1. Introduction and Who Guideline applies to

1.1 This guideline details the management of hyperglycaemia (capillary blood glucose >12mmol/l) in adult patients presenting to ED and admissions areas in UHL. This includes patients with and without a known diagnosis of diabetes. 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 series of flowcharts (see appendix 1) an approach to managing hyperglycaemia for all adult patients assessed in ED and the adult assessment areas.

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 Kath Higgins, Dr Kate Russ, Helen Atkins, Kerry Johnston	Case note reviews, datix incident reporting	Continuous	Report to the Diabetes Inpatient Safety Committee bi-annually.

5. Supporting References

None required.

6. Key Words

Hyperglycaemia, Emergency, Admissions Unit, Diabetes

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title): Dr Kath Higgins, Clinical Lead for Inpatient Diabetes Care.	**Executive Lead:** Andrew Furlong, Medical Director
Details of Changes made during review: None.	

Emergency Department (ED) and adult assessment areas

Management of Hyperglycaemia - Capillary blood glucose (CBG) >12 mmol/L "at the frontdoor"

Contents:

ADULT

DIABETES DECISION SUPPORT TOOL

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Rule out DKA/HHS

DKA/HHS excluded

- Monitor capillary blood glucose (CBG) 2 hourly check
- Check blood ketones
- Check venous glucose
- HbA$_1$C

Clinical picture of type 1 diabetes
- younger age
- weight loss
- short duration of symptoms
- thirsty & tired
- polyuria

Go to page 2

Clinical picture of type 2 diabetes
- older age
- long duration of symptoms
- obese
- south asian
- family history

DKA/HHS confirmed

- See DKA / HHS guideline and use DKA / HHS treatment chart
- Refer to diabetes team

WELL

- CBG persistently > 12 mmol/L
- ketones **<0.6mmol/L**)

- Confirm diagnosis of diabetes (see page 8)
- start metformin 500mg bd (if metformin contraindicated start Linagliptin 5mg od)
- if osmotic symptoms +/- BMI <25 add either gliclazide 40mg bd or basal insulin 8 units bd to metformin
- **If unsure seek specialist advice**

All further **CBG <12 mmol/L**

- Likely stress hyperglycaemia (see page 8)

Refer to GP

Ensure discharge letter to GP includes all relevant information as patient will require further follow-up by GP

UNWELL (e.g. vomiting, sepsis)

- Monitor CBG hourly and if persistently > 12 mmol/L (2 or more consecutive readings) initiate variable rate IV insulin infusion (VRIII) with concurrent substrate/dextrose containing IV fluids.
- Refer to diabetes team

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

Confirming a diagnosis of diabetes - see guidance notes - page 8

1

Remains Fit for Purpose & meets Legislative Requirements
Next review: April 2025 6 Month Extension Granted at PGC Oct 2024
Management of Hyperglycaemia at the front door: ED and Adult Assessment Areas - Adults
approved by Policy and Guideline Committee on 17 May 2019 Trust ref: B23/2019

Hyperglycaemia (CBG > 12 mmol/L) - Patient NOT KNOWN to have Diabetes "at the front door"

Clinical picture of type 1 diabetes and DKA excluded

CBG persistently >12mmol/L (2 or more

Ketones <0.6

WELL

UNWELL (e.g. vomiting, sepsis)

- Fluids – oral or IV
- Initiate basal insulin (see page 5)

Discharge with next working day Diabetes clinic appointment

Ketones 0.6 -1.5

WELL

UNWELL (e.g. vomiting, sepsis)

Ketones 1.6 -3.0

WELL

UNWELL (e.g. vomiting, sepsis)

Ketones >3.0

Risk of DKA
Check VBG
Likely to need admission

DKA excluded

DKA confirmed

UNWELL (e.g. vomiting, sepsis)

WELL

- Treat as per DKA protocol
- Refer to diabetes team

- Initiate VRIII with concurrent substrate/dextrose containing IV fluids
- Refer to diabetes team
- Initiate basal insulin (see page 6)

- Senior review
- Consider VRIII

- Fluids – oral or IV
- PRN insulin dose (see page 6)
- Initiate basal insulin (see page 6)
- Repeat CBG 2 hourly
- Repeat blood Ketone 2 hourly

If Ketones remain >1.5

When blood Ketone <0.6

Refer to the diabetes team if any concerns:

- **DSN referral via ICE** (9am–5pm everyday, incl Sat/Sun LRI site)
- **Diabetes SpR** via switchboard (Mon–Fri 9am–5pm)
- **Out of hours** Medical SpR on call via switchboard

