

Management of the perioperative diabetic patient in accordance with AAGBI guidelines, 2015

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A magnifying glass with a black frame and handle is centered on the page. The lens of the magnifying glass is focused on the word "Diabetes", which is written in a bold, black, italicized serif font. The background of the slide is white with a light blue wavy border at the top. The entire slide has a fine halftone dot pattern.

Diabetes

Diabetes

- Diabetes is a metabolic disorder in which there are high blood sugar levels over a prolonged period.
- Diabetes is due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced.

Blood Sugar Regulation

Low blood
Glucose



High blood
Glucose



Pancreas



Glucagon Released
by Beta Cells
of Pancreas

Insulin Released
by Alpha Cells
of Pancreas

Liver Releases
Glucose into Blood

Fat cells take in
Glucose from Blood



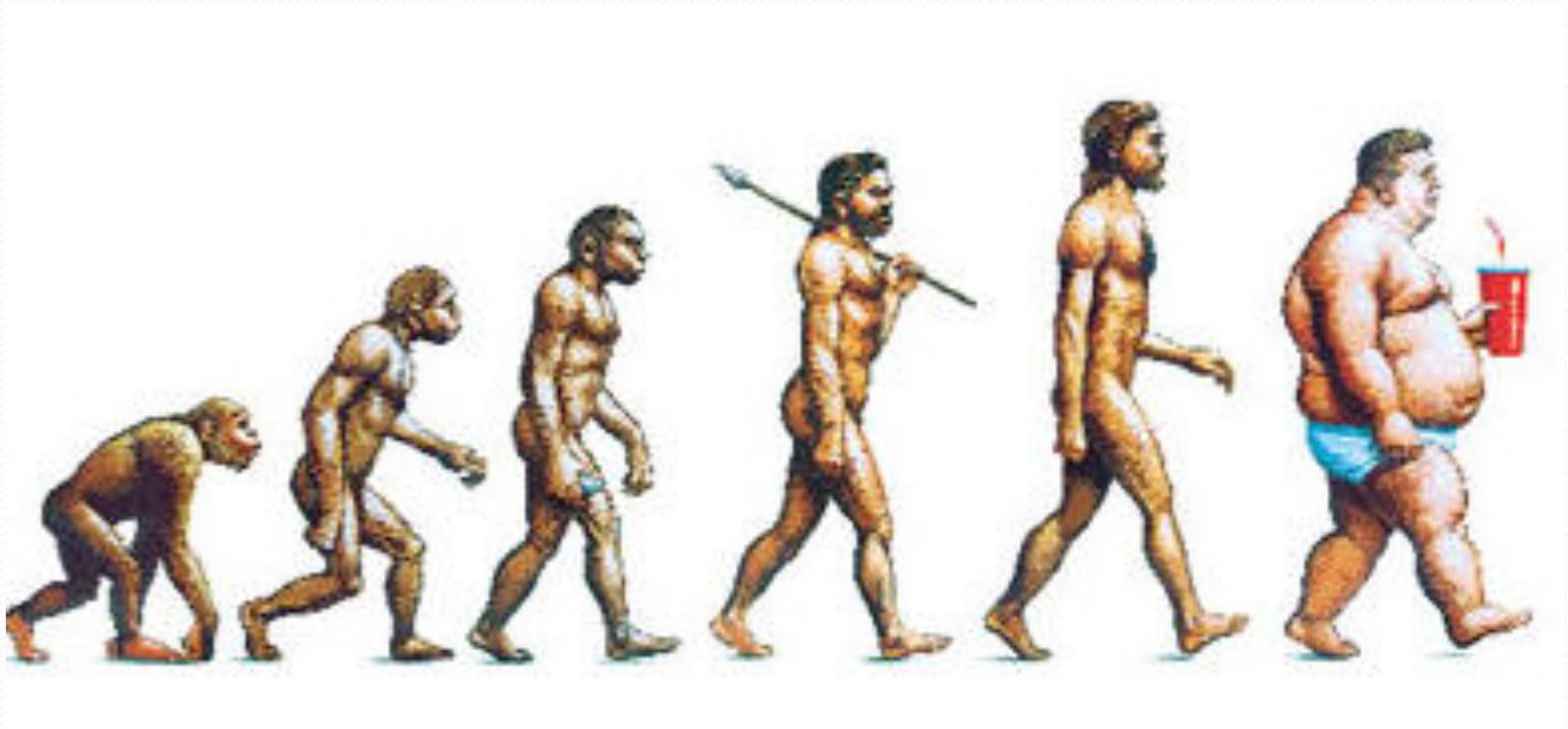
Achieve
Normal Blood
Glucose Levels



Background

- Diabetes is one of the major chronic illnesses
- The prevalence of type 2 diabetes is increasing rapidly, due mostly to the increase levels of obesity.
- Type 2 diabetes affects 1 in 20 people in Ireland while type 1 is always increasing but at a slower pace.
- This makes up to 5%-15% of the national health expenditure- depending on location.

