

CLINICAL GUIDELINE FOR PERIOPERATIVE MANAGEMENT OF THE ADULT DIABETIC PATIENT

1. INTRODUCTION

The diabetic patient undergoing surgery will be subject to a host of factors unbalancing the blood sugar levels. Pre- and postoperative fasting, the physiological stress response to the trauma of surgery, any infection present and anaesthetic agents will all, in different ways, influence glucose control. These factors can occasionally affect glucose regulation even in patients who are not clinically diabetic. We know that patients subjected to a tight blood sugar control regime have a better outcome in intensive care and carefully managed diabetics have fewer postoperative infections.

2. PURPOSE

To give the diabetic patient perioperative care that is optimal and safe, avoiding the potential pitfalls of hypoglycaemia, hyperglycaemic ketoacidosis and biguanide-induced lactic acidosis, whilst assuring an adequate intake of calories and electrolytes.

3. SCOPE

Clinicians and nurses at the James Paget University Hospitals NHS Foundation Trust.

4. CRITERIA

The guidelines apply to all diabetic adults (16 years and over) undergoing surgery. They can also be applied to non-diabetic patients with poor control of blood sugar levels in the perioperative period.

Patients are slotted into one of two groups, depending on the expected starvation time:

- A. less than 12 hours (generally procedures not involving the GI tract)
- B. 12 hours or more

A group **A** patient unable to resume oral intake within the 12 hour period defaults to group **B**.

5. MANAGEMENT

- put the diabetic patient first on the theatre list, unless this endangers infection control
- check capillary blood glucose before the patient goes to theatre
- use regional anaesthesia whenever possible
- resume oral nutrition and regular antidiabetic treatment at the earliest practicable point postop (gut working, no nausea, etc)
- do not discharge unless blood sugar levels are well controlled.

Diabetics know the rhythm of their disease well. Take their advice.
Be observant of any history of hypoglycaemic episodes.

5.1 IN PREASSESSMENT

The preoperative workup should specifically include

- a history of blood glucose control (hypoglycaemic episodes?)
- HbA_{1c} (accept if done within 3 months)
- BP and pulse lying down and standing up
- FBC, U&E's and a venous blood glucose reading.

Well-controlled diabetics (blood glucose 5 -10 mmol/l) are well suited to day surgery, if the procedure and co-morbidity allow. If in any doubt, contact the troubleshooting Anaesthetist

Poorly controlled diabetics should be referred to diabetes in-patient Sister (page through Trust Call ext 3301) from outpatients or preassessment clinic to facilitate timely optimisation of glycaemic control. Suggested criteria for referral

- frequent hypoglycaemia episodes
- mean blood glucose > 10 mmols/l
- HbA_{1c} > 8,5 %

If good control cannot be achieved before surgery the patient should be admitted the day before surgery and referred to diabetes team/on call physician.

5.2 PLANNING FOR ADMISSION

A: Patients admitted on day of surgery

Type I diabetics (insulin dependant)

- Patients on *morning list* should take their regular or slightly reduced evening insulin dose, fast according to current guidelines and omit morning insulin dose.
- Patients on *afternoon list* can have a light breakfast with half their regular morning dose.

Type II diabetics (late onset, non-insulin dependant) can be diet-controlled or on oral antidiabetic treatment, occasionally combined with insulin.

- Stop biguanides (Metformin and Avandamet[®]) 48 hrs and Chlorpropamide 24 hrs before surgery.
- For patients on *morning list*, stop evening dose of other oral antidiabetics' day before surgery and keep patient fasting according to current guidelines.
- For patients on *afternoon list*, stop other oral antidiabetics' day of surgery, allow light breakfast and keep fasting thereafter.
- For patients on both insulin and oral antidiabetics, combine the instructions above. Increase insulin dose by 10 % if stopping Metformin.

Preoperative fluid intake

Follow normal fasting procedures.

B. Patients admitted day before surgery

- Patients continue their normal diabetic regimen on day of admission
- Well-controlled diabetics follow the "planning for admission" rules outlined above
- If diabetes is not well controlled, start glucose-insulin sliding scale. Inform in-patient diabetic Sister.
- If a patient is starved the day before surgery initiate sliding scale from time starvation starts.

