

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

For use in:	Cringleford & Langley Wards & Clinical Investigation Unit
By:	Registered nurses and medical staff on Cringleford & Langley Wards
For:	Adult patients suspected of having spontaneous hypoglycaemia
Division responsible for document:	Medical Division
Key words:	72 hour fast, hypoglycaemia, blood glucose meter, lab glucose, insulin, c-peptide
Name and job title of document author:	Sister Sondra Gorick, Endocrine Specialist Nurse
Name and job title of document author's Line Manager:	Tanya Moon, Matron
Supported by:	Dr R Ahluwalia, Clinical lead for Endocrinology
Assessed and approved by the:	Clinical Guidelines Assessment Panel (CGAP) If approved by committee or Governance Lead Chair's Action; tick here <input checked="" type="checkbox"/>
Date of approval:	06 October 2016 Reapproved 27/04/2020 Current extension granted from 30/08/2022 until 28/02/2023
Ratified by or reported as approved to:	Clinical Safety and Effectiveness Sub-Board
To be reviewed before: This document remains current after this date but will be under review	06 October 2019 Previous extension Granted Until 27/04/2021 Current extension granted from 30/08/2022 until 28/02/2023
To be reviewed by:	Sondra Gorick
Reference and / or Trust Docs ID No:	JCG0329 ID No: 1460
Version No:	2.2
Compliance links:	None
If Yes – does the strategy/policy deviate from the recommendations of NICE? If so why?	N/A

This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

Version and Document Control:

Version Number	Date of Update	Change Description	Author
2.2	27/04/2020	1-year extension given due to Covid-19 Current extension granted from 30/08/2022 until 28/02/2023	Sondra Gorick

This is a Controlled Document

Printed copies of this document may not be up to date. Please check the hospital intranet for the latest version and destroy all previous versions.

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

Quick reference guideline

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

Objective

To enable patients to have a 72 hour fast test performed safely and efficiently by an Endocrine Specialist Nurse, Registered Nurses and medical staff on Cringleford and Langley wards.

Rationale

The 72-hour fast is used in adults to elicit evidence of genuine spontaneous hypoglycaemia (that is a plasma glucose of less than 2.2 mmol/L) and to establish an underlying cause such as pancreatic islet cell tumour (insulinoma) by measurement of insulin and c-peptide during hypoglycaemia. It also aims to exclude iatrogenic and factitious hypoglycaemia. Most patients with islet cell tumours develop symptoms of neuroglycopenia well within 24 hours and the blood glucose level invariably falls to less than 2.2 mmol/L. However, internationally it is felt that to absolutely exclude spontaneous hypoglycaemia, a 72 hour fast is the 'Gold Standard'. By 24 hrs, 66% insulinomas develop hypoglycaemia and by 48 hrs, >95% insulinomas can be diagnosed. After 72 hrs fast plus exercise, if no hypoglycaemia, insulinoma is very unlikely, (Hammersmith Hospital 2005).

Broad recommendations

- The test should be carried out by blood and urine sampling, in hospital, and under strict supervision.
- Consider and exclude where possible other causes of hypoglycaemia such as:
 - Reactive hypoglycaemia
 - Addison's disease
 - Hypopituitarism
 - Severe liver disease
 - Malignancy e.g. Sarcoma
 - Exogenous insulin or oral hypoglycaemic agents
- The test will be performed only on patients referred by an Endocrine Consultant or Specialist Registrar. **Other referrals will not be accepted.**

Patient Exclusions

The test will not be carried out in:

- Children aged less than 16 (refer to Paediatricians)
- Pregnant women
- End stage disease; this should be pre determined by the referring Consultant

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

If in doubt about the safety of performing this test on a patient the Endocrine Specialist Nurse or other registered nurse should discuss concerns with the referring doctor or the Specialist Registrar.