Evolution of man



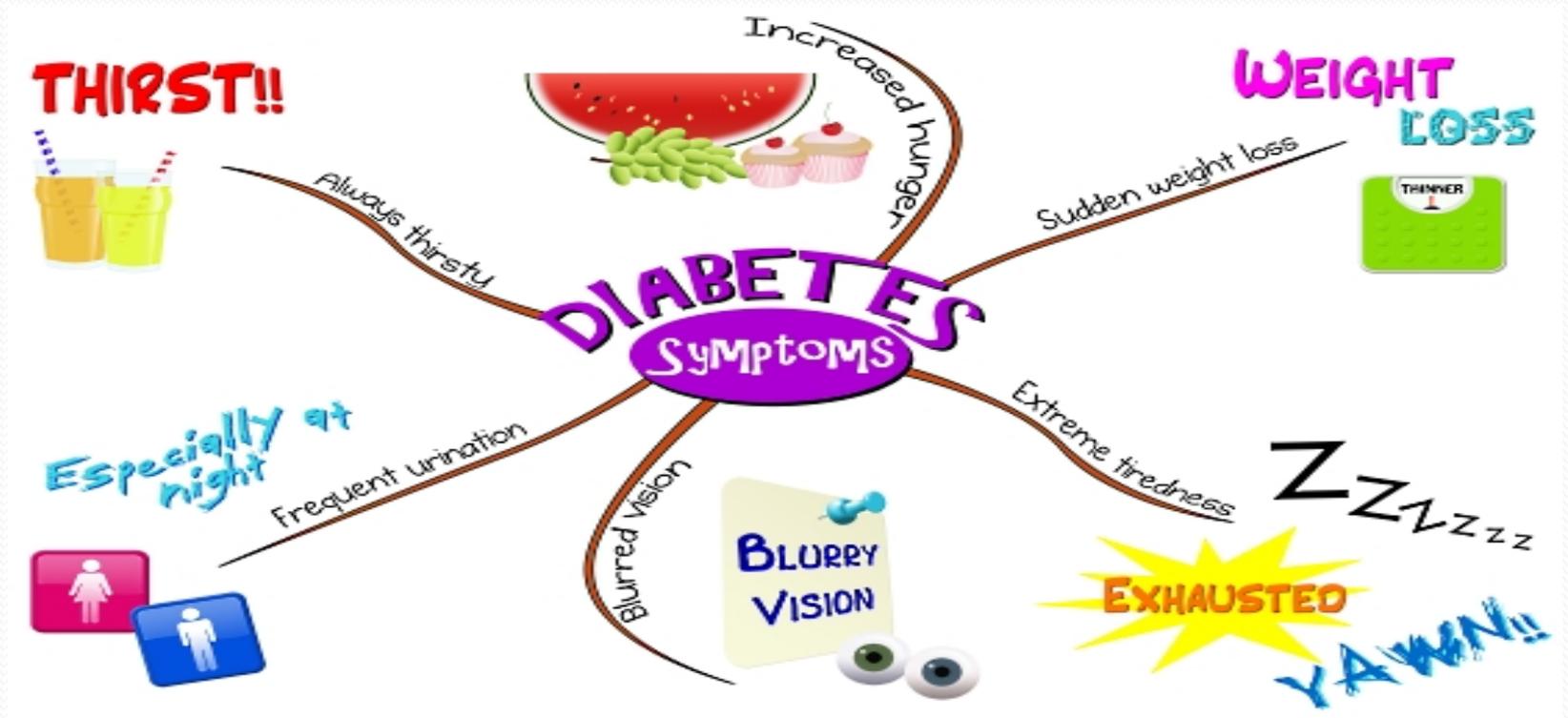
Classification

- Diabetes is classified as
- Type 1 Diabetes Mellitus
- Type 2 Diabetes Mellitus
- MODY (mature onset diabetes in the young, type2)
- LADA (latent autoimmune diabetes in Adults, Type1)
- Gestational Diabetes Mellitus
- Steroid induced Diabetes Mellitus
- Diabetes related to Malignancy/Trauma

Type 1

- Total beta-cell destruction in pancreas resulting in absolute insulin deficiency
- Autoimmune/idiopathic
- Sudden onset (within 48hrs)
- 5-30yrs (general age of onset)
- No family history
