CLINICAL GUIDELINE

Diabetes: Management of Diabetes during procedures requiring fasting

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

Version Number:	3
Does this version include changes to clinical advice:	Yes
Date Approved:	4th June 2025
Date of Next Review:	30th June 2028
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Approval Group:	Medicines Utilisation Subcommittee of ADTC
Guideline ID number:	294

Important Note:

The online version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

Contents

Introduction

Radiological and diagnostic procedures often require a period of fasting which can increase the risk of hypoglycaemia and diabetic ketoacidosis. This document provides guidance for healthcare staff involved in the care of people with diabetes undergoing such procedure. It also provides information on identifying patients who should be considered for admission prior to practical procedure.

This guideline is for adults only. It is not intended for use in pregnant patients.

Wherever possible, it is recommended that patients with diabetes who take insulin or sulphonylureas, and particularly those with type 1 diabetes, should be first on the list to minimise the period of fasting and risk of hypoglycaemia.

SGLT-2 inhibitors have been associated with DKA during periods of fasting and should always be withheld in patients undergoing procedures where fasting is needed.

Preparation for colonoscopy and barium enemas is more complex and involves a period of bowel preparation in addition to fasting. The recommended adjustments to the different types of insulin regimen are given in section 4.

1. Patients with diabetes undergoing radiological procedures requiring fasting (e.g abdominal ultrasound)

Wherever possible, patients with diabetes who take insulin or sulphonylureas, and particularly those with type 1 diabetes should be first on the list in order to minimise the period of fasting and risk of hypoglycaemia.

Ensure capillary blood glucose CBG is checked prior to procedure and before allowing patient home. If CBG <4.0 treat as per hypoglycaemia protocol (see appendix 2).

Not on insulin	Omit oral hypoglycaemic agents (OHAs), SGLT2 inhibitors, GLP-1 agonists and dual GLP-1/GIP agonists on the morning of the procedure (for examples see appendix 1). Restart usual diabetes medications once eating and drinking.
Type 2 DM/pancreatic diabetes on insulin	See Appendix 3 for dose adjustments according to regimen and insulin type. Restart insulin at usual time and dose once eating and drinking.
Type 1 diabetes	Patient should be first on list. See Appendix 3 for dose adjustments according to regimen and insulin type. Restart usual insulin at the usual time and dose once eating and drinking. Insulin pumps – please contact diabetes unit for advice

2. Patients with diabetes undergoing radiological procedures requiring intravenous contrast (e.g. coronary angiogram)

On metformin	There is no need to stop metformin after contrasts in patients with a serum creatinine range and/or eGFR >60ml/min/1.73m^2 If serum creatinine is above the reference range or eGFR <60 any decision to withhold metformin for 48hours should be made in consultation with the referring clinician

3. Patients with diabetes undergoing diagnostic procedures requiring fasting (e.g. upper GI endoscopy, trans-oesophageal echo, barium swallow)

Wherever possible, patients with diabetes who take insulin or sulphonylureas, and particularly those with type 1 diabetes should be first on the list in order to minimise the period of fasting.

Ensure capillary blood glucose CBG is checked prior to procedure. If CBG <4.0 treat as per hypoglycaemia protocol (appendix 2). Procedure can commence once CBG ≥4mmol/L.

Ensure CBGs are monitored regularly and check within acceptable limits prior to discharge (4-12mmol/L).

Not on insulin	Omit oral hypoglycaemic agents (OHAs), SGLT2 inhibitors, GLP-1 agonists and dual GLP-1/GIP agonists on the morning of the procedure (for examples see appendix 1) Restart usual diabetes medications once eating and drinking
Type 2 diabetes	See Appendix 3 for dose adjustments according to regimen and insulin type. Restart insulin at usual time and dose once eating and drinking
Type 1 diabetes/ pancreatic diabetes on insulin	Patient should be first on list. See Appendix 3 for dose adjustments according to regimen and insulin type. Restart usual insulin at the usual time and dose once eating and drinking. Insulin pumps – please contact diabetes team for advice.

* if recent CBGs are <6mmol/L or frequent hypos consider 20% reduction in evening insulin. Discuss with diabetes team for advice if needed.

4. Patients with diabetes undergoing colonoscopy or barium enema as day cases

A. Patients with T2D on oral therapies and/or GLP-1 agonist injections/dual GLP/GIP agonist injections

Patients taking sulphonylureas are at significant risk of hypoglycaemia. It is recommended they are early on the procedure list to avoid prolonged fasting. They should have hypo treatments to hand at home and whilst traveling to their appointment in case of hypoglycaemia.

Red or purple jelly beans/babies should be not be used to treat hypoglycaemia to avoid confusion with symptoms of an upper gastro-intestinal bleed.

