Hyperglycaemia in Adult Inpatients with Diabetes - including Decision Support Tool UHL Guideline approved by PGC on 21.6.19 Trust ref: B27/2019 next review June 2022

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 (capillary or urine) 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 ketones >3 mmol/L
(urinary ketones ≥ ++) AND bicarbonate <15 or pH <7.3

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

Patient hypovolaemic
- Osmolality >320 mOsm/kg
- CBG >30 mmol/L
- Urinary ketones negative or + (capillary ketones <1.5mmol/L)

Manage as Hyperglycaemic Hyperosmolar State (HHS)

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

Patient NOT DKA or HHS

Patient clinically **WELL**
Eating and drinking, capillary ketones <1.5mmol/L or urinary ketones negative or +

CBG >18 mmol/L

- 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 Novorapid*
  (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

CBG >14 mmol/L for 24 hours or >12 mmol/L for 48 hours?

- NO
  - Observe
- YES
  - 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-5pm, incl Sat/Sun 9am-5pm LRI site)
- Diabetes SpR
  via switchboard
  (Mon-Fri 9am-5pm)
- Out of hours
  Medical SpR on call via switchboard

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

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**DIABETES DECISION SUPPORT TOOL**

**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 7.8-10mmol/l, moderate/severe frailty and end of life 7.8-15mmol/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 Novorapid will reduce CBG 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.

<table>
<thead>
<tr>
<th>CBG (mmol/L)</th>
<th>PRN insulin dose (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1-25</td>
<td>4</td>
</tr>
<tr>
<td>≥ 25.1</td>
<td>6</td>
</tr>
</tbody>
</table>

**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 2-6 units subcut max frequency 4 hrly on the ‘as required’ section of the ‘green chart’ (Adult Insulin Prescribing and Glucose Monitoring Chart)
  • Review PRN dose daily as PRN insulin doses can increase risk of hypoglycaemia.

*Note to nursing staff*

Annotate on the ‘green chart’ the ACTUAL number of units administered and repeat CBG at 2 and 4 hrs after PRN insulin dose.

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**If NO PRN doses required in 48hr period:**
- STOP PRN Novorapid 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
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

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Lead</th>
<th>Tool</th>
<th>Frequency</th>
<th>Reporting arrangements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of this guidance in appropriate areas.</td>
<td>Dr Kath Higgins, Helen Atkins, Julia Ball</td>
<td>Case note reviews, datix incident reporting, Inpatient diabetes dashboard</td>
<td>Continuous</td>
<td>Report to the Diabetes Inpatient Safety Committee monthly.</td>
</tr>
</tbody>
</table>

5. Supporting References

None required.

6. Key Words

Hyperglycaemia, Diabetes, Adult inpatients