- Insulin dependent

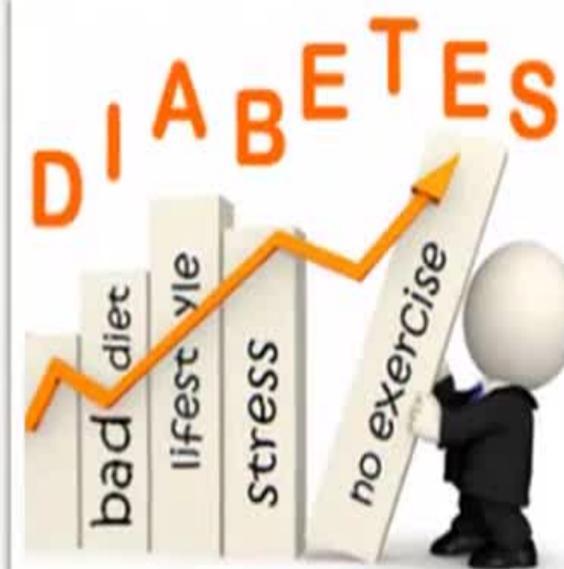
Type 1 Diabetes signs and symptoms.



Type 2 Diabetes Mellitus

- Asymptomatic/insidious
- Insulin resistant
- Reduced beta cell function (less insulin production)
- >40yrs age
- Family history
- Ethnicity
- Overweight/obese
- Inactivity
- Oral agents/injectables/insulin

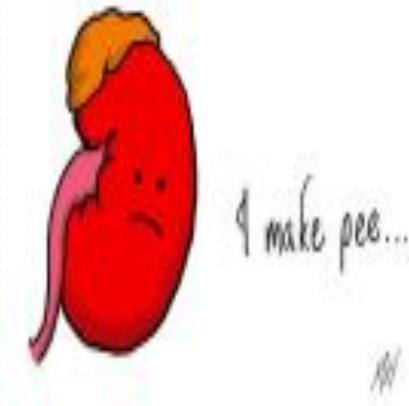
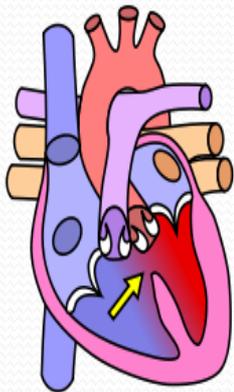
Symptoms of Type 2 Diabetes



Signs and symptoms of type 2 diabetes often develop slowly and in fact, you can have type 2 diabetes for years and not know it.