Day prior to procedure

- If taking long acting sulphonylureas (e.g. glimepiride or MR gliclazide) reduce dose by 50%
- If taking short acting sulphonylureas (e.g. glipizide or gliclazide), repaglinide or nateglinide, stop once fasting has started.
- Other oral hypoglycaemic agents – stop once fasting has started.
- Injectable GLP-1 or dual GLP-1/GIP agonists (e.g. liraglutide, dulaglutide, semaglutide, tirzepatide) – omit until after procedure.

Day of procedure

Withhold all oral medications, GLP-1 agonists or dual GLP-1/GIP agonists.

Check CBG prior to procedure and one hour post procedure.

- **Prior to procedure**

CBG ≥4 mmol/L – proceed with colonoscopy
CBG <4mmol/L – treat hypoglycaemia (appendix 2), recheck CBG in 15 minutes and repeat as necessary until CBG ≥4mmol/L

- **Post procedure**

CBG ≥4 mmol/L – if a meal is provided, usual morning medications can be restarted
CBG <4mmol/L – treat hypoglycaemia (appendix 2) and ensure CBG ≥4mmol/L prior to administering usual medications

- **Pre-discharge**

Check CBG within acceptable limits (4-12mmol/L). Contact medical staff if any concerns.

B. Patients with T2D taking once daily insulin (with or without other glucose lowering therapies)

Patients taking insulin are at significant risk of hypoglycaemia and should be first on the procedure list to avoid prolonged fasting. They should have hypo treatments to hand at home and whilst traveling to their appointment in case of hypoglycaemia.

Red or purple jelly beans/babies should be not be used to treat hypoglycaemia to avoid confusion with symptoms of an upper gastro-intestinal bleed.

Patients should also omit oral hypoglycaemic agents (OHAs), SGLT2 inhibitors, GLP-1 agonists and dual GLP-1/GIP agonists on the morning of the procedure (for examples see appendix 1).

Day prior to procedure

The following adjustments are recommended once fasting has commenced:

- Once daily long acting insulin taken in the morning (e.g. Toujeo, Humulin I, abasaglar, lantus)
  Reduce morning dose by 20%

- Once daily long acting insulin at other times
  Reduce dose by 50%

If patient taking other glucose lowering medications follow instructions in section A in addition to insulin dose reductions.

Check CBG every 2-3 hours.

Day of procedure

Withhold all oral medications, GLP-1 agonists or dual GLP-1/GIP agonists.

Check CBG prior to procedure and one hour post procedure.

- **Prior to procedure**

CBG ≥4 mmol/L – proceed with colonoscopy
CBG <4mmol/L – treat hypoglycaemia (appendix 2), recheck CBG in 15 minutes and repeat as necessary until CBG ≥4mmol/L

- **Post procedure**

CBG ≥4 mmol/L – if a meal is provided, usual morning medications including insulin can be restarted
CBG <4mmol/L – treat hypoglycaemia (appendix 2) and ensure CBG ≥4mmol/L prior to administering usual medications

- **Pre-discharge**

Check CBG within acceptable limits (4-12mmol/L). Contact medical staff if any concerns.

C. Patients with T2D on twice daily insulin (with or without other glucose lowering therapies)

Examples of twice daily mixed insulin include Humulin M3 and novomix 30 (see also Appendix 1).

Patients taking insulin are at significant risk of hypoglycaemia. It is recommended they are first on the procedure list to avoid prolonged fasting. They should have hypo treatments to hand at home and whilst traveling to their appointment in case of hypoglycaemia.

Red or purple jelly beans/babies should not be used to treat hypoglycaemia to avoid confusion with symptoms of an upper gastro-intestinal bleed.

Day prior to procedure

The following adjustments are recommended:

- Reduce usual morning insulin dose by a 30-50%
- Reduce evening insulin dose by 50%

If patient taking other glucose lowering medications follow instructions in section A in addition to insulin dose reductions.

Check CBG every 2-3 hours

Day of procedure

Patient should reduce their morning insulin dose by 50%. Their usual evening insulin can restart at usual time and dose once they are eating and drinking.

Withhold all oral medications, GLP-1 agonists and dual GLP-1/GIP agonists.

Check CBG prior to procedure and one hour post procedure.