Confirming a diagnosis of diabetes - see guidance notes - page 8

Hyperglycaemia (CBG > 12 mmol/L) - Patient KNOWN to have Diabetes "at the front door"

Rule out DKA/HH

DKA/HHS excluded

- Monitor capillary blood glucose (CBG) 2 hourly check
- Check blood ketones
- Check venous glucose
- HbA_1C

UNWELL
(vomiting, not eating or drinking, sepsis or blood ketones > 1.5)

- Initiate VRIII with concurrent substrate/dextrose containing IV fluids
- Refer to diabetes team
- Review usual diabetes treatment
- Metformin, SGLT2 inhibitors and GLP1 agonists should be stopped if patients are acutely unwell
- Background insulin may be continued with VRIII

Caution – Do not omit insulin in patients with type 1 diabetes due to risk of DKA

WELL

- Initiate/ prescribe usual diabetes treatment if no contraindications

CBG >18 mmol/L

YES

- Assess CBG profile
- Review treatment regime and increase if required (see insulin dose titration decision support tool on INsite)
- Consider giving single dose of 2-6 units Novorapid* (see PRN insulin dose guidance page 6)
- 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 or Ketones >1.5 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 >12mmol/L for 48 hours?

YES

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

NO

Observe

DKA/HHS confirmed

- See DKA/HHS guideline and use DKA/HHS treatment chart
- Refer to diabetes team

Refer to the diabetes team if any concerns, contact:

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Hyperglycaemia (CBG > 12 mmol/L) - Patient KNOWN to have Diabetes "at the front door"

Insulin treated patients who attend ED without their insulin

1

- Insulin brands/s and doses known – every effort should be made to obtain correct insulin from either pharmacy or AMU insulin fridge.
- If insulin brand/s and doses known but insulin not available refer to the Emergency Insulin Substitution chart overpage (page 5). This chart should also be displayed on the AMU insulin fridge door. When usual regime identified transfer patient to usual regime when appropriate.

2

- If insulin brand/s and doses unknown – manage patient according to "Hyperglycaemia (CBG>12mmol/l) in ED – patient NOT KNOWN to have diabetes – clinical picture of type 1 diabetes" (page 2). This will ensure patients with type 1 diabetes who present without any insulin history do not develop DKA in ED.
- Refer to diabetes team.
- When usual regime identified transfer patient to usual regime when appropriate.

Emergency Insulin Substitution chart

- For use when patients regular insulin is unavailable.
- Compatible substitute insulins are kept as stock on AMU.
- Please reduce the dose of substitute insulin by 10%.

Action	Name of usual Insulin	Compatible substitute insulin
Ultra-rapid acting	Fiasp	Novorapid
Rapid acting	Apidra	Novorapid/Humalog
	Humalog(100units/ml)	Novorapid
	Humalog(200units/ml)	Humalog (100units/ml)/Novorapid
	Novorapid	Humalog
Short acting	Actrapid	All wards keep Actrapid as stock
	HumulinS	Actrapid
	HypurinPorcineneutral	Actrapid
	InsumanRapid	Actrapid
Intermediate acting	HumulinI	Insuman Basal
	HypurinPorcineIsophane	HumulinI/InsumanBasal
	Insulatard	HumulinI/InsumanBasal
	InsumanBasal	Humulin I
Rapid/Intermediate Mix	HumalogMix25	Novomix 30/Humulin M3
	HumalogMix50	Novomix 30/Humulin M3
	Novomix30	HumulinM3
Short/Intermediate Mix	HumulinM3	Novomix 30
	HypurinPorcine30/70Mix	Humulin M3/Novomix 30
	InsumanComb15	HumulinI/InsumanBasal
	InsumanComb25	Humulin M3/Novomix 30
	InsumanComb50	Humulin M3/Novomix 30
Long acting	Abasaglar	Lantus
	Lantus	Abasaglar
	Levemir	Abasaglar/Lantus
	Semglee	Lantus
	Toujeo(300units/ml)	Abasaglar/Lantus/Tresiba
	Tresiba(100units/ml)	Abasaglar/Lantus
	Tresiba(200units/ml)	Tresiba(100units/ml)/Abasaglar/Lantus/Toujeo

Hyperglycaemia (CBG > 12 mmol/L) - "at the front door" - guidance notes

Oral fluids = One litre of water or sugar free squash over 1 hour, repeat once if required.

Metformin – do not start if eGFR <45

Basal insulin – for clinical picture of type 2 diabetes – either Insuman Basal or Humulin I sc 8 units bd.
For clinical picture of type 1 diabetes – Levemir sc 8 units bd.