Procedure

see Care Plan – Appendix 1

- To facilitate easy and accurate blood sampling and to allow administration of intravenous glucose during severe hypoglycaemia, insertion of an IV cannula at the start of the fast should be considered. This will be based on clinical judgement of the likelihood of severe hypoglycaemia.
- Patient is given nothing to eat or drink except water from the time of their admission and time at which the fast start is recorded.
- Non essential medication should be suspended for the duration of the test. The decision of what medication can be safely suspended should be made in advance of the admission by the referring clinician. All other medication should be given as prescribed with water.
- The patient should be moderately active and not confined to bed; however they should not leave the ward area unsupervised.
- All finger prick and lab glucoses and patients symptoms to be recorded on the specific 72 hour fast care plan; Appendix 2. This will facilitate easy reading of all results by clinicians
- 2 hourly capillary blood glucose is taken using a standard blood glucose meter throughout the test.
- The Endocrine Specialist Nurse will organise some laboratory request forms and bottles for blood samples to be collected in advance of the test starting. These will be available for use by the nurse or doctor attending to the patient.
- Blood is collected at intervals throughout the days and nights of the fast for glucose and insulin/c-peptide (Appendix 1) adhering to the following instructions :
 1. Samples are taken every six hours unless the patient becomes symptomatic, or hypoglycaemic. A grey tube is taken for venous glucose, a green lithium heparin tube is taken for insulin and c-peptide. A yellow tube should also be taken at the start of the fast for insulin antibodies unless this has already been performed by the requesting clinician. However send the sample for insulin antibodies only when lab glucose confirmed below 2.2 mmol/L. Near patient testing of hydroxybutyrate is available via the Endocrine Specialist Nurses. This “ketone testing” should be performed and documented twice daily at baseline then 08.00 and 17.00 and at the end of the fast. All samples must be taken to the laboratory to be centrifuged and plasma stored immediately.
 2. If capillary glucose is <2.8 mmol/L at any time, or the patient has symptoms of hypoglycaemia, take blood urgently into a grey and green bottle, but continue fasting the patient. The grey bottle should be sent to the laboratory for urgent glucose, and bedside ketone testing should also be performed (or a yellow topped blood sample taken for subsequent processing). A green lithium heparin sample must also be filled with venous blood and taken straight to the lab for

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

centrifuging. **Only if the laboratory glucose is confirmed as below 2.2 mmol/L can the fast be terminated, and the specimen processed for insulin and C peptide measurement.** Green request form should state LITHIUM HEPARIN SAMPLE FOR URGENT CENTRIFUGING. PLASMA TO BE FROZEN FOR INSULIN & C-PEPTIDE MEASUREMENT.

3. If the patient becomes symptomatic, or their meter capillary glucose starts to fall, increase the frequency of testing as below. Send venous samples to the lab if bedside testing is <2.8mmol/L. If the lab glucose is between 2.2-2.6mmol/L, continue sampling every 15-30 minutes. If the lab glucose is between 2.6-2.8mmol/L, continue sampling every 1-2 hours unless they become symptomatic. If the lab glucose is above 2.8mmol/L, continue 6 hourly monitoring.

Stopping the fast

- If biochemistry confirms a **laboratory blood glucose of 2.2 mmol/L or less** and the patient is symptomatic, then the fast can be stopped and the patient fed. However before this; **please ensure that blood ketones have been tested, and that a spare sample in lithium heparin and a yellow topped tube has been taken and dealt with as below**
- If 72 hours have elapsed and the patient has not become hypoglycaemic or symptomatic the fast can be terminated
- At the end of the fast, collect samples for plasma glucose, insulin, c-peptide, for the laboratory
- If the patient has a confirmed blood glucose of <2.2mmol/L a urine sample should be sent to biochemistry for a subsequent sulphonylurea screen. A separate WebICE request should be made for this
- After these samples have been taken, proceed to a Glucagon test only if requested by the referring clinician. Administer IV glucagon 1.0mg and measure plasma glucose in a grey tube at 5, 10, 20 and 30 minutes
- The patient can then be given fruit juice, a carbohydrate meal, oral glucose or intravenous glucose as appropriate

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

Urgent glucose and lithium heparin samples

1. Immediately deliver samples to Pathology Laboratory (Level 1 East Block)
2. Ask for samples to be processed urgently, if reception staff unable to help ask to speak to MLSO or if out of hours; ring the bell for on call biochemist. If they do not come to hatch bleep them using the number on the board for urgent blood gases.
3. Tell them these are the urgent samples for insulin and c-peptide, which require immediate centrifuging and freezing.

