

IPN UK

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National Best Practice Guides: Inpatients on Continuous Subcutaneous Insulin Infusion (CSII)

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Disclosures

Dr M.Ali Karamat has received speaker fees, research & educational grants from:

Boehringer Ingelheim, Eli Lilly, Novo Nordisk, Roche, MSD and Sanofi Aventis.

Introduction



- Guides to support inpatient care of people with Type 1 diabetes managed on CSII
- Developed by a multi-disciplinary group of HCPs and patients on behalf of IPN-UK & ABCD
- Aim to support delivery of high quality diabetes care

Development committee



Parth Narendran: Consultant Diabetologist, Birmingham (Chair)

M.Ali Karamat: Consultant Diabetologist, Birmingham (co-Chair)

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Emma Wilmot: Consultant Diabetologist, Derby

Andrew Solomon: Consultant Diabetologist, Hertfordshire

Inpatients & CSII



Performance indicators



- Aim to maximise patient safety, improve patient satisfaction & support best clinical practice
- Performance indicators include
 - adverse events relating to insulin pump use (hypoglycaemia, DKA)
 - delayed discharge due to conversion onto/off insulin pump
 - patient satisfaction with inpatient management of insulin pump therapy
 - ‘loss’ of insulin pumps removed from patients

Commonly used pumps & associated consumables:



Animas

- AA batteries
 - Infusion sets
 - Cannulas
- Tech support: 0800 0556606**



Medtronic Paradigm veo

- Contour next link XT test strips
 - AAA Batteries
 - Infusion set
 - Cannula
- Tech support: 01923205167**



Accu-chek combo:

- Test strips
 - Cartridges
 - Infusion set
 - AA & AAA batteries
- Tech support: 0800 7312291**



Medtronic 640g

- Contour link XT 2.4 test strips
 - Infusion set
 - Cannula
 - AA lithium batteries
- Tech support: 01923 205167**



Accu-chek Insight

- *Pre-filled cartridge. Only uses 1.6ml Novorapid pump cart
 - Infusion sets
 - Cannula
 - AAA batteries
- Tech support: 0800 7312291**



Mylife Omnipod

- Abbott freestyle test strips
 - Alkaline AAA batteries for hand-set
 - Pod (syringe and needle inside pod)
- Tech support: 08448 567820**



Cellnovo

- Consists of 2 pumps, each lasting 3 days)
 - Rechargeable pump & hand-set
 - Charging dock
 - One-touch test strips
- Tech support: 0203 0581250**

The CSII user in hospital



- Most people using CSII are safest remaining on CSII if admitted to hospital
- CSII should only be adjusted by its owner or an appropriately skilled member of the Diabetes team

Discuss all CSII patients with a member of the Diabetes team

Inpatient self-management



Usually best for the user to continue to self-manage their diabetes with CSII except:

1. If unconscious, confused or incapacitated e.g. if illness/pain prevents self-management
2. If undergoing major procedures under General Anaesthetic lasting >2 hours
3. Diabetic ketoacidosis (DKA)