- **Prior to procedure**

CBG ≥4 mmol/L – proceed with colonoscopy
CBG <4mmol/L – treat hypoglycaemia (appendix 2), recheck CBG in 15 minutes and repeat as necessary until CBG ≥4mmol/L

- **Post procedure**

CBG ≥4 mmol/L – if a meal is provided, usual morning medications including insulin can be restarted
CBG <4mmol/L – treat hypoglycaemia (appendix 2) and ensure CBG ≥4mmol/L prior to administering usual medications

- **Pre-discharge**

Check CBG within acceptable limits (4-12mmol/L). Contact medical staff if any concerns

Patients with T1 taking twice daily mixed insulin

Examples of twice daily mixed insulin include Humulin M3 and novomix 30 (see also Appendix 1).

Patients should be first on the morning list. If this is not possible, admission the day prior should be considered.

Day prior to procedure

The following adjustments are recommended:

- Reduce morning dose by 50%
- Reduce evening insulin dose by 50%

Patient should be encouraged to monitor their CBG every 2-3 hours.

Once fasting has begun patients should be advised to take regular fluid carbohydrates. For example, 200mls of lemonade every 2-3 hours.

Day of procedure

Patients should take 50% usual dose of morning insulin and c*ontinue drinking fluid carbohydrates until 2 hours prior to procedure.*

Their evening insulin can restart at usual time and dose if they are eating and drinking.

Check CBG prior to procedure and one hour post procedure. If CBG >14mmol/L check ketones and advise patient to follow sick day rules.

- **Prior to procedure**

CBG ≥4 mmol/L – proceed with colonoscopy
CBG <4mmol/L – treat hypoglycaemia (appendix 2), recheck CBG in 15 minutes and repeat as necessary until CBG ≥4mmol/L

- **Post procedure**

CBG ≥4 mmol/L – restart usual insulin once eating and drinking normally.
CBG <4mmol/L – treat hypoglycaemia (appendix 2) and ensure CBG ≥4mmol/L prior to administering usual medications

- **Pre-discharge**

Check CBG within acceptable limits (4-12mmol/L). Contact medical staff if any concerns.

D. Patients with T1D on multiple daily injection (basal bolus)

Examples include basal insulin plus fast acting insulin (e.g. Tresiba and novorapid, toujeo and lyumjev). See appendix 1 for more information.

Patients should be first on the morning list. If this is not possible, admission the day prior should be considered.

Day prior to procedure

Reduce long acting insulin by 20%

Once fasting has started, bolus insulin should not be taken and patients should be advised to take regular fluid carbohydrates. For example, 200mls of lemonade every 2 hours.

Patient should be encouraged to monitor their CBG every 2-3 hours.

Day of procedure

If long acting insulin is taken in the morning take usual dose. No bolus insulin should be taken. C*ontinue drinking fluid carbohydrates until 2 hours prior to procedure.*

Check CBG prior to procedure and one hour post procedure. If CBG >14mmol/L, check ketones and advise patient to follow sick day rules.

Their usual insulin regimen can resume once eating and drinking.

- **Prior to procedure**

CBG ≥4 mmol/L – proceed with procedure
CBG <4mmol/L – treat hypoglycaemia (appendix 2), recheck CBG in 15 minutes and repeat as necessary until CBG ≥4mmol/L

- **Post procedure**

CBG ≥4 mmol/L – restart usual insulin once eating and drinking normally.
CBG <4mmol/L – treat hypoglycaemia (appendix 2) and ensure CBG ≥4mmol/L prior to administering usual medications

- **Pre-discharge**

Check CBG within acceptable limits (4-12mmol/L). Contact medical staff if any concerns.