Decreasing lab glucose but not reaching <2.2mmol/L

If glucose falls but has not reached <2.2 mmol/L, increase frequency of a standard blood glucose meter measurements and frequency of venous glucose sampling. This may be as often as every 10-15 minutes. The aim is to capture the moment when the glucose is <2.2mmols/L with symptomatic hypoglycaemia, but not to continue the test until the patient becomes comatose. Do not reverse the fast with a carbohydrate meal, oral glucose or intravenous glucose until you are sure that the glucose is low enough, confirmed by, laboratory glucose and blood has been taken into a green lithium heparin tube.

Dealing with Symptomatic Hypoglycaemia

Always make sure that the blood samples have been collected, bedside ketones tested, and hypoglycaemia <2.2mmol/l documented by the laboratory before ending the fast. Once the blood has been taken, follow the trust standard hypo protocol as below:

<http://nnvmwebapps01/TrustDocs/Doc.aspx?id=1337>

Mild hypoglycaemia – patient conscious and able to swallow

If the patient is able to eat and drink, give them fruit juice and food (15-20g oral carbohydrate) and repeat the test at 10 minutes. This can be repeated up to three times if necessary.

Moderate hypoglycaemia – patient conscious but confused or aggressive

If the patient is unable to cooperate as above but can still swallow, or if the patient has not responded to oral carbohydrates give 1.5-2 tubes of Glucogel®, and recheck after 10 minutes. This can be repeated three times. If the patient is improving, follow with oral carbohydrates as above. If the blood glucose is still low or the patient remains unwell, consider starting 10% dextrose infusion at 100mL/hour.

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

Severe – patient unconscious / fitting / very aggressive or not responded to oral treatment

Check ABC and fast bleep a doctor.

If the patient has not responded to Glucogel or is too unwell to take this, give 150mL of 10% glucose over 10-15 minutes. Use an infusion pump if available, but if not, start the infusion anyway to avoid delay. Repeat capillary blood glucose measurement 10 minutes later if it is still less than 4.0mmol/L.

Post Hypoglycaemia

If hypoglycaemia is achieved a sample of urine for measurement of sulphonylurea should be obtained as soon as possible in a plain universal container sent with a WebICE request to Pathology.

The patient must be reviewed by a senior clinician from the Endocrine Team. All patients with documented hypoglycaemia will need to remain in hospital for further investigations and management.

Clinical Audit Standards derived from guideline

To ensure that this protocol is compliant with the above standards, the following monitoring processes will be undertaken:

- Patient exclusion criteria met and samples obtained according to this schedule. This will be performed by retrospective review of patient's notes.

The audit results will be sent to the Lead Clinician from the Endocrine Team who will ensure that these are discussed at relevant governance meetings to review the results and make recommendations for further action.

Summary of development and consultation process undertaken before registration and dissemination

This protocol has been adapted from the Endocrine Society Clinical Practise guideline and approved by the Consultant Endocrinologists and Clinical Biochemistry at a Multidisciplinary Endocrine Meeting and Clinical Governance Meeting of the Directorate of Endocrinology. This version has been endorsed by the Professional Protocols, Policies and Guidelines Committee.

Distribution list/ dissemination method

Clinical Investigation Unit

The Clinical Policies and Guidelines book on Langley Ward
Practice Development and Education Department
Trust Intranet via 'Trust Docs'

Source documents

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

Anderson J Hypoglycaemia (1989) In Fundamentals of clinical Endocrinology. 4th edition. Hall R & Besser M, editors. Churchill Livingstone. London, Longman Singapore Publishers.

Barth J H, Butler G E and Hammond P (2001) Biochemical Investigations in Laboratory Medicine. ACB Venture Publications. Kent, KSC Printers.

Cryer et al 2009 Evaluation and management of adult hypoglycaemic disorders: an endocrine society clinical practice guideline.
J Clin Endocrinol Metab 94: 709-728

Endocrinology Handbook ICSM Endocrine Unit Hammersmith Hospital (2005)

The Hospital Management of Hypoglycaemia in Adults with diabetes Mellitus, (March 2010). <http://intranet/guidelines/Word%20docs/HypoglycaemiaManagementNational.pdf>

Marks V. Chapter 39 Insulinoma (1998) In Clinical Endocrinology 2nd Edition Grossman A editor. Blackwell Science Ltd, Oxon, Marston Book Services Ltd.

