

**MEDICAL DISCLAIMER:**

Please note that these guidelines are approximate and cannot be substituted for clinical judgement. Please take particular care if your patient has other medical issues such as mental health disorders, alcohol dependence etc – your knowledge of the patient is paramount.

This document cannot and does not contain medical/health advice. The medical/health information is provided for general information and educational purposes only and is not a substitute for professional advice. The use of or reliance on any information contained in this document is solely at your own risk.

The Freshwell Low Carb Project

[www.lowcarbfreshwell.co.uk](http://www.lowcarbfreshwell.co.uk)

This protocol has been devised to help healthcare professionals support their patients with a low carbohydrate lifestyle, by deprescribing diabetes medication for both safety reasons, and when they are no longer required.

Start by looking at this excellent guide published in the BJGP July 2019 which provides all the basic, relevant information needed to get started <https://bjgp.org/content/bjgp/69/684/360.full.pdf>.

Always start with medications that carry risk of hypoglycaemia (pages 2 and 3) – namely insulin, sulfonylureas and meglitinides.

SGLT2 Inhibitors should also be assessed in the initial consultation with the patient (alongside insulin and sulfonylureas), and should be discontinued particularly if the patient is planning to follow a keto or very low carb diet (of <50g carbohydrate per day), or has signs of possible insulin insufficiency e.g. a BMI <26, possible LADA diagnosis (Latent Automimmune Diabetes in Adults), positive GAD autoantibodies, or low C-peptide. It is more common in slim patients who have had rapid need for insulin or sulfonylureas early in their diagnosis (see page 4 for further details). If the patient is taking an SGLT2 inhibitor which is initially continued, please ensure they have a copy of the patient information leaflet (see Appendix 2) alerting them to possible symptoms suggestive of ketoacidosis which they need to seek medical advice for and request a finger prick ketone measurement. Please also note that nutritional ketosis (which can occur in a low carb diet and is not dangerous) is different to metabolic acidosis (which requires medical input).

Work through each stage in turn for each patient if they are taking more than one medication. Always start with pages 1, 2, 3 and 4. Page 5 can be addressed at any stage of the patient's low carb journey and these drugs (including metformin) can be safely continued in a low carb or keto diet until diabetic remission is achieved.

Once medications that cause hypoglycaemia have been stopped, it is then time to move on to other diabetes medications (page 5).

Consider prescribing a blood glucose monitor and strips in the initial stages to guide adherence and efficacy of a low carb diet, particularly in those on insulin, sulfonylureas, meglitinides and SGLT2 inhibitors (those on insulin and taking sulfonylureas should already have access to this). The patient could also use a flash glucose monitoring system such as Freestyle Libre 2, at their own cost, or apply on the Abbott website for a 2 week free trial.