E. Patients with T1D on an insulin pump

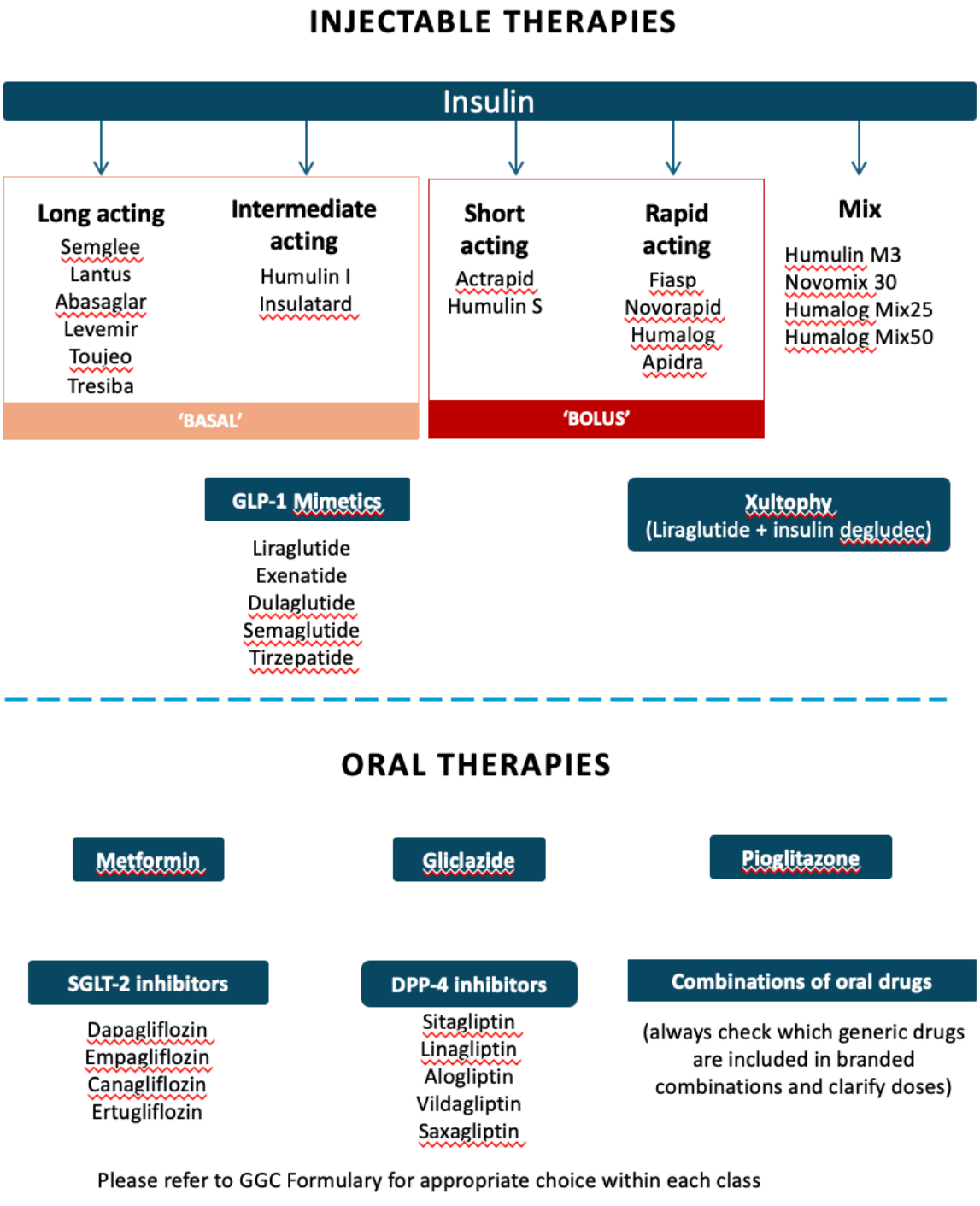
Patients should be first on the morning list. If this is not possible, admission the day prior should be considered.

Please advise the patient to contact their local diabetes unit for advice on management.

5. Patients who should be considered for admission for procedures which require fasting

- patients requiring district nurses to administer insulin
- patients with recurrent episodes of severe hypoglycaemia (i.e. requiring third party assistance to manage hypoglycaemia)
- patients with complete loss of hypoglycaemia awareness
- patients unable to self monitor CBGs

Appendix 1. Drugs used in the management of hyperglycaemia



Appendix 2. Management of Hypoglycaemia

Please see the guideline - Algorithm for Treatment of Hypoglycaemia in Adults with Diabetes (281):

https://rightdecisions.scot.nhs.uk/ggc-clinical-guidelines/endocrine/co-morbidities/algorithm-for-treatment-of-hypoglycaemia-in-adults-with-diabetes-281/?searchTerm=hypoglycaemia

Appendix 3

Insulin dose adjustment for procedures requiring fasting (EXCEPT COLONSCOPY or BARIUM ENEMA)

Insulin	Day before procedure	Day of procedure
Long acting insulin (evening) e.g. Semglee, Lantus, Abasaglar, Toujeo, Humulin I, Levemir	Reduce dose by 20%	No dose adjustment needed
Long acting insulin (morning) e.g. Semglee, Lantus, Abasaglar, Toujeo, Humulin I, Levemir	No dose change	Reduce morning dose by 20%
Twice daily (mixed/biphasic) insulin **e**.g. Humulin M3, novomix 30, Humalog mix 50	No dose change	Reduce morning dose by 50% Evening dose as usual
Basal bolus with long acting insulin at night (e.g. once daily long acting with meal time insulin)	Reduce long acting insulin by 20% Meal time insulin continues as usual	Omit breakfast insulin Restart mealtime insulin as usual once eating and drinking
Basal bolus with long acting insulin at in morning (e.g. once daily long acting with meal time insulin)	No change	Reduce long acting insulin by 20% Omit breakfast insulin Restart mealtime insulin as usual once eating and drinking

For any other insulin regimens, please contact local diabetes team for advice.