NHS
Greater Glasgow and Clyde

CLINICAL GUIDELINE

Diabetes: Guidelines for the Management of Diabetes during Practical Procedures (including Colonoscopy)

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:	2
Does this version include changes to clinical advice:	Yes
Date Approved:	16th May 2018
Date of Next Review:	4th April 2021
Lead Author:	Dr Steve Cleland
Approval Group:	Medicines Utilisation Subcommittee of ADTC

Important Note:

The Intranet 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.

PRACTICAL PROCEDURES

This guideline covers patients with Diabetes undergoing:

- Radiological procedures that require fasting (e.g. abdominal ultrasound) **Table 1**
- Radiological procedures that require intravenous contrast (e.g. coronary angiogram) **Table 2**
- Diagnostic procedures requiring fasting (e.g. upper GI endoscopy, transoesophageal ECHO, barium swallow) **Table 3**
- Colonoscopy or barium enema *as day cases*:
  1. Type 2 diabetes on oral medication and/or GLP-1 mimetic injections **Flowchart 1**
  2. Type 2 diabetes on once daily insulin (could also be on GLP-1 mimetics and oral medication) **Flowchart 2**
  3. Type 2 diabetes on twice daily insulin (could also be on GLP-1 mimetics and oral medication) **Flowchart 3**
  4. Type 1 diabetes on twice daily mixed insulin **Flowchart 4**
  5. Type 1 diabetes on basal/bolus insulin **Flowchart 5**
  6. Type 1 diabetes on Insulin Pump / Continuous Subcutaneous Insulin Infusion (CSII) **Flowchart 6**
- Colonoscopy who require admission prior to procedure

Patients with diabetes undergoing radiological procedures that require fasting (e.g. abdominal ultrasound)

Aim for procedure to be undertaken first on morning list

Not on insulin	Omit oral hypoglycaemic agents (OHA) and injectable GLP-1 mimetics on morning of procedure. If patient took a sulphonylurea on the previous day (e.g. Gliclazide), check capillary blood glucose (CBG). If CBG <4, treat according to hypoglycaemia protocol (appendix 1). Recommence OHA & GLP-1 once returned to normal diet.
Type 2 Diabetes, on insulin treatment	Reduce preceding evening insulin by 20% and omit insulin on morning of procedure. Monitor CBG regularly and restart insulin at usual doses once on normal diet
Type 1 Diabetes	Ensure that patient is first on list. Reduce preceding evening insulin by 20% and delay morning insulin until after procedure and inject prior to a meal. If on an insulin pump, apply temporary basal rates of 80% overnight and prior to procedure and delay bolus until next meal. Monitor CBG closely throughout. Apply 'sick day rules' if required (patient can seek advice from local Diabetes service if necessary).

Table 1

Patients with diabetes undergoing radiological procedures that require intravenous contrast (e.g. coronary angiogram)

On metformin	There is no need to stop Metformin after contrast in patients with serum creatinine within the normal reference range and/or eGFR > 60ml/min/1.73m^2. If serum creatinine is above the normal reference range or eGFR > 60ml/min/1.73m^2, any decision to stop it for 48 hours should be made in consultation with the referring clinician.

Table 2

Patients with diabetes undergoing diagnostic procedures requiring fasting (e.g. upper GI endoscopy, transoesophageal ECHO, barium swallow)

Aim for procedure to be undertaken first on morning list

Not on insulin	Omit oral hypoglycaemic agents (OHA) and injectable GLP-1 mimetics on morning of procedure. If patient took a sulphonylurea on the previous day (e.g. Gliclazide), check capillary blood glucose (CBG). If CBG <4, treat according to hypoglycaemia protocol (appendix 1). Recommence OHA & GLP-1 once returned to normal diet.
Type 2 Diabetes, on insulin treatment	Reduce preceding evening insulin by 20% and omit insulin on morning of procedure. Monitor CBG regularly. Restart insulin at usual doses if on normal diet later that day. Otherwise, commence variable rate intravenous insulin infusion (VRIII)* – see guidance in the Therapeutics Handbook under 'Insulin Sliding Scale'- at 0800 and continue until eating and drinking normally.
Type 1 Diabetes	Ensure that patient is first on list. Reduce preceding evening insulin by 20%. If simple, short procedure, delay morning insulin until following procedure and inject prior to next meal. Apply 'sick day rules' if required (patient can seek advice from local Diabetes service if necessary). If on an insulin pump, apply temporary basal rates of 80% overnight and prior to procedure and delay bolus until next meal. If procedure or recovery is likely to be metabolically stressful or prolonged (more than 1-2 hours), or if patient has co-morbidity, commence VRIII at 0800 and continue until eating and drinking normally. Monitor CBG closely throughout.