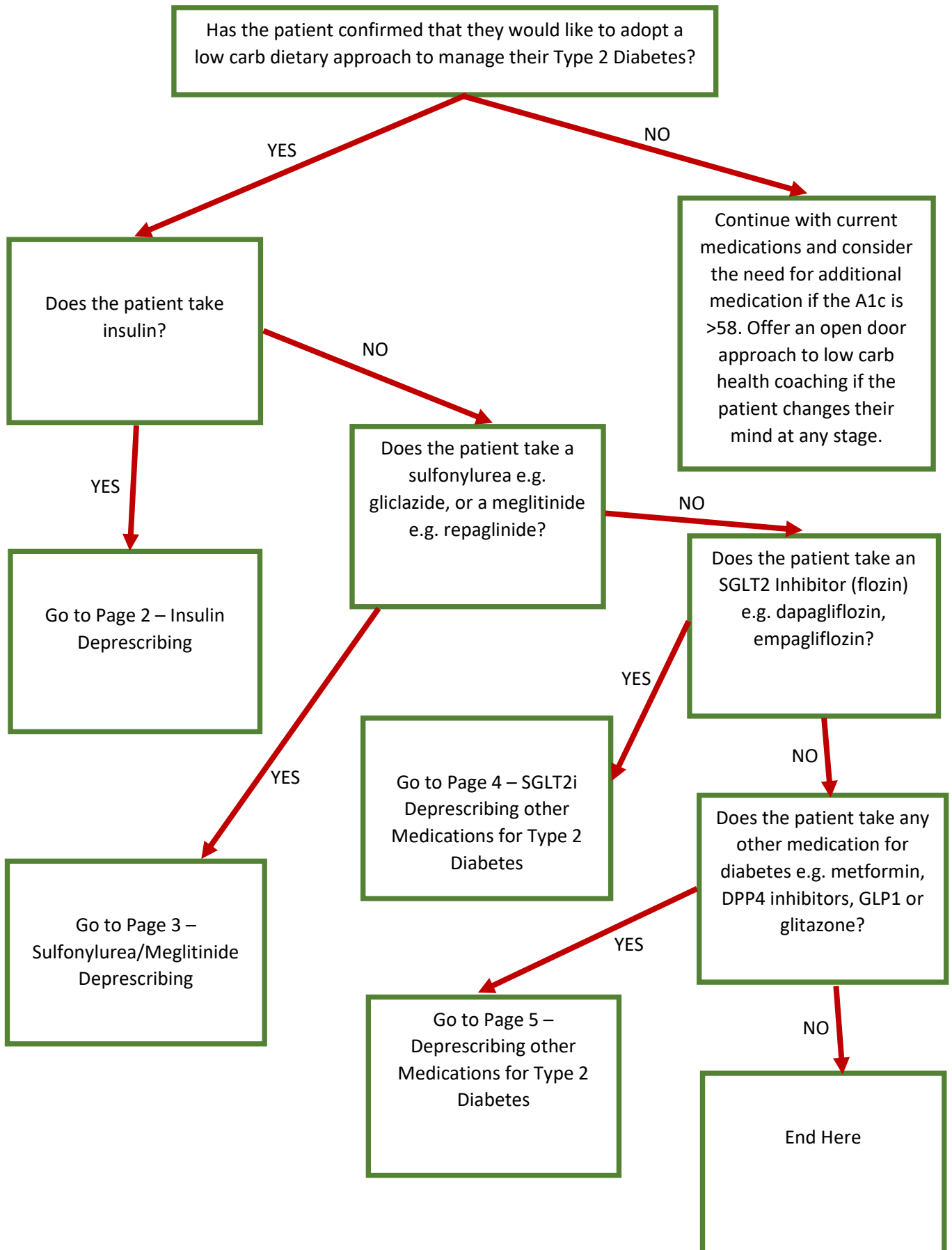
Check A1c every 6 to 12 weeks as needed to guide adherence and cessation of diabetes medication.

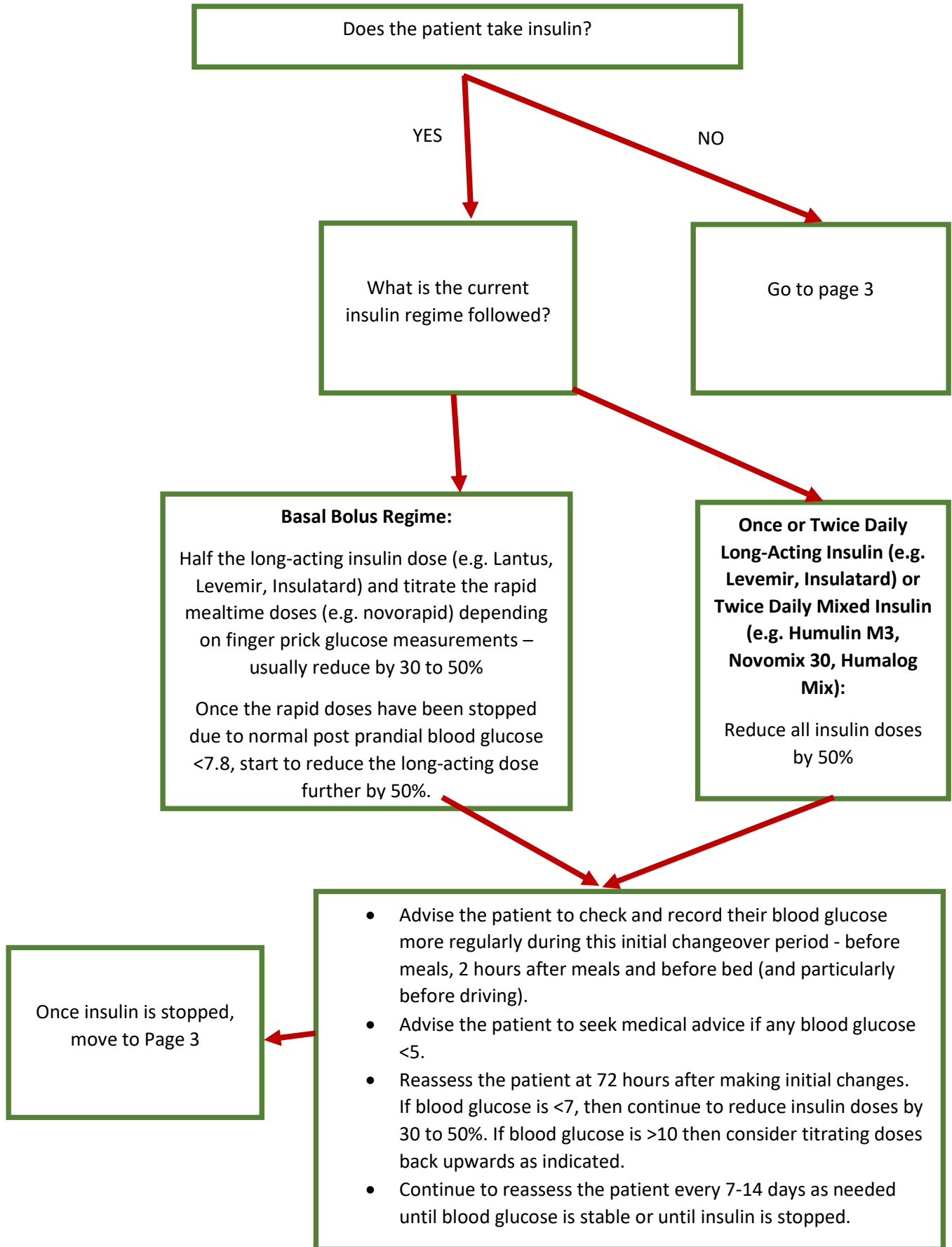
Ensure the patient is aware that a low carbohydrate lifestyle can lead to REMISSION of Type 2 Diabetes, but is NOT A CURE. If they return to their previous way of eating then it is almost certain that their diabetes will recur and their medication will need to be re-introduced.

