of hypoglycaemia present)
- If the feed is stopped at an unplanned time and subcutaneous insulin is due, delay but do not omit the insulin dose. Insulin dose should be given when the feed is recommenced.
- For patients with type 1 diabetes who are not on basal insulin or premixed insulin, a VRIII combined with IV 10% glucose would be advisable if the feed is stopped for a prolonged period (e.g. > 2hours)

6. Actions in the event of hyperglycaemia

- Hyperglycaemia is considered to be a CBG > 12 mmol/l
- If CBG > 12 mmol/l, increase insulin doses by 2 - 4 units or (10 - 20%) per dosage adjustment
- If CBG > 12 mmol/L on two consecutive occasions, check capillary ketone. If Ketonaemia (> 3mmol/l), inform medical team for DKA management
- Avoid one-off use of “stat” doses of insulin
- Avoid recommencing a VRIII if possible, unless the patient is clinically unwell and the CBG is rising uncontrollably

7. Actions in the event of hypoglycaemia

- Hypoglycaemia is defined as a CBG <4 mmol/l
- Refer to the Inpatient Treatment of Hypoglycaemia in adults with diabetes **(CID208)** on COIN

8. Moving from enteral feeding to oral diet

- Enteral feeds should be reduced gradually, in tandem with an increase in oral intake. It can take time for some patients to re-establish eating and drinking
- Patients may be recommended oral nutritional supplements as part of their recovery. As they contain carbohydrate, they will impact on blood glucose levels. However, they should not be stopped
- Continue to monitor blood glucose regularly
- Involvement of Diabetes Specialist Team in order to adjust glucose lowering medications

Appendix 1: Calculating insulin dose

1. Daily nutritional insulin requirement

The following example illustrate how to calculate initial daily insulin requirement for patients starting on enteral feed.

a) Total carbohydrate intake from the enteral feed

This is the total carbohydrate intake expected from the enteral feed over the duration of feed (e.g. 16, 20, 24 hours). This is calculated as:

[Infusion rate (ml/hour)] x [carbohydrate content (g/100ml)] x [duration of feed]/ 100

b) Carbohydrate to insulin ratio (CIR)

This is how many grams of carbohydrate are covered by 1 unit of insulin.

If not usually on insulin, use a CIR value of **10**

If usual total daily insulin dose < 40 units, use a value of **8**

If usual total daily insulin dose > 40 units, use a value of **6**

c) Daily nutritional insulin requirement

This is the daily insulin required to cover the enteral feed over the duration of feeding. This is calculated as:

[Total carbohydrate intake from feed] divided by [carbohydrate to insulin ratio].

Example:

Patient with type 2 diabetes 68kg, not previously on insulin.

a) Carbohydrate content of feed (g/100ml) = 12.3
Intended infusion rate of enteral feed (ml/hour) = 75
Intended duration of feed (hrs per day) = 20
Total carbohydrate intake from the enteral feed = (12.3 x 75 x 20)/ 100 = 184.5g

b) Not previously on insulin: hence CIR = 10

c) Total premixed insulin dose= 184.5 / 10 = 18.45 units / 24 hours

2. Daily basal insulin requirement

For patients with type 1 diabetes with poor glycaemic control despite twice daily insulin, the patient may be required additional basal insulin. The daily basal insulin requirement may be roughly calculated as:

Daily basal insulin requirement = (body weight) x (0.1 – 0.2 units /kg)