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Who should read this document?

All medical and nursing staff involved in the management of acute stroke patients in Salford Royal Hospital.

Key Practice Points

- All stroke patients should have admission capillary blood glucose (CBG) and a HbA1c (glycated haemoglobin).
- Acute stroke patients with capillary blood glucose > 15mmol/l on a single occasion in the first 48 hrs should be started on variable rate insulin infusion (constituted as per hospital policy).
- The target blood glucose should be 4-11mmol/L in acute stroke patients.

Background

Hyperglycaemia is common in acute ischaemic stroke reported in up to 32% of patients without prior diabetes. Various studies have shown that hyperglycaemia is associated with poor outcome in stroke patients. This protocol is aimed to guide appropriate assessment and management of hyperglycaemia in acute stroke patients.

Policy/ Guideline/ Protocol

1. Protocol

1.1 Definition

In general, the normal range of glucose for most people (fasting adults) is 4 to 6 mmol/l.
Diabetes is diagnosed on the basis of history of polyuria, polydipsia and unexplained weight loss AND
- a random venous plasma glucose concentration ≥ 11.1 mmol/l
- OR a fasting plasma glucose concentration ≥ 7.0 mmol/l

1.2 Effects of hyperglycaemia on stroke outcome

Most studies on association between acute stroke and hyperglycaemia have shown that admission hyperglycaemia in patients with or without diabetes are associated with a worse clinical outcome than in patients without hyperglycaemia especially in patients with non-lacunar type of stroke. Hyperglycaemia can exacerbate brain injury by various mechanisms such as by provoking anaerobic metabolism, lactic acidosis, free radical generation and increased permeability of blood-brain barrier.
1.3 Causes of Hyperglycaemia in acute stroke

A third of acute stroke patients have either diagnosed or newly diagnosed diabetes but a significant proportion of patients have stress hyperglycaemia mediated partly by release of cortisol and norepinephrine. Acute hyperglycaemia has a more adverse impact on outcomes in patients without prior diabetes than in those with diabetes.

1.4 Monitoring and treatment of hyperglycaemia (Appendix 1)

To date only one randomised control trial - The United Kingdom Glucose Insulin in Stroke Trial (GIST-UK) which investigated the effects of glycaemia control in stroke outcome found no clinical benefit but was underpowered and had problems with design of the trial like the intervention was too brief to have a lasting effect. Despite this, various guidelines support treatment of hyperglycaemia in stroke patients.

NICE 2008 stroke guidelines recommend that glucose levels above 11mmol/l following stroke should be treated and blood glucose should be maintained between 4-11 mmol/l. The RCP (Royal College of Physicians), 2012 stroke guidelines state the same thresholds.

Standards

- All stroke patients should have admission capillary blood glucose (CBG/BM) and HbA1C (glycated haemoglobin).
- Stroke patients with blood glucose >15mmol/L on one occasion should be started on variable rate insulin infusion and dextrose saline for first 48 hours (constituted as per hospital policy- VRII chart, STOCK CODE G12020606WZA462).
- All type 1 diabetics unable to swallow should be started on VRII.
- Continue long acting insulin if patient is already taking it.
- Aim to keep glucose within target range of 4-11 mmol/l.
- Monitor glucose hourly if patient on VRII otherwise 4-6 hourly.
- Monitor for DKA and hypoglycaemia and treat as per hospital policy if occurs. (http://intranet.srht.nhs.uk/policies-resources/trust-policy-documents/trust-wide-clinical/gen/twcg4112/).
- Transfer from VRII to subcutaneous insulin or oral treatment once patient eating and drinking or being NG feed.
- Involve the diabetic inpatient team/diabetic specialist nurse at the earliest opportunity.
- Inform GP if HbA1C is between 42 and 47mmol/mol in non-diabetic patients on discharge.
Explanation of terms & Definitions

Terms explained in the document

Roles and responsibilities

Stroke service ward managers and consultants to ensure all medical and trained nursing staff is familiar with, and comply with this policy, in accordance with agreed competencies set-out for nursing and medical staff.
Appendix 1: Management of hyperglycaemia in Acute Stroke Patients

Acute stroke – check HbA1c and CBG
Target CBG 4-11mmol/L

Known to have diabetes

If eating: Monitor BG levels QDS and continue usual diabetes medications
If eating (type 2): Stop diabetic medications and monitor BG levels QDS
If not eating (type 1): Continue basal insulin and start variable rate insulin infusion (VRII) + IV dextrose saline as per the trust policy.

CBG < 11mmol/L

If CBG > 15 mmol/L on one occasion in first 48hrs
Start VRII

If CBG 11 - 15 mmol/L repeat within 2 hours and then QDS for first 48hrs

Not known to have diabetes

If HbA1c < 48mmol/mol - no further action needed
(inform GP if HbA1c 42-47mmol/mol)

If HbA1c > 48mmol/mol
Monitor CBG 12hrly

If CBG 11-15 mmol/L on any 2 consecutive occasions within the first 48hrs
If eating: increase doses of diabetes medication or add extra diabetes medication.
If not eating: start VRII with IV dextrose saline
(Continue basal insulin as well if applicable).
After 48hrs, if nutritional intake adequate (oral or enteral) and HbA1c < 65mmol/mol start usual diabetes medication
If HbA1c > 65mmol/mol request specialist diabetes input

If CBG > 15 mmol/L on one occasion in first 48hrs
Start VRII

If eating: Start an oral diabetes medication and request specialist diabetic input.
If not eating: start VRII with IV dextrose saline.
After 48hrs, if nutritional intake adequate (oral or parenteral) request specialist diabetes input

If CBG < 11mmol/L

Not known to have diabetes

Find HbA1c

If eating: Monitor BG levels QDS and continue usual diabetes medications

If HbA1c > 48mmol/mol

If eating: increase doses of diabetes medication or add extra diabetes medication.
If not eating: start VRII with IV dextrose saline.
After 48hrs, if nutritional intake adequate (oral or parenteral) request specialist diabetes input

CBG = capillary blood glucose
QDS monitoring = before each meal and before bed
** Patients may need insulin adding into treatment plan

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Current Version is held on the Intranet
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