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. Avoid hypoglcyaemia (CBG <4.0)

PRN insulin doses:

- **Guidance for PRN insulin doses** given in table (below).
  For patients with conservative target range consider reducing PRN insulin dose.

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, are very sensitive to insulin. Review PRN insulin dose in context of their usual insulin dose, use PRN insulin doses with caution – can result in hypoglycaemia*

Note to nursing staff

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

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

- If CBG remains > 18mmol/L at 4 hrs repeat PRN insulin dose
- If after 2 consecutive PRN insulin doses CBG remains > 18mmol/L doctor to assess patient and consider transfer to VRIII
- Max frequency PRN insulin dose is four hourly

* If hypoglycaemia occurs treat immediately using the Hypoglycaemia treatment algorithm

Hyperglycaemia (CBG > 12 mmol/L) - "at the front door" - guidance notes continued

Senior review – ensure all patients with confirmed or possible type 1 diabetes, unwell or being discharged directly from E.D. have a senior ED medical review within the department. Senior medical review if discharging/admitting from adult assessment areas.

How to book an appointment in Diabetes clinic
Ring extension 4919 and leave patient details and reason for clinic appointment.

NOTE: if patients require same day review – these patients should be referred directly to DSN via ICE or to Diabetes SpR/Medical SpR on-call.

Patients who use a continuous subcutaneous insulin infusion (CSII) or insulin pump – assess patient, assessment should include CBG, blood ketones and VBG and initiate appropriate management depending on well/unwell. If DKA confirmed treat as per DKA protocol. If not DKA but unwell start alternative insulin (VRIII). If requires treatment for DKA or VRIII remove insulin pump and tubing when IV insulin treatment initiated. If well assess patient, establish with patient if any concerns regarding function of pump, if no concerns continue pump at basal rate, if PRN doses of insulin required patient is likely to be able to administer via the pump and increase basal rate accordingly. If concerns regarding function of pump, or competency of the patient to self manage, then refer patient urgently to diabetes team for review (medical SpR out of hours), initiate alternative insulin regime immediately (example alternative s.c insulin regime would include s.c Levemir b.d and s.c Novorapid with meals). Insulin pumps should be discontinued 60 mins after initiation of s.c Levemir and 2 hourly CBG and blood ketone measurement in ED to prevent DKA developing.

If insulin pump and tubing removed give to relative or patient for safe keeping. CSII costs £4,000 to replace.

Abbreviations used:

ED	emergency department
CBG	capillary blood glucose
VBG	venous blood gas
DKA	diabetic ketoacidosis
CSII	continuous subcutaneous insulin infusion
HHS	hyperosmolar hyperglycaemic state
VRIII	variable rate iv insulin infusion
GPAU	GP assessment unit
PRN	per required need
AMU	acute medical unit
CDU	Clinical Decisions Unit.

Refer to the diabetes team if any concerns, contact:

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- **Diabetes SpR** via switchboard (Mon–Fri 9am–5pm)
- **Out of hours** Medical SpR on call

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ADULT

DIABETES DECISION SUPPORT TOOL

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Hyperglycaemia (CBG > 12 mmol/L) - "at the front door" - guidance notes

Confirming a diagnosis of diabetes. Hyperglycaemia in patients who are acutely unwell falls into 3 categories:

- Patients already **KNOWN** to have diabetes (type 1 or type 2)
- Stress hyperglycaemia – transient and normalises after discharge
- Patients **NOT KNOWN** to have diabetes who are presenting with a new diagnosis of diabetes. Diabetes persists following discharge.

WHO diagnostic criteria for diagnosing diabetes:-

1. **Diabetes symptoms plus:**
   - random venous plasma glucose ≥ 11.1 mmol/L

   OR
   - fasting venous plasma glucose ≥ 7.0 mmol/L

OR

2. **If no symptoms, at least 2 confirmatory blood tests required taken on seperate days**

OR

3. **HbA_1C >6.5% / 48 mmol/L and symptoms present. If HbA_1C >6.5% and no symptoms, patient is at risk of diabetes and needs follow-up with GP.**

If patients are unwell or have possible type 1 diabetes then diagnosis likely to be confirmed in hospital.

If patients are well and have possible type 2 diabetes diagnosis may be confirmed at follow-up with GP.

Refer to the diabetes team if any concerns, contact:

- **DSN referral via ICE** (9am-5pm every day, incl Sat/Sun 9am-5pm LRI site)
- **Diabetes SpR** via switchboard (Mon-Fri 9am-5pm)
- **Out of hours** Medical SpR on call

8