5.3 ON THE WARDS

A. ELECTIVE PATIENTS WHO CAN RESUME ORAL INTAKE = 12 HOURS

Diabetics who have a limited period of starvation can often be managed without perioperative use of sliding scale.

- **hypoglycaemia** (capillary blood glucose < 4 mmol/l) treat with a rapid infusion of glucose 5 % 250 ml and recheck BM. Patients on long-acting insulin may need a continuous glucose infusion. Alert the Anaesthetist if patient is due for surgery, or else the parent team.
- **hyperglycaemia** (capillary blood glucose > 12 mmol/l on two occasions 1 hour apart) treat with glucose-insulin sliding scale infusion as per below.

B. ELECTIVE PATIENTS WHO REMAIN FASTING > 12 HRS

At least 2 hours before the patient goes to theatre initiate the following regimen, which is to be continued until the patient resumes normal oral intake:

- glucose 10% + 20 mmol KCl per litre @ 85 ml/hr (use glucose 10% + 10mmol KCl in 500ml bag)
- soluble insulin 1 IU/ml (mix 50 IU soluble insulin in a 50 ml syringe of NaCl 0,9%) running according to regimen A, B, C or D
- In the **postoperative period**, add NaCl 0,9 % @ 25 mls/hr or, depending on serum Na and fluid losses, a minimum of 500 ml NaCl 0,9% daily

The sliding scale insulin options below are based on the patient's TDD (preoperative total daily dose of insulin). Follow the instructions on the "Insulin-glucose therapy" infusion chart. A fourth option D is for the use of diabetes specialists only.

A TDD 0-30 units/day or DM type II < 60 kg		B TDD 31-100 units/day or DM type II = 60 kg		C TDD 101 - 170 IU/day	
Blood glucose	Units/hr	Blood glucose	Units/hr	Blood glucose	Units/hr
< 3	Alert doctor	< 3	Alert doctor	< 3	Alert doctor
3,1 - 7	0,5	3,1 - 7	1,0	3,1 - 7	2,0
7,1 - 11	1,0	7,1 - 11	2,0	7,1 - 11	4,0
11,1 - 15	1,5	11,1 - 15	3,0	11,1 - 15	6,0
15,1 - 19	3,0	15,1 - 19	4,0	15,1 - 19	10,0
> 19,1	Alert doctor	> 19,1	Alert doctor	> 19,1	Alert doctor
Date:	Time:	Date:	Time:	Date:	Time:
Signature:		Signature:		Signature:	

MONITORING TREATMENT

- Aim for blood glucose **6 - 10 mmol/l** in the perioperative period.
- Check capillary blood glucose 2 hourly on preoperative patients.
- Hourly measurements until blood glucose levels stabilize, then 2 hourly and if still stable 4 hourly.
- If the patient requires a change of insulin dose go back to hourly measurements.
- If not stable on one option within 6 hrs, change for alternative insulin infusion.
- U&E's should be checked daily until patients have resumed their normal diabetic regime.
- Observe carefully for signs of hypo-/hyperglycaemia (pallor, sweating, tachycardia; drowsiness, increased urine output, ketotic breath) and carry out extra blood glucose checks if indicated.
- If TDD > 170 IU/day please call in-patient diabetic Sister for help!

Alert parent team immediately if a diabetic patient develops altered mentation!

IMPORTANT!

- All insulin and glucose infusions must be given either through separate iv cannulas or through a Y-connection with one-way valves to prevent backflow in case of pump failure.
- If any cannula fails, it must be replaced immediately as IV insulin has a very short half-life.
- Patients on *full* TPN and/or enteral feeding should have an insulin infusion only.
- Review daily the need for extra fluid and electrolyte replacement (NB! Risk of hyponatraemia!).
- If glucose levels are not well controlled by the above regimens, please refer patient as soon as possible to the diabetic in-patient Sister. During on call hours, please alert the parent team.
- If patient develops ketoacidosis, treat as per DKA guidelines and postpone surgery.