Unconscious/incapacitated



If unable to self-manage their CSII

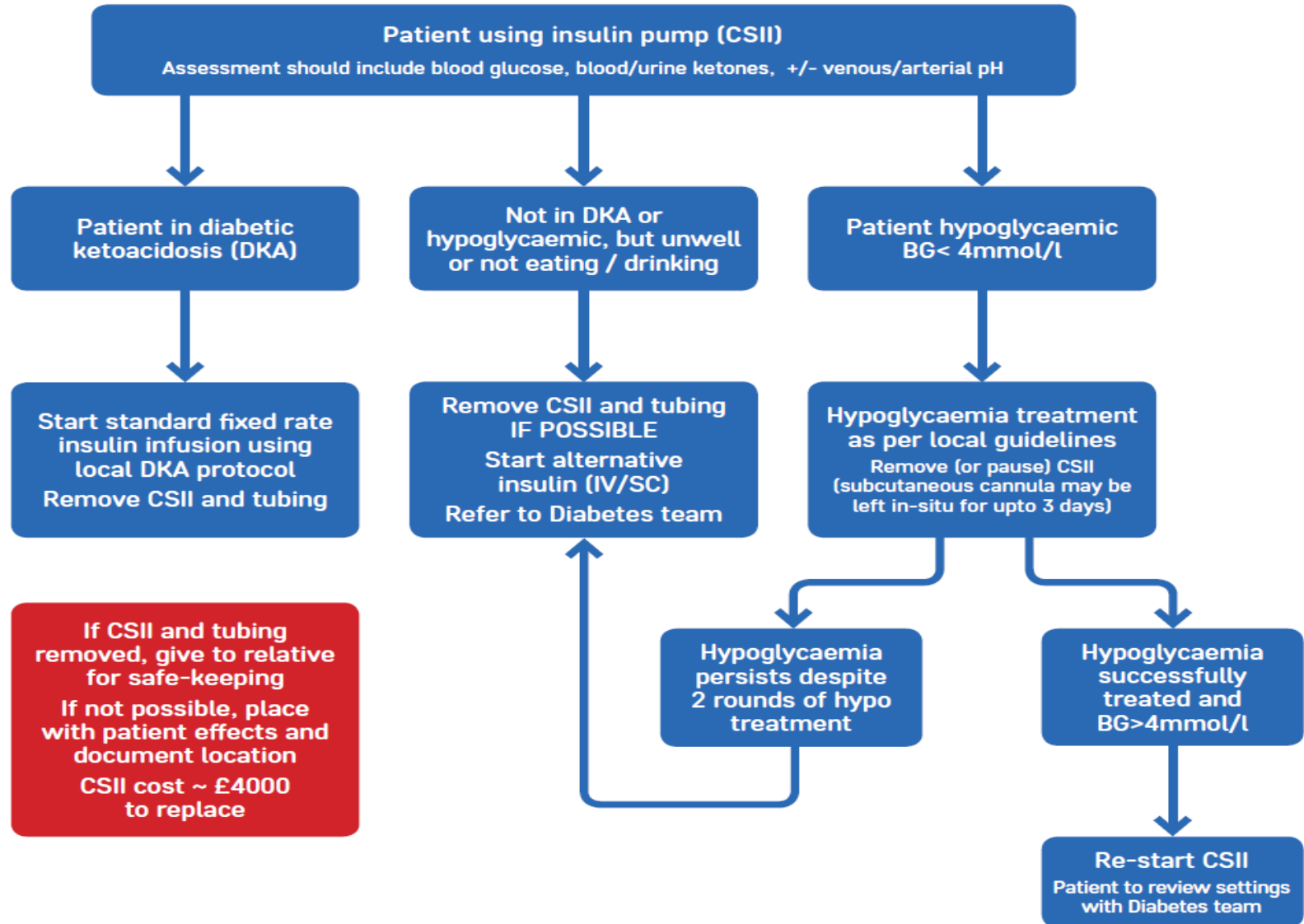
1. Detach pump and tubing
2. Immediately start alternative insulin e.g. variable rate IV insulin
3. Place pump in a safe place and document

Ensure the insulin pump is not lost!!

Diabetic Ketoacidosis (DKA)

- CSII should be temporarily removed
 - Altered tissue perfusion in DKA affects insulin absorption, making CSII unreliable
- Follow standard DKA protocol
- CSII can be restarted once DKA has resolved
 - Users should obtain supplies of infusion sets, cartridges and cannulas to keep with during their inpatient stay so that they can perform a set change if required
- **All patients should have specialist diabetes review** to review CSII settings which may need adjusting to prevent subsequent DKA and to re-enforce “sick day rules”

APPENDIX 1: EMERGENCY ADMISSIONS AND CSII MANAGEMENT



Radiology invx

- **Remove pump prior to MRI**
 - do not take into the scanning room
- CSII manufacturers advise removing pump prior to CT scan
- No need to remove CSII for plain X-rays

- Reconnect CSII **immediately** following any radiological investigation
- CSII can be removed for up to an hour at a time without alternative insulin, a correction bolus may be needed on reconnecting