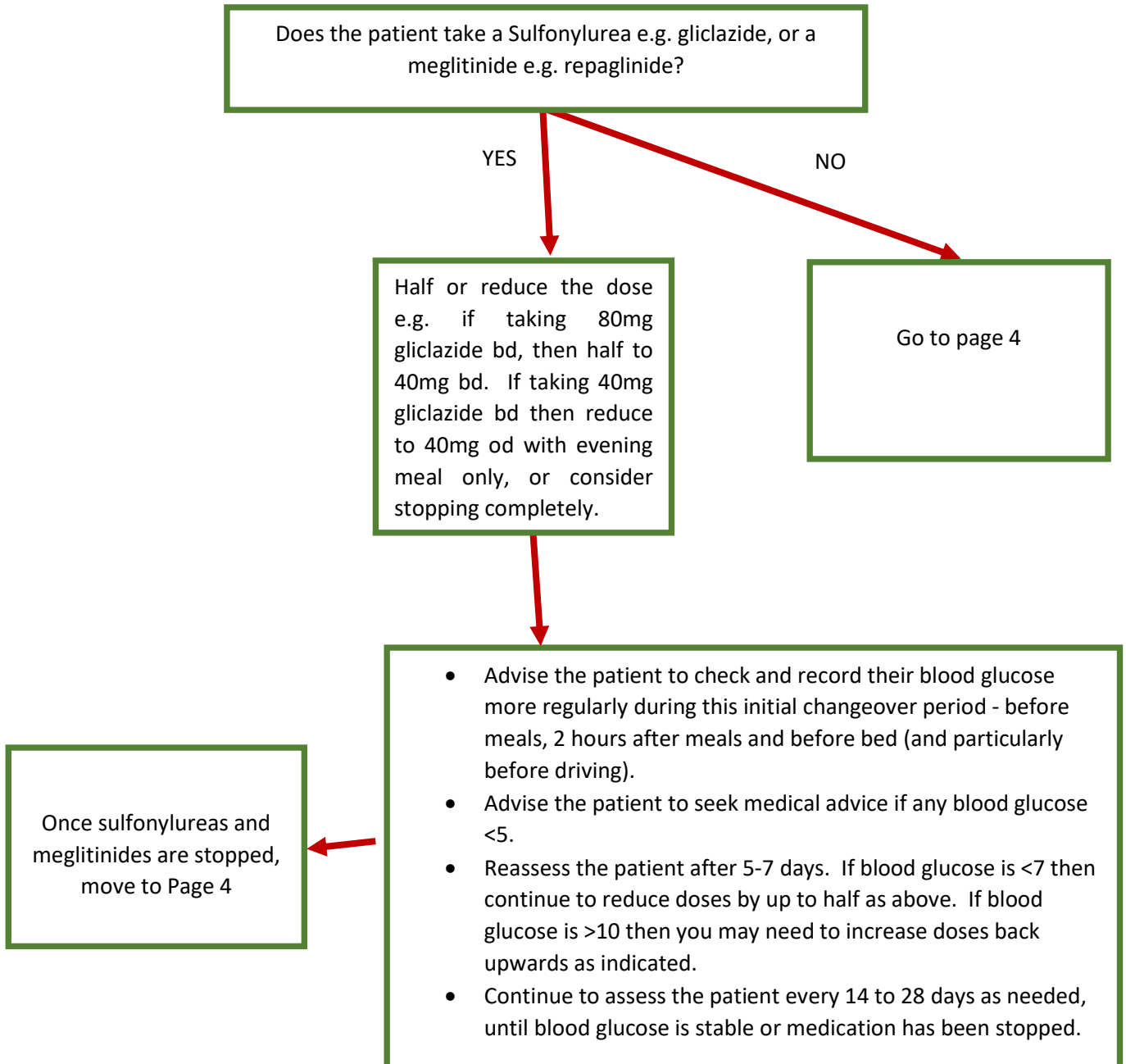
Dr Kim Andrews, GPwSI Diabetes, PGDip Diabetes and Endocrinology