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

D

Appendix 1

72-hour Fast Care Plan Page 1

This patient is undergoing a “72 hour fast”. He/She is not permitted to eat during the test and is only allowed to drink water nothing else.

Ensure the cannula is patent, 10% glucose and glucagon for IV use, and fruit juice are available on the ward throughout this period.

Patients must be reviewed on a regular basis to check for subtle signs of hypoglycaemia and MUST not be allowed to leave the ward during the fast unaccompanied

Starting	Date : (dd/mm/yyyy)	Time: (24hr clock)
Finishing	Date: (dd/mm/yyyy)	Time: (24hr clock)

- Test 2 hourly capillary blood glucose using a standard blood glucose meter and document overleaf.
- Take 6 hourly, routine venous blood samples in a grey top fluoride oxalate bottle for glucose & a green top lithium heparin bottle to biochemistry with pre-prepared (by specialist nurses) WebICE form. Check blood ketones at baseline, twice daily at 08.00 and 17.00 and at the end of the fast. The Endocrine Specialist Nurse or junior endocrine doctors will coordinate this.
- If capillary glucose is <2.8 mmol/L at any time then take* samples as above to biochemistry urgently. **NB These samples must have a WebICE form printed by the person taking the blood sample so that the glucose can be requested urgently. Remember to add insulin and c-peptide to the request form.**

*Do not pod samples to the path lab; these must be hand delivered and handed to a person not left on the counter. If out of hours, ring the bell for on call biochemist. If they do not come to hatch bleep them using the number on the board for urgent blood gases.

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

D

72-hour Fast Care Plan Page 2

The fast must **NOT** be terminated UNLESS the patient has one or more of the following:

- Laboratory glucose (**not just BM**) below <2.2 mmol/l
- Seizure / impaired consciousness
- Focal Neurology

If clinical biochemistry confirms glucose of <2.2 mmol/l then take venous blood into a grey, green and yellow topped tube, and stop the fast by giving fruit juice, a carbohydrate meal, Glucogel® or iv glucose (100ml/hour 10% glucose in most patients, or 150ml 10% glucose over 10-15 minutes in unstable patients). If an infusion pump is available use this, but if not readily available the infusion should not be delayed. Repeat capillary blood glucose measurement 10 minutes later. See trust guideline on management of hypoglycaemia for further details. Once the blood has been taken, follow the trust standard hypo protocol as below:

[Trustdocs ID 1337](#)

As soon as possible collect a sample of urine in a universal container and send with a WebICE request for to pathology. The form should request sulphonylurea screen. This only needs to be collected if the patient has a confirmed venous glucose of <2.2 mmol/L .

Send stored sample of insulin antibodies

Dropping glucose but not down to venous glucose of <2.2 mmol/L?

- If glucose starts to drop but has not reached <2.2 mmol/L, increase frequency of finger prick on a standard blood glucose meter and increase frequency of venous glucose. It can be as often as every 10 - 15 minutes to catch the glucose as soon as the patient becomes hypoglycaemic.
- If any stage, you are uncertain as to the correct course of action then contact the following:
 - during day time :
 - out of hours :

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

72-hour Fast Care Plan Page 3

Appendix 2

Date	Time	Capillary Glucose	Blood sample taken				Symptoms
			Glucose	Insulin	c-peptide	Ketones	

Joint Trust Guideline for 72 hour fast for investigation of spontaneous hypoglycaemia in adults

72-hour Fast Care Plan Page 4

AT THE END OF 72 HOUR FAST, if no hypoglycaemia

Consider exercising the patient up and down the stairs (accompanied)

2. Take blood sample for plasma glucose, insulin profile and send to pathology with WebICE request form. Bedside ketone testing should be performed either by the Endocrine Specialist Nurse or one of the junior doctors working for the endocrine team.

3. Glucagon stimulation test may then be performed if requested by an endocrinologist as follows:
 - Give 1 mg glucagons intravenously
 - Take blood sample for glucose after 5, 10, 20 and 30 min post glucagon (labelled, timed, correct tube)
 - Give patient fruit juice, followed by a meal

Blood sample	Glucose	Insulin	β OH butyrate
0 min			
Give glucagon 1 mg intravenously			
5 min			
10 min			
0 min			
30 min			