Surgery and CSII



Pre-op



- Fasting is not usually a problem for CSII users, so being “nil by mouth” does *not necessarily* mean removal of CSII or need for IV insulin
- Not necessary to admit day-case patients overnight for variable rate IV insulin infusion simply because they manage their diabetes by CSII
- **INDIVIDUALISE MANAGEMENT**
 - Some may feel unable to self-manage
 - Some may require alternative management such as prior conversion back to insulin pens or hospital admission

Major surgery



Major surgical procedures (>2 hours duration, or likely to miss >1meal, or surgery requiring diathermy within 30cm of the CSII)

1. **Remove insulin pump** and store in a safe place and document, or give to family/friend for safe-keeping
2. Once CSII removed, start variable rate IV insulin infusion immediately
3. CSII can be restarted once patient recovered and able to manage it

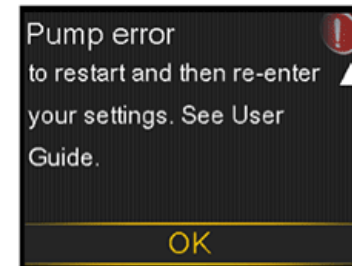
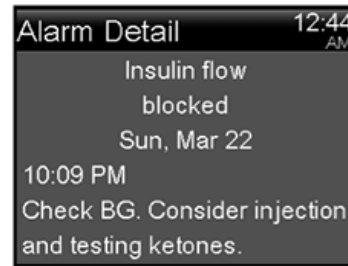
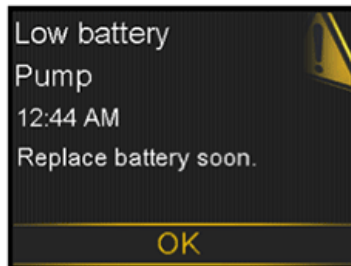
Minor Surgery



Minor procedures (<2 hours and expected to eat/drink within 2-3hrs) under general anaesthetic or sedation:

1. Can **continue CSII if glucose in target**; ensure CSII cannula is sited away from operative site and accessible
2. Aim for pre-procedure glucose of 6-10mmol/l, but 4-12 acceptable. Not in range, then one correction is allowed before starting variable rate IV insulin
3. Monitor glucose **at least hourly**; start VRII if any >12 mmol/l
4. Post procedure, correction bolus if capillary glucose >10 mmol/l

Pump alarms....