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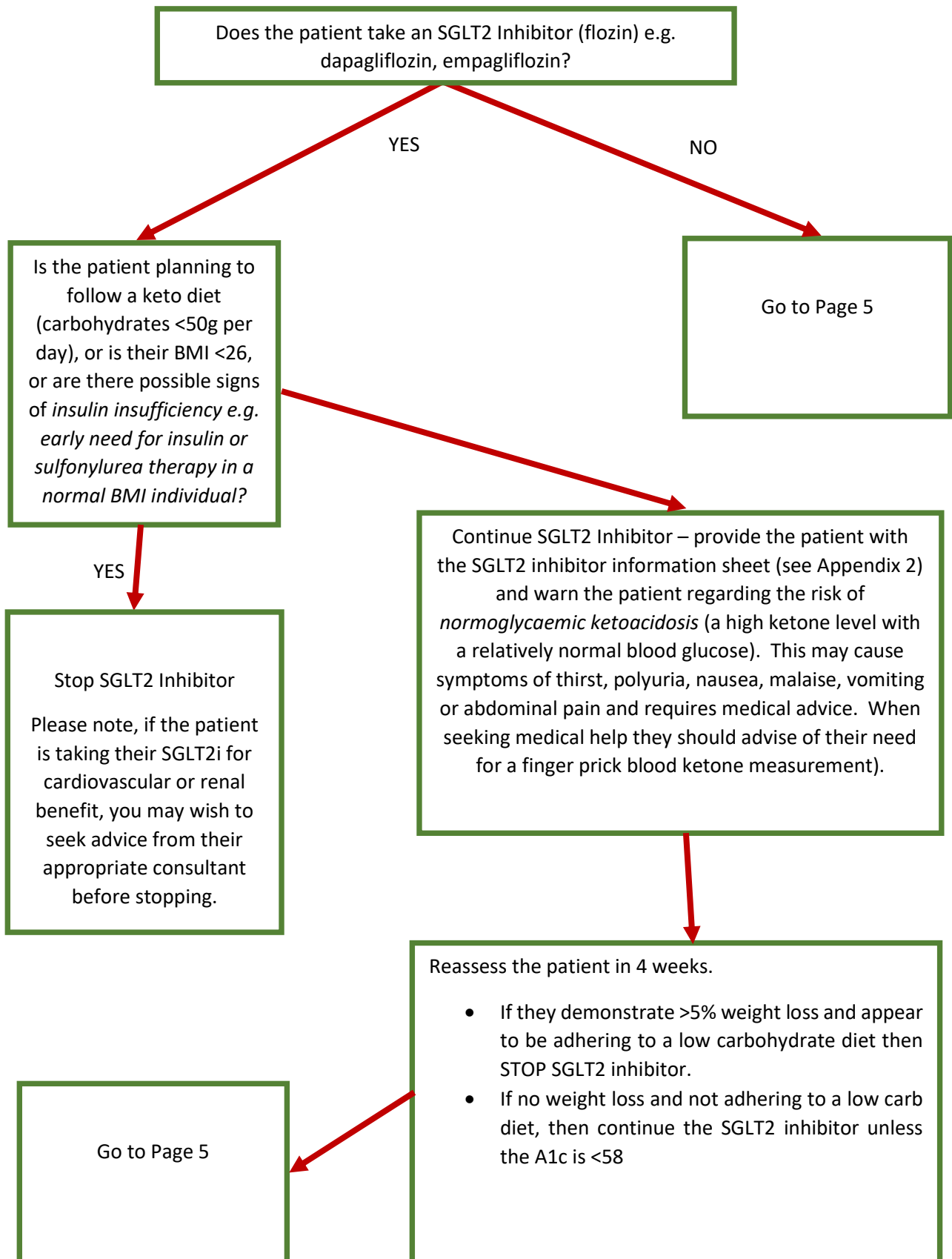
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Page 4 – Deprescribing SGLT2 Inhibitors