Table 3

* **N.B.** New guideline on VRIII to be implemented in 2019.

Patients with diabetes undergoing colonoscopy or barium enema *as day cases*

Advice and action to be taken for patients with Type 2 diabetes on oral medication and/or GLP-1 mimetic injections attending for colonoscopy

Should be advised to take bowel prep as per instructions

↓

Day -1: dose adjustment of oral medications/GLP-1 may be needed as follows:

- If on long-acting Sulfonylureas (i.e. Glimepiride or Gliclazide MR) reduce dose by half i.e. Glimepiride 6mg – take 3mgs, Gliclazide MR 120mg – take 60mg.
- If on short-acting Sulfonylurea (i.e. Gliclazide, Glipizide) or Repaglinide or Nateglinide, do not take any further doses once fasting has begun.
- If taking any other OHAs, do not take any further doses once fasting has begun.
- If taking Exenatide, take morning injection only. If taking Liraglutide, reduce morning dose to 0.6mg injection. If taking Lixisenatide, reduce dose to 10mcg injection. If taking weekly GLP-1 mimetics (e.g. Bydureon, Dulaglutide), postpone until after procedure.

↓

Day 0: Withhold oral medications and injections of GLP-1 on morning of colonoscopy

↓

Patients on Sulfonylureas are particularly at risk of hypoglycaemia. They should have glucose tablets, Lucozade, small can of lemonade or jelly babies/jelly beans (not red coloured) at home and whilst travelling to hospital for their appointments, in case of hypoglycaemia.

↓

Patient to bring oral medications/GLP-1 with them to hospital

↓

Check CBG prior to procedure and one hour post procedure:

Prior to colonoscopy

- If CBG ≥ 4mmol/l, it is safe to proceed with colonoscopy.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1); recheck CBG in 15 minutes and repeat as necessary until CBG ≥ 4mmol/l.

Post colonoscopy

- If CBG ≥ 4mmol/l and patient is being provided with a breakfast, usual dose of oral medication/GLP-1 should be taken.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1): ensure CBG ≥ 4mmol/l prior to giving oral medication/GLP-1 .

N.B. Ensure patient's CBG is within acceptable limits (4-12 mmol/l) prior to leaving the department; if any concerns contact medical staff.

Flowchart 1

Advice and action to be taken for patients with Type 2 diabetes on once daily insulin (could also be on GLP-1 mimetics and oral medication) attending for colonoscopy

Should be advised to take bowel prep as per instructions

↓

Day -1: dose adjustment of insulin as follows:

- If on once daily long-acting insulin in the morning (e.g. Humulin I), take $^{1}/_{3}$ off usual dose i.e. if on 36 units daily, take 24 units.
- If on once daily insulin at any other time of the day, reduce insulin by 50% i.e. if on 36 units take 18 units.
- If taking oral hypoglycaemics and/or GLP-1 as well as insulin, please refer to Flowchart 1 for type 2 patients on oral/GLP-1 medications.

Patients should check CBG every 2-3 hours.

↓

If patient is hypoglycaemic, take either 170ml Lucozade, 200ml of lemonade, or 4-5 glucotabs

↓

Day 0: Withhold oral medications, GLP-1 and insulin (if on morning dose) on day of colonoscopy

↓

Patient to bring insulin, GLP-1 and oral medications with them to hospital

↓

Check CBG levels prior to procedure and one hour post procedure:

Prior to colonoscopy

- If CBG ≥ 4mmol/l, it is safe to proceed with colonoscopy.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1); recheck CBG in 15 minutes and repeat as necessary until CBG ≥ 4mmol/l.
- If CBG > 12mmol/l, it may be necessary to commence VRIII.

Post colonoscopy

- If CBG ≥ 4mmol/l and patient is being provided with a breakfast, usual dose of insulin, GLP-1 and oral medication should be taken.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1): ensure CBG ≥ 4mmol/l prior to giving insulin, GLP-1 and oral medication.

