

Tayside Diabetes MCN Handbook

Management of Diabetes in Acute Coronary Syndrome

Diabetes Mellitus

Patients with type 1 and type 2 diabetes require special management when they present with acute coronary syndromes. Some patients, who are not previously known to have diabetes, can present with hyperglycaemia, so called “stress hyperglycaemia”. Patients not known to be diabetic but presenting with a laboratory blood glucose (BG) ≥ 11 mmol/L should also be treated in this way.

IV insulin infusion should be commenced for acute management in first 24-48 hours.

Patients with type 1 diabetes should continue their usual basal (long acting insulin) e.g. Lantus/Levemir daily to reduce the risk of diabetic ketoacidosis if IV insulin is interrupted.

Initial Management in first 24-48 hours

Insulin and glycaemic control

Add 50 units of soluble insulin (e.g. Actrapid) to 50 ml 0.9% NaCl (1 unit insulin / ml, thus 1 unit / hour = 1ml / hour). Infuse using a syringe driver.

Check a fingerpick BG level hourly during the day and 2 hourly once stable and at night. The aim to of management is to optimise glycaemic control (5-9 mmol/L) without hypoglycaemia. Consider 10% glucose infusion if BG remains < 6 mmol/L.

Prescribe insulin infusion as:

| BLOOD GLUCOSE | RATE OF INSULIN INFUSION | INTRAVENOUS FLUIDS 500 ml/ 12 hour |
|--------------------|--------------------------|---------------------------------------|
| > 16.0 mmol/L | 10 unit / hour | 0.9% NaCl |
| 12.1 – 16.0 mmol/L | 6 unit / hour | 0.9% NaCl |
| 10.1 – 12.0 mmol/L | 4 unit / hour | 0.9% NaCl |
| 8.1 – 10.0 mmol/L | 3 unit / hour | 0.9% NaCl |
| 6.1 – 8.0 mmol/L | 2 unit / hour | 0.9% NaCl |
| 4.1 – 6.0 mmol/L | 1 unit / hour | 10% Glucose |
| < 4.0 mmol/ | 0.5 unit / hour | 10% Glucose |

IV insulin pumps should never be switched off as the half life of IV insulin is < 3 minutes.

IV fluids

IV fluid should run through the same IV access as the insulin infusion. Infuse at least 500ml / 12 hours. The rate of infusion can be varied depending on the patient's fluid status. In cases of CCF or pulmonary oedema requiring fluid restriction the rate of IV fluid can be decreased to 500 ml / 24 hours.

Potassium

Serum potassium should be measured at entry to CCU and then at 6, 12 and 24 hours.

Potassium should be added to the IV fluid depending on the patient's serum K^+ . No potassium should be added if serum $K^+ > 4.9$ mmol/L or if there is renal impairment i.e. eGFR < 30 ml/min.

Subsequent management after 24-48 hours

Continue IV insulin for at least 24 hours or until clinically stable and tolerating fluids and diet. Use recent HbA1c to assess success of previous diabetes therapy i.e. last 3 and 6 month estimations (target HbA1c 6.5 - 7.5%).

Conversion to Insulin

Type 1 diabetes/ type 2 diabetes normally prescribed insulin:

- Restart usual subcutaneous (SC) insulin preparation and dose at suitable mealtime.
- Stop IV insulin one hour after subcutaneous insulin administration.
- Titrate dose to optimise glycaemic control

Type 2 diabetes with suboptimal HbA1c where oral medication cannot be increased or medication contraindicated. Consider conversion to insulin therapy.

- Calculate insulin dose by determining number of units of IV insulin required in the last 24 hours.
- E.g. if total 24-hour insulin requirements = 30 units, then prescribe as 20 units insulin before breakfast, 10 units insulin before tea. (Mixtard 30 or Novomix 30 are suitable insulin preparations).
- Start usual subcutaneous (SC) insulin at suitable mealtime.
- Stop IV insulin one hour after subcutaneous insulin administration.
- Titrate dose to optimise glycaemic control.

For further information, see Handbook sections **Treatment with Insulin** and **Adjustment of Insulin**

Conversion to oral medication

Type 2 normally prescribed oral medication

- Restart usually oral medication* at suitable mealtime then stop IV insulin.

Type 2 normally treated with healthy eating with suboptimal HbA1c

- Commence oral medication.
- Metformin is the usual 1st choice agent but for further information see Handbook section **Treatment with Oral Hypoglycaemic Agents**

***Metformin** should be avoided if there are any of the following: Grade III/IV heart failure, if eGFR is < 30ml/min (creatinine >150ummol/L) and/or liver failure. *If eGFR is 30-50ml/min reduce metformin dose by 50% or to maximum dose of 500mg BD.*

***Glitazones** (rosiglitazone, pioglitazone) should both be avoided if clinical heart failure or LV dysfunction is present. Rosiglitazone is contraindicated in patients with acute coronary syndrome and it should be avoided in patients with underlying IHD or PVD. For further information see www.emea.europa.eu/pdfs/human/press/pr/4223208en.pdf

***Sulphonylureas** (gliclazide, glipizide, glimepiride and glibenclamide) should be avoided in liver failure

Not previously known to have diabetes

Distinguish between diabetes and stress hyperglycaemia. Patients with a laboratory glucose greater than 11 mmol/L on admission probably have diabetes. If the plasma glucose is between 8.9 and 11 mmol/L then they may have diabetes or impaired glucose tolerance and if the admission plasma glucose is less than 8.9 mmol/L then they are unlikely to have diabetes.