Does the patient take other medications for their diabetes  
e.g. metformin, DPP4i, GLP1, Glitazones, acarbose?

YES

NO

Aim to stop one drug at a time guided by blood sugar monitoring or A1c levels, using the following order:

End here

1<sup>st</sup>: THIAZOLIINEDIONES (Glitazones) i.e. pioglitazone

- Can remain on initially
- Generally stop first due to potential side effects such as fractures, bladder cancer, heart failure and macular oedema
- Stop when A1c <58

2<sup>nd</sup>: DPP-4 INHIBITORS (Gliptins) e.g. sitagliptin, alogliptin, linagliptin

- Can remain on initially
- Generally stop second due to cost and lack of benefit
- Stop when A1c <48

3<sup>rd</sup>: ALPHA GLUCOSIDASE INHIBITORS i.e. Acarbose

- Can remain on initially
- Generally stop third due to lack of efficacy and side effects of diarrhoea
- Stop when A1c <48

4<sup>th</sup>: GLP-1 AGONIST (injectable) e.g. exenatide, liraglutide, semaglutide

- Can remain on throughout
- Consider stopping when A1c <48
- May need to be continued for other reasons such as cardiovascular or renal benefit so you may wish to seek advice from the patient's consultant.

5<sup>th</sup>: BIGUANIDES i.e. Metformin SR or MR

- Can remain on throughout, but consider stopping earlier if there are gastrointestinal side effects.
- Generally stop last due to cost effectiveness, weight benefits and available research evidence
- Consider stopping when A1c <48

## Appendix 2: PATIENT INFORMATION LEAFLET: SGLT2 INHIBITORS AND DIABETIC KETOACIDOSIS IN TYPE 2 DIABETES

### **Why have I been given this leaflet?**

You are taking one of the following drugs:

- canagliflozin (Invokana)
- dapagliflozin (Forxiga)
- empagliflozin (Jardiance).

There is information about these drugs which you and your doctor or nurse should know about.

### **What's the problem?**

People taking this drug can develop an unusual complication of diabetes. This can lead to too much acid in your blood. This is called diabetic ketoacidosis and can happen *even when your blood glucose level is normal*. If not identified early, this can be very dangerous. However, this is a VERY RARE complication.

### **What should I look out for?**

If you are taking one of these tablets, please look out for these symptoms:

- nausea, vomiting, fast breathing, abdominal pains or fever.

If you have any of these symptoms, please see a medical professional, such as a doctor or nurse, *even if your blood sugars are near normal*.

If your GP practice is closed, please phone 111. State that you are worried about “Diabetic ketoacidosis”, that you take an SGLT2 inhibitor drug, and that you may require finger prick blood ketone testing.

### **Is there anything more likely to cause this?**

- This problem can develop at any time.
- You need to be especially careful if you develop an infection (like a chest or urine infection) or undergo surgery.
- In fact, if you have an operation, please discuss this medication with your doctor or nurse – you may need to stop your tablets. However, do not stop these drugs without discussing it with your doctor or nurse first.

### **If I feel unwell, what will my doctor or nurse do?**

You will have a finger prick blood test to test for the amount of sugar and ketones (a breakdown product of fat) in the bloodstream. If the levels of ketones are high, your doctor or nurse will contact the diabetes specialist team.

Please keep a copy of this leaflet with you.