Hyperglycaemia in Adult Inpatients with Diabetes – including Decision Support Tool UHL Guideline

University Hospitals of Leicester NHS
NHS Trust

Trust ref: B27/2019

1. Introduction and Who Guideline applies to

1.1 This guideline details the management of hyperglycaemia (capillary blood glucose >12mmol/l) in adult inpatients admitted to ward-based clinical areas in UHL. The guidance is applicable for both medical and nursing staff working in these areas.

2. Guideline Standards and Procedures

2.1 This guideline sets out in a flowchart (see appendix 1) an approach to managing hyperglycaemia for all adult inpatients admitted to adult inpatient wards in UHL.

2.2 If staff are unsure regarding the management of such patients despite referral to the guidance then they should seek advice from the specialist diabetes team or a senior colleague.

2.3 The Diabetes specialist nurse team can be contacted via ICE (electronic referral) or via switchboard (mobile phone) and this is a 7 day service 9-5pm at LRI and Mon-Fri 9-5pm at LGH and GGH. Diabetes SpR on-call via switch board Mon-Fri 9-5pm. Out of hours medical advice should be via the medical SpR on-call via switchboard.

3. Education and Training

All medical and nursing staff are required to complete essential to role Insulin Safety training. This training can be accessed via HELM and is renewable on a yearly basis.

4. Monitoring Compliance

Element to be monitored	Lead	Tool	Frequency	Reporting arrangements
Implementation of this guidance in appropriate areas.	Dr S Setty Kat Ryan Helen Atkins	Case note reviews, datix incident reporting, Inpatient diabetes dashboard	Continuous	Report to the Diabetes Inpatient Safety Committee monthly.

5. Supporting References

None required.

6. Key Words

Hyperglycaemia, Diabetes, Adult inpatients

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title): Dr Setty, Clinical Lead for Inpatient Diabetes Care.	**Executive Lead:** Andrew Furlong, Medical Director
Details of Changes made during review: Trurapi added as alternative to Novorapid.	

ADULT INPATIENT

DIABETES DECISION SUPPORT TOOL

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Management of Hyperglycaemia - High Capillary Blood Glucose Levels (CBGs) in Patients With Diabetes

- **Pre-meal blood glucose (CBG) >12 mmol/L** – review patient and CBG readings. Check CBG pre-meal and bedtime as minimum
- **Check for ketones (blood capillary ketone test)** in **ANY** patient known to have diabetes who is clinically unwell or in patients who are clinically well **if CBG >18mmol/l**
- **Look for the cause** – consider inter-current illness, sepsis, missed/incorrect dose of oral hypoglycaemic agents or insulin/steroids/NG feeds
- **Doctor to review patient and advise treatment according to below:**

Patient clinically UNWELL

Sepsis/vomiting/NOT eating or drinking OR capillary ketones ≥1.5 mmol/L or urinary ketones ≥++

Check U&E, venous pH and bicarbonate, laboratory glucose (+/- osmolality)

Capillary blood ketones >3mmol/L
AND
bicarbonate <15 or pH <7.3

YES → **Manage as Diabetic Ketoacidosis (DKA)**
See DKA guideline & use DKA treatment chart

NO

Patient hypovolaemic
- Osmolality >320mOSM/kg **OR** CBG >30mmol/L
- Capillary blood ketones <1.5mmol/L

YES → **Manage as Hyperglycaemic Hyperosmolar State (HHS)**

NO

Patient NOT DKA or HHS

YES → **IV Variable Rate insulin (VRIII)**
Look for inter-current illness

Patient clinically WELL

Eating and drinking, capillary ketones <1.5mmol/L or urinary ketones negative or +

CBG >18 mmol/L

YES

- Assess pre-meal CBG profile
- Review treatment regime and increase if required (see insulin dose titration decision support tool)
- Consider giving single dose of 2-6 units Rapid acting insulin e.g. Novorapid/Trurapi* *(see PRN insulin dose guidance overleaf)*
- Check CBG after 2hrs and 4hrs
- If at 4hrs CBG remains >18mmol/L, doctor to review PRN insulin dose
- If after 2 consecutive PRN insulin doses CBG remains >18mmol/L doctor to re-assess patient and consider transfer to IV variable rate insulin (VRII)

* If you use PRN doses of insulin to reduce high CBG, you **MUST** also review the usual diabetes treatment

NO → **CBG >14 mmol/L for 24 hours or >12 mmol/L for 48 hours?**

YES

Observe

Increase doses of oral agents or insulin doses
(see insulin dose titration decision support tool)

Refer to the diabetes team if any concerns, contact:
- **DSN via ICE**
  (Mon-Fri 9am-4pm, incl Sat/Sun 9am-4pm LRI site)
- **Diabetes SpR**
  via switchboard (Mon-Fri 9am-5pm)
- **Out of hours**
  Medical SpR on call via switchboard

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PRN INSULIN DOSE GUIDANCE FOR PATIENTS WITH DIABETES WHO ARE CLINICALLY WELL AND CBG >18mmol/L

- **Standard CBG target** For inpatients with diabetes **6-10 mmol/l (4-12mmol/l acceptable)**
- **Conservative CBG target:** Frail older patients 6-10mmol/l, moderate/severe frailty and end of life 6 -15mmol/l.
- **Guidance for PRN insulin doses** Given in table (below right).
  For patients with conservative target range consider reducing PRN insulin dose to avoid hypoglycaemia.

Note: As a guide, 1 unit of rapid acting insulin will reduce CBGs by 3mmol/L

Caution: Some patients with type 1 diabetes, particularly if slim, newly diagnosed or on very small amounts of regular insulin, are very sensitive to insulin.
Review PRN insulin dose in context of their usual insulin dose, use PRN insulin doses with caution.

CBG (mmol/L)	PRN insulin dose (units)
18.1-25	4
≥ 25.1	6

THINK Does this patient need a PRN insulin dose? Consider on an individual patient basis.

If NO: Doctor to document

If YES: Doctor to prescribe PRN dose of Novorapid®/Trurapi® 2-6 units subcut max frequency 4 hrly on the 'as required' section on Nerve Centre
(in elderly or frail patients avoid PRN doses at bedtime (increased risk of hypoglycaemia)

Review PRN dose daily as PRN insulin doses can increase risk of hypoglycaemia.

***Note to nursing staff**

Annotate on the **Nerve Centre** the **ACTUAL** number of units administered and repeat CBG at 2 and 4 hrs after PRN insulin dose.

If NO PRN doses required in 48hr period:
- **STOP PRN** rapid acting Insulin

If <2 PRN doses given in 48hr period:
- **CONTINUE PRN** insulin and
- Review daily
- Refer to diabetes team via ICE if any concerns.

If PRN doses given daily in 48 hr period:
- **Doctor to review insulin** +/- other diabetes medication
- Increase doses of insulin
  (see insulin titration decision support tool)
- Refer to diabetes team via ICE

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