Page in-patient diabetic Sister through Trust Call

5.4 EMERGENCY PATIENTS

All diabetic patients admitted as surgical emergencies and kept nil by mouth should be started on glucose-insulin sliding scale infusions as per above unless the patient is having a minor procedure within a few hours and blood glucose is well regulated. Do not give extra potassium if serum K > 4,5 or urine output is <30 ml/hr. Correct dehydration with carbonated sodium lactate or NaCl 0,9% as appropriate. If in doubt, discuss with on call Anaesthetist.

5.5 RESTARTING REGULAR ANTIDIABETICS

This should only be contemplated when the patient is

- eating at least half a portion of normal diet each meal
- is free of nausea and vomiting

Continue blood glucose measurements at least 4 hourly until stable at a preoperative level.

The guidelines below are all subject to individual variations. If a patient's oral intake goes down again, give Lucozade/milk/dietary supplements or restart glucose-insulin sliding scale infusion. Alert the in-patient diabetic Sister.

Always keep the patient informed of any changes to their antidiabetic treatment, when infusions are to be stopped or injections given, etc.

REGULAR TREATMENT	ACTION
Oral antidiabetics	<ul style="list-style-type: none"> • To be given before meal. • Stop sliding scale glucose-insulin two hours later
Insulin twice daily regimen	<ul style="list-style-type: none"> • Give first inj 20 min before meal. • Stop sliding scale glucose-insulin two hours later
Long acting insulin (e.g. Glargine)	<ul style="list-style-type: none"> • Give evening dose. • Continue sliding scale glucose-insulin till next morning. • Give short acting insulin before breakfast. • For the occasional patient who takes long acting insulin in the morning, please call the diabetic in patient Sister

6. ENDORSEMENT

Dr Pieter Bothma, Anaesthetics Lead
Mr John Studley, Elective Division Lead
Mr Johnson-Nurse, Orthopedics Lead
Mr Nick Oligbo, Gynaecology Lead
Mrs Angela Wakeley, Matron Gynaecology
Ms S Prince, Oral Surgery and Orthodontics Lead
Mr D Premachandra, ENT Lead
Mr P Black, Ophthalmology Lead
RRS Michelle Thompson, Preassessment Sister
Mrs Sarah Morris, Theatre Matron
Mr Yuri van de Pieterman, Senior Charge Nurse Day Care
Dr Sharon Rhodes, Consultant Anaesthetist, Day Care Lead
Mrs Jackie Copping, Matron Elective Division
Mrs Dawn Taylor, Matron Outpatient Services