N.B. Ensure patient's CBG is within acceptable limits (4-12mmol/l) prior to leaving the department; if any concerns contact medical staff

Flowchart 2

Advice and action to be taken for patients with Type 2 diabetes on twice daily insulin (could also be on GLP-1 mimetics and oral medication) attending for colonoscopy

Should be advised to take bowel prep as per instructions

↓

Day -1: dose adjustment of insulin as follows:

- Take $^{1}/_{3}$ off usual dose mixed insulin in the morning (e.g. Humulin M3) i.e. if on 36 units daily, take 24 units.
- Reduce evening dose of mixed insulin by 50%, and take 100ml lucozade or 200ml lemonade.
- If taking oral hypoglycaemics and/or GLP-1 as well as insulin, please refer to Flowchart 1 for type 2 patients on oral/GLP-1 medications.

Patients should check CBG every 2-3 hours.

↓

If patient is hypoglycaemic, take either 170ml Lucozade, 200ml lemonade, or 4-5 glucotabs

↓

Day 0: Withhold oral medications, GLP-1 and morning dose of mixed insulin on day of colonoscopy

↓

Patient to bring insulin, GLP-1 and oral medications with them to hospital

↓

Check CBG prior to procedure and one hour post procedure:

Prior to colonoscopy

- If CBG $\geq$ 4mmol/l, it is safe to proceed with colonoscopy.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1); recheck CBG in 15 minutes and repeat as necessary until CBG $\geq$ 4mmol/l.
- If CBG > 12mmol/l, it may be necessary to commence VRIII.

Post colonoscopy

- If CBG $\geq$ 4mmol/l and patient is being provided with a breakfast, usual dose of mixed insulin, GLP-1 and oral medication should be taken.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1): ensure CBG $\geq$ 4mmol/l prior to giving mixed insulin, GLP-1 and oral medication.

N.B. Ensure patient's CBG is within acceptable limits (4-12mmol/l) prior to leaving the department; if any concerns contact medical staff

Flowchart 3

Advice and action to be taken for patients with Type 1 diabetes on twice daily mixed insulin attending for colonoscopy

Should be advised to take bowel prep as per instructions

↓

Patients must have a morning appointment for the procedure, otherwise it would be necessary to admit them on the day before procedure

↓

If patient is on oral hypoglycaemics as well as insulin, please refer to Flowchart 1 for patients on oral medications

↓

Patient should take usual dose of morning mixed insulin on day before colonoscopy. Patient should reduce evening dose of mixed insulin by 50%.

↓

Patient should check CBG on going to bed and every 2-3 hours on awakening

↓

Patient should be advised to take carbohydrates every 2 hours during the day after fast has started. Suggested intake would be:

150ml ordinary lemonade or
120ml Lucozade (original) or
3 glucose tablets or
3 jelly babies (not red coloured) or
10 jelly beans (not red coloured).

If CBG ≥ 14mmol/l, patient should be advised to follow 'sick day rules' (patient can seek advice from local Diabetes service if necessary)

↓

Withhold insulin and oral medications on morning of colonoscopy

↓

Patient to bring insulin and oral medications with them to hospital

↓

Check CBG prior to procedure and one hour post procedure:

Prior to colonoscopy

- If CBG ≥ 4mmol/l, it is safe to proceed with colonoscopy.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1); recheck CBG in 15 minutes and repeat as necessary until CBG ≥ 4mmol/l.
- If CBG > 12mmol/l, it may be necessary to commence VRIII.

Post colonoscopy

- If CBG ≥ 4mmol/l and patient is being provided with a breakfast, usual dose of mixed insulin should be taken.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1): ensure CBG ≥ 4mmol/l prior to giving mixed insulin.

N.B. Ensure patient's CBG is within acceptable limits (4-12mmol/l) prior to leaving the department; if any concerns contact medical staff.

Flowchart 4

Advice and action to be taken for patients with Type 1 diabetes on basal/bolus insulin attending for colonoscopy

Should be advised to take bowel prep as per instructions

↓

Patients must have a morning appointment for the procedure, otherwise it would be necessary to admit them on the day before procedure

↓

If patient is on oral hypoglycaemics as well as insulin, please refer to Flowchart 1 for patients on oral medications

↓

On day before colonoscopy, patient should reduce total long-acting dose of insulin by 20%, whether given once or twice per day (e.g. Insulatard, Humulin I, Lantus, Levemir, Abasaglar, Degludec). After fast has started, no further bolus insulin should be given routinely (e.g. Novorapid, Humalog).

