

# THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST

## MANAGEMENT OF HYPERGLYCAEMIA ON CCU

All patients on CCU should have optimal management of hyperglycaemia, unless a different management plan has been agreed with the consultant cardiologist (for example patients at the end of life).

### Overall aim

To achieve and maintain a blood glucose between 6 and 10 mmol/l, hence improving clinical outcome.

### Initial assessment

All patients admitted to CCU must have had a lab glucose measured. BM monitoring should be initiated in those with a laboratory glucose above 7 mmol/l.

Those at risk of ketosis require urinalysis to exclude ketonuria.

### Initial blood glucose $\geq$ 10 mmol/l

- Glucose  $\geq$  20 mmol/l
  - Stop any oral hypoglycaemic agents
  - IV insulin 6 units per hour
  - Monitor BM hourly
  - If BM falls by less than 4 mmol/l in the first 2 hours, increase the insulin infusion rate to 12 units per hour
  - When BM < 10 mmol/l change to GKI if not eating, or to subcutaneous insulin regime (see below). Monitor BM 2 hourly until stable.
- Glucose 10 – 20 mmol/l
  - If eating; 12 units actrapid insulin subcutaneous (abdominal) stat
  - Monitor BM 2 hourly
  - Repeat 12 units actrapid insulin subcutaneous (abdominal) 2 hourly until BM < 10 mmol/l (increase the dose of subcutaneous actrapid if BM does not fall eg to 16 units)
  - When BM < 10 mmol/l, change to regular subcutaneous insulin regime (see below). Monitor BM 2 hourly until stable
  
  - If not eating; IV insulin infusion as above, then GKI when BM < 10 mmol/l until able to eat

### Initial blood glucose 7 – 10 mmol/l

- Not known diabetes or diabetes controlled by diet alone
  - Monitor BM four times daily
  - Avoid refined sugar
  - BM > 10 mmol/l more than 4 hours after a meal, subcutaneous insulin regime
- Known diabetes treated with oral agents
  - Metformin – STOP
  - Other oral agents – continue usual dose unless there are contra-indications
  - Monitor blood glucose 2 hourly for 6 hours, then four times daily if BM remains < 10 mmol/l

Blood glucose  $\geq 10$  mmol/l more than 4 hours after a meal, stop oral agents and use subcutaneous insulin regime if eating, or GKI if not (initial IV insulin infusion if required to achieve BM  $< 10$  mmol/l)

- Known diabetes treated with insulin  
If eating – continue usual regime, monitor BM four times daily (increase dose by 20% if significant stress response eg definite MI)  
If not eating – start GKI, monitor BM 2 hourly

## Regimes

### 1. IV insulin infusion

50 units of actrapid with normal saline to a total volume of 50 mls infused via a syringe driver

### 2. Standard GKI for a post MI patient

24 units actrapid added to 10 mmol/l KCL in 500ml 10% dextrose infused at 80 ml/hour. Adjust insulin dose to maintain BM between 6 and 10 mmol/l.

If volume overloaded or cardiogenic shock; use GKI with 48 units actrapid added to 20 mmol/l KCL in 500ml 20% dextrose infused at 40 ml/hour.

In patients with renal failure and hyperkalaemia, the potassium must be omitted); seek SpR / consultant cardiologist advice.

### 3. Subcutaneous insulin regime

*In those not previously treated with insulin*

Actrapid 12 units tds before meals and insulatard 12 units at 10pm (reduce the dose if low body weight eg  $< 50$ kg). Monitor BM four times daily and adjust dose as required. A BM between 6 and 10 mmol/l is not an indication to withhold the insulin, but indicates satisfactory control

*In those previously treated with insulin*

Continue usual regime, monitor BM four times daily (increase dose by 20% if significant stress response eg definite MI)

## Notes

1. Please do not adopt a wait-and-see approach to patients on CCU with a raised blood glucose. A raised blood glucose requires active management. This will improve patient outcome.

2. If a BM is raised requiring a change in treatment, the on call medical staff should be informed.

3. If a BM has changed in a surprising way, check it is accurate (eg finger not clean), check for disconnected lines etc

## POST ACUTE MANAGEMENT OF HYPERGLYCAEMIA FOLLOWING MI

All patients with raised glucose on CCU or who are known to have diabetes should have a HbA1c measured.

### A. Required diet or oral hypoglycaemic agent therapy on CCU

Continue to monitor, aiming for pre-meal blood glucose levels <7.0 mmol/l. Restart metformin after 48 hours if this agent was discontinued in the acute phase, and angiography is not planned or been undertaken within the last 48 hours. Increase sulphonylurea dosage if required. Ensure dietary provision is appropriate. Inform whoever normally looks after the person's diabetes (GP or Diabetes Clinic) at the time of discharge.

### B. Required new subcutaneous insulin on CCU

Continue insulin therapy for 2-3 days, depending upon overall clinical state. Aim for pre-meal blood glucose <7 mmol/l.

#### *Is long term insulin required?*

- Newly diagnosed diabetes without prior weight loss - NO
- Evidence of previous poor control ( HbA1C > 8.5%) but poor dietary or tablet compliance – NO, but involve Diabetes Team
- Evidence of previous poor control ( HbA1C > 8.5%) and previous maximal drug and diet therapy – YES. Involve the Diabetes Team
- If long term insulin is not required, stop insulin on Day 2/3 and start metformin (500 mg bd initially) or gliclazide (40 mg bd if metformin contraindicated).

Metformin is generally contra-indicated if the creatinine is raised to above 150 micromol/l. However, remember that a decision to treat with metformin cannot be solely based on the creatinine. Some patients may be more at risk of renal function being unstable and this needs to be taken into account when deciding about treatment. Renal function may be worse than is suggested from the creatinine in patients with low muscle mass and who are older.

### C. Required insulin infusion/GKI on CCU

As soon as the patient is able to eat, transfer to subcutaneous insulin (usual regime as per CCU Guidelines). If blood glucose is over 8 mmol/l before the next meal, increase the dosage rapidly; by approximately 30% (e.g. 12 to 16 units), or by 60% if blood glucose is over 12 mmol/l (e.g. 12 to 20 units). Increase bedtime Insulatard in step. The aim is to establish stable control rapidly - then do not change insulin dose often.

It is vital that carbohydrate intake is reasonably constant. It makes no sense to worry about a precise insulin dose but to ignore dietary considerations.

Requirement of intravenous insulin during an acute MI is no guide to long term need for insulin. See above points regarding the possible need for longer term insulin.

#### *Newly diagnosed diabetes*

- *If well controlled on diet ± oral agents ensure that the diabetes is highlighted in discharge summary for GP further management.*
- *If not well controlled or requiring insulin involve the Diabetes Team.*

- *Patients starting insulin who will be, or likely to be, remaining on this after discharge should be referred to the diabetes specialist nurse by telephoning (dect number 21855) (currently Jan Porter) as soon as possible. These patients will be reviewed 2 weeks after discharge in the 'insulin start clinic' where a decision about the need for long term insulin treatment will be made and appropriate ongoing diabetes care arranged.*

**Guideline updated by;**

Dr JS Skinner, Dr PC Adams, Prof R Taylor, Dr N Leech, August 2007

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