7. REFERENCES

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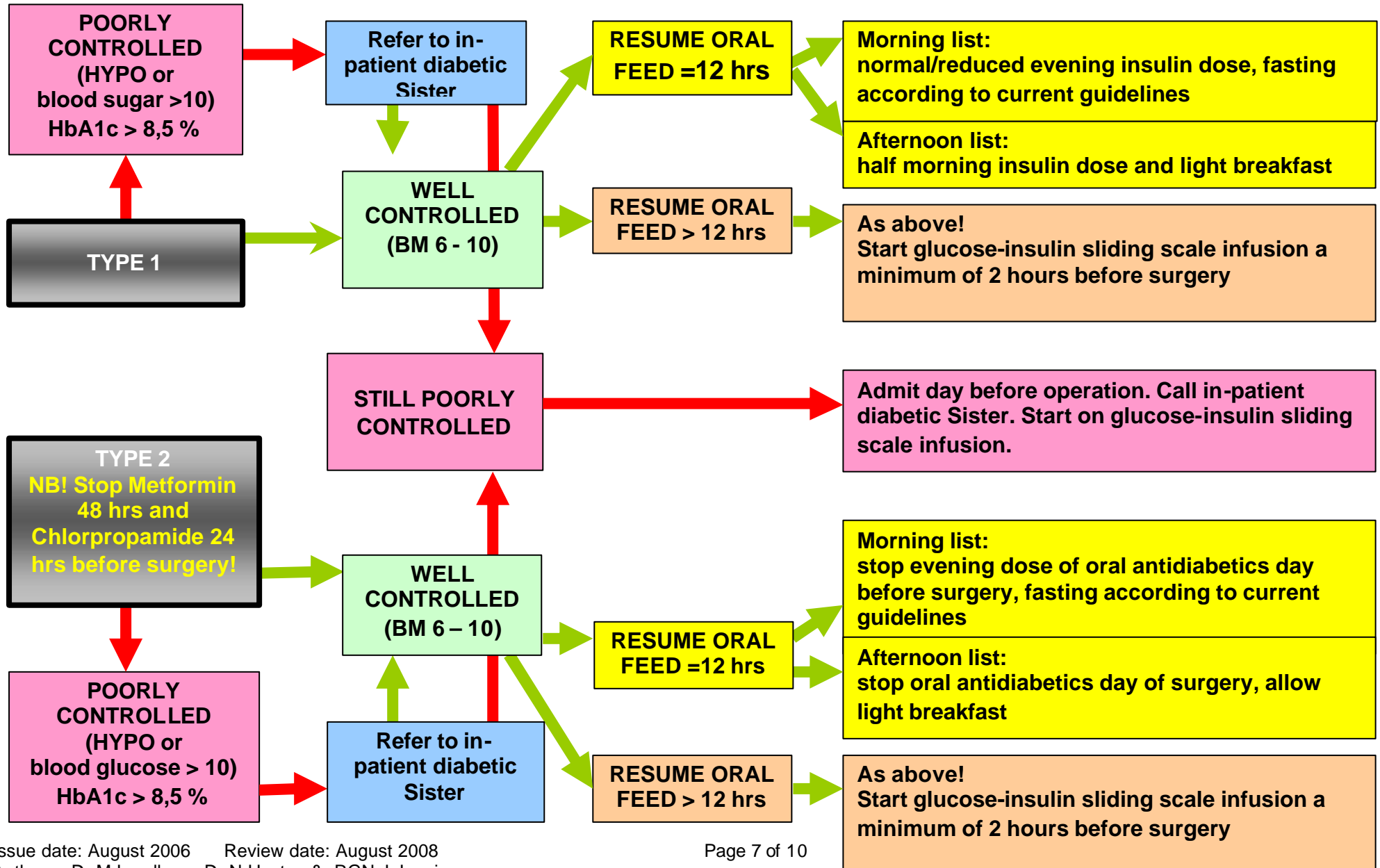
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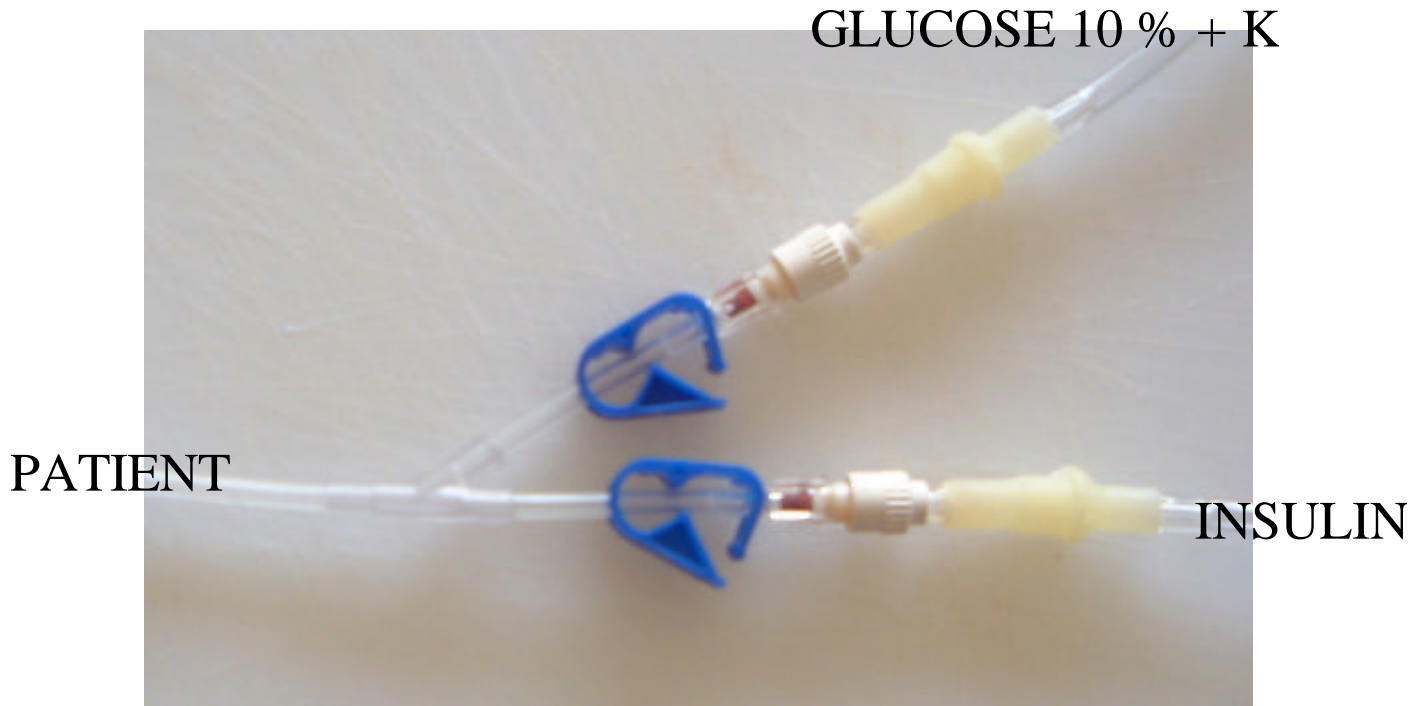
8. AUTHORS AND DATES