↓

Patient should check CBG on going to bed and every 2-3 hours on awakening

↓

Patient should be advised to take carbohydrates every 2 hours during the day after fast has started. Suggested intake would be:

150ml ordinary lemonade or
120ml Lucozade (original) or
3 glucose tablets or
3 jelly babies (not red coloured) or
10 jelly beans (not red coloured).

If CBG ≥ 14mmol/l, patient should be advised to follow 'sick day rules' (patient can seek advice from local Diabetes service if necessary).

↓

Withhold insulin and oral medications on morning of colonoscopy

↓

Patient to bring insulin and oral medications with them to hospital

↓

Check CBG prior to procedure and one hour post procedure
:

Prior to colonoscopy

- If CBG ≥ 4mmol/l, it is safe to proceed with colonoscopy.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1); recheck CBG in 15 minutes and repeat as necessary until CBG ≥ 4mmol/l.
- If CBG > 12mmol/l, it may be necessary to commence VRIII.

Post colonoscopy

- If CBG ≥ 4mmol/l and patient is being provided with a breakfast, usual dose of bolus (and basal if applicable) insulin should be taken.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1): ensure CBG ≥ 4mmol/l prior to giving bolus (and basal if applicable) insulin.

N.B. Ensure patient's CBG is within acceptable limits (4-12mmol/l) prior to leaving the department; if any concerns contact medical staff.

Flowchart 5

Advice and action to be taken for patients with Type 1 diabetes on Insulin Pump / Continuous Subcutaneous Insulin Infusion (CSII) attending for colonoscopy

Should be advised to take bowel prep as per instructions

↓

Patients must have a morning appointment for the procedure, otherwise it would be necessary to admit them on the day before procedure

↓

If patient is on oral hypoglycaemics as well as insulin, please refer to Flowchart 1 for patients on oral medications

↓

On day before colonoscopy, after fast has started, patient should commence temporary basal rates of 80% of usual basal doses, and no further bolus insulin should be given unless correcting as per 'CSII sick day rules' (appendix 2).

↓

Patient should check CBG on going to bed and every 2-3 hours on awakening

↓

Patient should be advised to take carbohydrates every 2 hours during the day after fast has started. Suggested intake would be:

100ml ordinary lemonade or
100ml ordinary cola or
120ml Lucozade (original) or
3 glucose tablets or
3 jelly babies (not red coloured) or
10 jelly beans (not red coloured).

If CBG ≥ 14mmol/l, patient should be advised to follow 'CSII sick day rules' (appendix 2)

↓

Continue with 80% usual basal insulin rate on morning of colonoscopy

↓

Check CBG levels prior to procedure and one hour post procedure:

Prior to colonoscopy

- If CBG ≥ 4mmol/l, it is safe to proceed with colonoscopy.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1); recheck CBG in 15 minutes and repeat as necessary until CBG ≥ 4mmol/l.
- If CBG > 12mmol/l, it may be necessary to commence VRIII.

Post colonoscopy

- If CBG ≥ 4mmol/l and patient is being provided with a breakfast, usual dose of bolus insulin should be taken and normal basal rates should be restarted.
- If CBG < 4mmol/l, follow protocol for hypoglycaemia (appendix 1): ensure CBG ≥ 4mmol/l prior to giving usual dose of bolus insulin should be taken and normal basal rates should be restarted.

N.B. Ensure patient's CBG is within acceptable limits (4-12mmol/l) prior to leaving the department; if any concerns contact medical staff.

Flowchart 6

Insulin-requiring patients who require admission prior to colonoscopy:

- Those who are district nurse dependent.
- Those with a history of recurrent severe hypoglycaemic episodes requiring aid from another person.
- Those with complete loss of hypoglycaemic awareness.
- Those with complex medical histories including those on steroid therapy.
- Those who cannot self-monitor.

Appendix 1:
Guideline on ‘Diabetes: Algorithm for treatment of Hypoglycaemia in Adults with Diabetes in Hospital’ can be found in the Clinical Directory Electronic Resource Directory on NHS GGC StaffNet.

Appendix 2:
‘Sick day rules’ for patients with Type 1 Diabetes on CSII insulin pump, see guideline on ‘Diabetes, Ketone testing in Type 1 Diabetes’, in the Clinical Directory Electronic Resource Directory on NHS GGC StaffNet.