A fasting blood glucose should be performed at least 48 h after admission in cases of doubt. If the fasting plasma venous glucose is < 6.0 mmol/L then no further action is required but those with a fasting plasma venous glucose ≥ 7.0 mmol/L have diabetes and will require dietary advice and/ or further treatment **prior to discharge**.

See Handbook section **Diagnosis of Diabetes** for further information

Lifestyle management and follow up

- Titrate insulin/ medication and optimise glycaemic control
- Provide diabetes information/ education
- Refer to Diabetes Specialist Nurse for specific advice
- Refer to dietician if newly diagnosed, treatment changed to insulin or for improvement of diabetes management.
- Refer to diabetes clinic with relevant background medical history (copy letter to Angus or PRI casenotes if the patient does not attend the diabetes clinic in Ninewells Hospital).
- Diabetes management information and patient leaflets available www.diabetes-healthnet.ac.uk
- Contact details for diabetes team
Ninewells Hospital - SpR Diabetes bleep 5416, Diabetes Specialist Nurse, ext 36009, bleep 4872
Perth Royal Infirmary – Specialist Nurse bleep 5288/5164

Management of Diabetes following Myocardial Infarction

For patients with diabetes and/or those with an admission glucose >11 mmol/l

INSULIN

IV Insulin should be administered for 24-48 h post MI to optimise glycaemic control with hypoglycaemia. Consider 10% glucose infusion if necessary to prevent blood glucose levels below 6 mmol/l. IV Insulin pumps should never be switched off. The half life of Insulin is less than 3 min. In patients with type I diabetes continue usual daily basal long acting Insulin e.g. Lantus/ Levemir to reduce the risk of DKA if IV Insulin is interrupted.

FLUIDS

IV fluids should run through the same IV access. Infuse at least 500ml of IV fluid / 12 h. If CCF or pulmonary oedema requires fluid restriction infuse IV fluid to 500 ml/ 24 h. Measure serum K⁺ at entry to CCU then at 6, 12, 24 h. KCl should be added to IV fluid depending on serum K⁺. Do not add KCl if serum K⁺ >4.9 mmol/L or if there is renal impairment.

50 units of soluble insulin e.g. actrapid in 49.5 ml 0.9% NaCl (1 unit/ml); infuse using a syringe driver
Blood glucose mmol/l

>16
12.1 - 16.0
10.1 - 12.0
8.1 - 10.0
6.1 - 8.0
4.1 - 6.0
<4.0

Rate of IV Insulin

10 units/h
6 units/h
4 units/h
3 units/h
2 units/h
1 unit /h
0.5unit/h

IV fluid
0.9% NaCl
0.9% NaCl
0.9% NaCl
0.9% NaCl
0.9% NaCl
10% glucose
10% glucose

Check hourly glucose (2 hourly overnight)

NOTE : modify insulin regimen if necessary to maintain optimum glycaemic control 5-9mmol/l without hypoglycaemia

When patient clinically stable, tolerating oral fluids and diet, plan ongoing diabetes management

Avoid Metformin in grade III/IV heart failure, creatinine>150 ummol/l and/or liver failure
Avoid Glitazones (rosiglitazone/ pioglitazone) in grade II/III heart failure and/or Liver failure
Avoid Sulphonylureas (glipizide, gliclazide, glimepiride, and glibenclamide) in liver failure

INSULIN treated Type I and Type 2 diabetes:
Restart usual subcutaneous Insulin at suitable mealttime; stop IV Insulin 1h later

ORAL MEDICATION treated Type 2 diabetes
Restart usual oral medication at suitable mealttime and stop IV Insulin. Review HbA1c; consider need for medication adjustment/ education

DIET treated Type 2 Diabetes
Review HbA1c and consider need for medication requirement/ education

New Diagnosis suspected
Distinguish between diabetes and stress hyperglycaemia (IV Insulin requirement \leq 1 unit/hr)
Recheck fasting venous glucose 48h after admission if in doubt

MAXIMUM ORAL MEDICATION and HbA1c >8% (in last 3 months)
Consider conversion to Insulin therapy

Specialist Registrar Diabetes
NW bleep 5416 PRI
Diabetes Specialist Nurse
NW 36009 bleep 4842 PRI
13476 bleep 5288/5164

For more information on the diagnosis of diabetes go to:
<http://darts.tayside.scot.nhs.uk/tayside/handbook/diagnosisofdiabeteshtm>