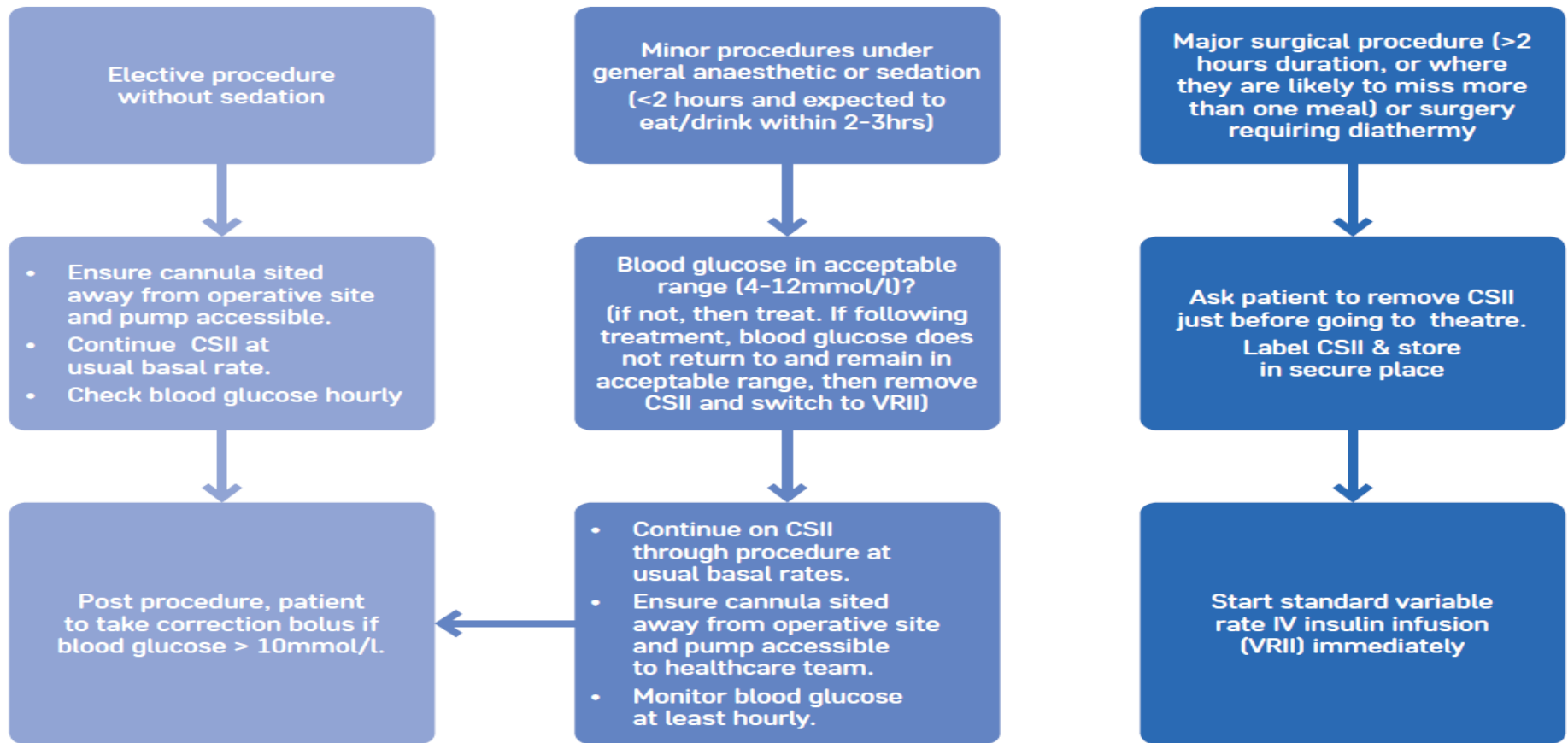


If the pump alarms during the procedure

- Non-experts should not attempt to rectify
- Monitor blood glucose every 30 mins and start IV insulin if $>12\text{mmol/l}$
- If alarm becomes intrusive, remove CSII plus cannula, allow CSII to continue to run (the amount of insulin “lost” is minimal) and store safely in a suitable receptacle.

Do not misplace the insulin pump!!!

APPENDIX 2: CSII MANAGEMENT FOR ELECTIVE SURGICAL PROCEDURES UNDER SEDATION OR ANAESTHESIA



- If blood glucose < 4, follow local hypoglycaemia protocol; re-test every 10-15 mins. Post hypo recovery, test glucose every 30 min until end of procedure
- Leave CSII in place and do not attempt to adjust settings
- If CSII alarms during procedure, don't try to rectify; leave CSII in place, monitor blood glucose every 30mins.
- If alarm becomes intrusive, or patient has more than one hypo, remove CSII and tubing (do not attempt to switch off CSII), Label CSII & store in secure place. Start VRII.

Pregnant inpatients & CSII



Labour & CSII

- Women can continue to use their CSII during labour or elective caesarean section if:
 - Hourly blood glucose levels remain within the **target range of 4 – 7 mmol/l** and
 - user/partner able to manage their CSII
- The decision regarding suitability to self-manage CSII in the above situations will be made by the diabetes team and documented

Labour and CSII

Switch to IV insulin if:



1. Patient/partner unable to manage CSII
2. Blood glucose rising $>7\text{mmol/l}$ for >2 hours despite correction doses

Remove CSII and tubing and place in suitable container
No need to turn off CSII nor to remove SC cannula