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PERIOPERATIVE CARE OF THE DIABETIC PATIENT



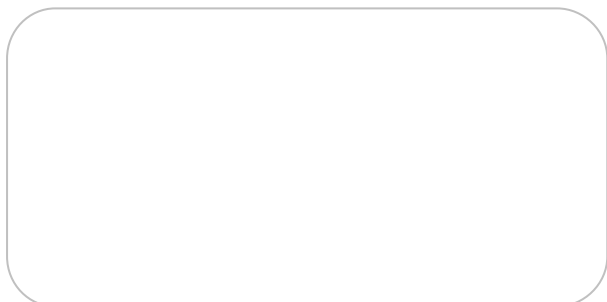
CORRECT CONNECTION FOR GLUCOSE-INSULIN SLIDING SCALE INFUSION



Y-CONNECTOR WITH ANTI-REFLUX VALVES



DO NOT USE THREE-WAY TAPS!



INSULIN-GLUCOSE THERAPY

for adult surgical patients

- **Aim for blood glucose 6-10 mmol/l**
- Check capillary blood glucose 2 hourly preoperatively
- Prescribe
 - a 1 IU/ml soluble insulin infusion in the “as required” section of the patient’s drug chart
 - glucose 10% + 20 mmol/l KCl @ 85 mls/hr
- Choose one of the sliding scale options (A, B or C or D) below based on the patients normal total daily dose (TDD) of insulin. Sign and date. Option D to be used by diabetes specialist only!
- Always use Y-connector with one-way valve
- Check capillary blood glucose and start infusion of glucose and soluble insulin 1 IU/ml as appropriate
- Check capillary blood glucose hourly until stable, then 2 hourly and, if still stable, 4 hourly
- If capillary blood glucose is not stable on one option within 6 hours, change for alternative insulin infusion
- **NB: Daily review the need for Na, K and fluid substitution!**

A	
TDD 0-30 IU/day or DM type II patient <60 kg	
Blood glucose	IU/hr
< 3	Alert doctor
3.1 – 7	0.5
7.1 – 11	1.0
11.1 – 15	1.5
15.1 – 19	3.0
> 19	Alert doctor
Date:	Time:
Signature:	

B	
TDD 31-100 IU/day or DM type II ≥ 60 kg	
Blood glucose	IU/hr
< 3	Alert doctor
3.1 – 7	1.0
7.1 – 11	2.0
11.1 – 15	3.0
15.1 – 19	4.0
> 19	Alert doctor
Date:	Time:
Signature:	

C	
TDD 101-170 IU/day	
Blood glucose	IU/hr
< 3	Alert doctor
3.1 – 7	2.0
7.1 – 11	4.0
11.1 – 15	6.0
15.1 – 19	10.0
> 19	Alert doctor
Date:	Time:
Signature:	

D	
TDD	IU/day
Blood glucose	IU/hr
< 3	Alert doctor
3.1 – 7	
7.1 – 11	
11.1 – 15	
15.1 – 19	
> 19	Alert doctor
Date:	Time:
Signature:	