Post-delivery



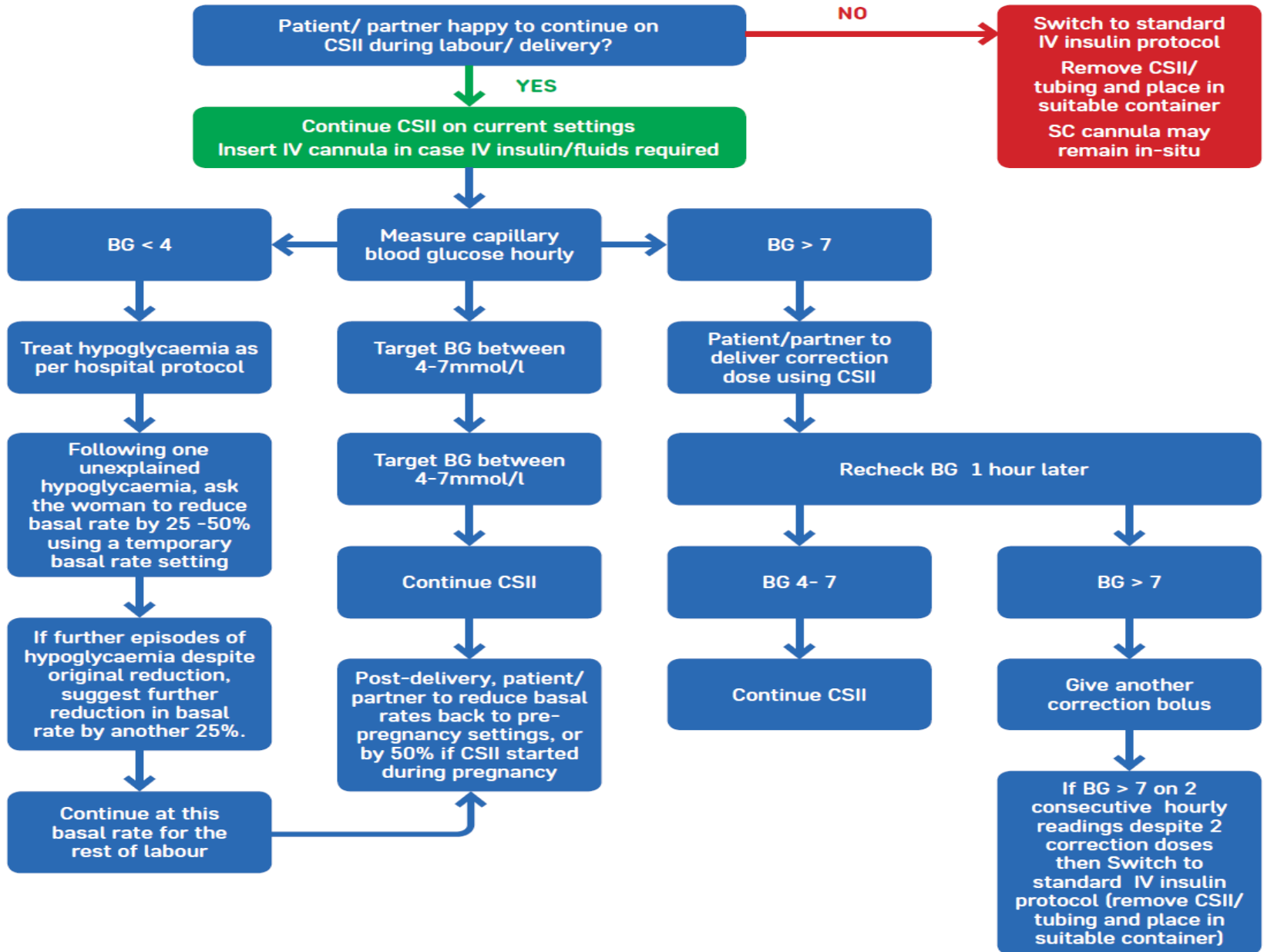
- Post-delivery basal profile
 - Typically same as pre-pregnancy basal profile, or if CSII started during pregnancy, 50% of pre-delivery basal rates
 - If breastfeeding, rates may need reducing by a further 10-20% or even more
 - Don't forget to change Insulin: carbohydrate and insulin sensitivity factor settings too!!

Inform Diabetes Specialist antenatal team of any woman using CSII therapy admitted to hospital.

Post delivery

- If used VRII in labour
 - CSII can be recommenced once the patient is able to self-manage the pump
 - Ensure basal profile is changed to post-partum settings
 - The VRII should NOT be discontinued **until 60 minutes after restarting CSII**

APPENDIX 3: WOMEN USING CSII ADMITTED IN LABOUR OR FOR ELECTIVE CAESAREAN SECTION

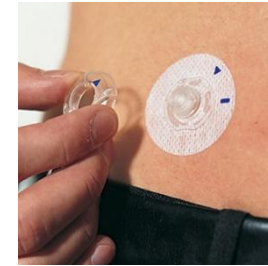
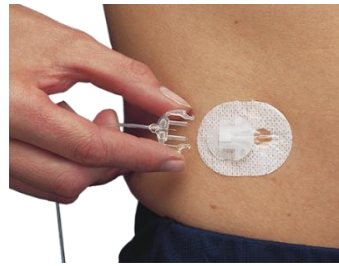


Stopping CSII

- The pump/tubing may be removed leaving the SC cannula in place, unless cannula site is infected or in surgical field.
- **Do not to cut pump tubing or disconnect the pump from the tubing**
 - remaining insulin in the tube may infuse quickly risking hypoglycaemia
 - Place the CSII into a suitable container and do not attempt to turn off; the amount of insulin “lost” into the container will be minimal
 - Document where the CSII is stored, or to whom it has been given.
- The insulin in a pump is very short acting therefore **alternative insulin must be started immediately i.e. within an hour** to avoid risk of ketoacidosis

Restarting

- The patient is ideally placed to restart the CSII



- **If transferring from IV insulin infusion:**
 - User inserts new cannula and re-start CSII after performing a fixed prime (there is no need to wait until a meal); wait 60 minutes before discontinuing IV insulin
- **If transferring from subcutaneous insulin:**
 - User inserts new cannula, performs a fixed prime and re-starts CSII
 - May need to temporarily reduce background insulin infusion rate (e.g. drop to a 70% temporary basal rate for 24hrs) while long acting subcutaneous insulin is still active - increased glucose monitoring required
 - No further subcutaneous insulin doses should be required once CSII restarted
 - Re-check blood glucose 1-2 hours after CSII re-start. Contact diabetes team for further advice
- If glucose >10mmol/l, correction bolus once CSII re-connected, using their personal correction ratio or ISF (insulin sensitivity factor)

Alternative regimens

- For **patients with DKA**, use a fixed rate IV insulin infusion as per local Diabetic ketoacidosis guidelines.
- For **patients who are fasted and/or have unstable glucose levels** (but not DKA), use a variable rate IV insulin infusion (VRIII) as per local guidelines.
- For **women in labour**, refer to local guidelines for the management of blood glucose for women with diabetes in labour.
- For **patients who are unable to self-manage their CSII, but do not have unstable blood glucose levels** and are not NBM, a basal-bolus insulin regimen is preferable to VRIII.

Returning to MDI

- Calculate appropriate starting doses based on the patient's recent (e.g. 7 day) average total daily insulin dose (TDD); this information can be obtained by the patient or DSN from the pump.
- Prescribe 50% of the TDD as Levemir insulin initially split equally in a bd insulin regime
- For meal-time (rapid acting) insulin dose: use existing insulin:carbohydrate ratio
- If not used to carbohydrate counting to calculate fixed doses:
 - 50% of TDD/ 3 plus a safety adjustment (e.g. minus 30%) to minimise risk of hypoglycaemia. Titrate doses according to response.
 - E.g. a patient's average CSII insulin TDD for last 7 days is 48 units/day.
 - 50% of 48 units = 12 units bd daily Levemir® insulin.
 - 50% of 48units/3 = 8 units of rapid acting insulin with each meal: after safety adjustment = 6 units.



Thank you

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