Co-morbidities

- People with diabetes are 2-4 times more likely to develop cardiovascular disease and die from these than the general population.
- It is a significant cause of blindness, non traumatic lower limb amputations and end stage renal disease resulting in transplantation and dialysis.(Harkins, 2016)



Nurses Knowledge



- Research carried out by Modic et al (2014) found that nurses knowledge of inpatient diabetes management principles was low. This was reiterated by Abduelkarem and El- Shareif (2013)
- This may be due in part to the rapidly changing technologies and drug regimes.
- Peimani et al (2010) concluded that by educating nurses and improving education to pts led to improved patient outcomes and lower healthcare costs.

Diabetes and Surgery

- Diabetes affects 10-15% of surgical population
- Patients with diabetes undergoing surgery have greater complication rates, mortality rates and length of hospital stay.
- Frisch et al (2010) showed that high pre-operative and peri-operative glucose levels can lead to :
 - 50% increase in mortality,
 - a 2.4 fold increase in post op respiratory infections
 - Doubling of surgical site infections
 - 3 fold increase in UTI's
 - A doubling in incidence of MI
 - ↑ Acute kidney injury.



Peri-operative management of the surgical patient with diabetes 2015

**Published by
The Association of Anaesthetists of Great Britain & Ireland**

Sept 2015

AAGBI.....

- AAGBI state that “ *management of diabetes is a vital element in the management of surgical patients with diabetes. It is not good enough for the diabetic care to be secondary or sometimes forgotten, element of the peri-operative package*”



Pre-op

- Aim is to ensure that diabetes is as well controlled as possible before elective surgery.
- Pre assessment is advised as early as possible.
- HbA_{1c} should be <69mmol for elective cases, elective surgery should be delayed if it is ≥ 69 mmol while control is improved. Patient should be referred back to primary care team.
- If it is not possible to improve diabetic control pre-op i.e if chronic infection is contributing to poor glycaemic control then patient should be advised of increased risks
- NICE guidelines on pre-op testing indicate that all patients with diabetes should have ECG and urea and electrolytes (\uparrow risk heart disease, \uparrow risk kidney disease)
- Written instructions for patient for day of surgery.

Note

- HBA₁C is a measure of the glucose levels in your blood over a 2-3 month period. It is reflective of how well controlled your diabetes is.
- Glycaemic control in diabetic patients is a balance between carbohydrate intake and utilisation (exercise)
- It also depends on what medication they are on and how they work.

Day of surgery

- Aim is to minimise fasting period, ensure normoglycaemia (6-10mmol) and minimise as far as possible disruption to the patients usual routine.
- First on list
- With appropriate guidance patients with diabetes should be allowed to retain control and continue to self administer their medication.
- Avoid hypo- or hyperglycaemia during the period of fasting and time during and after procedure until patient is eating and drinking.

Recommendations for adjustment of oral hypoglycaemic agents with patients undergoing surgery

Agent	Action	Risk with surgery	Adjustment for day of surgery	Adjustment post surgery
Sulphonureas (diamicron) and meglinides eg gliclazide	Stimulates the pancreas to produce more insulin	Risk of hypoglycaemia while fasting	Omit on day of surgery	Take at usual times once drinking and eating normally
SGLT-2 Inhibitors Empagliflozine,(jardiance)	Helps eliminate glucose in the urine	Risk of ketosis and acidosis while fasting or systemically unwell. DKA	Omit on day of surgery	Omit the day after surgery- restart following ady once eating and drinking normally

Agent	Action	Risk with surgery	Adjustment for day of surgery	Adjustment post surgery
Biguanides Metformin	Reduces the production of glucose by the liver.	Risk of lactic acidosis if renal impairment present. Avoid 48hrs if using contrast.	Take as normal assuming no contrast given	Take as normal assuming no contrast given.
DPP4 inhibitors Linagliptine(trajenta, Sitagliptine(Januvia)	Intensify the effect of intestinal hormones involved in the control of blood sugar	Minimal risk	Take as normal	Take as normal

Recommendations for adjustment of insulin in patients with diabetes undergoing surgery (short starvation period)

Insulins Patients on:	Adjustment on day before admission	Adjustment on day of surgery	Adjustment post surgery
Once daily long acting insulin e.g. Lantus, levemir, tresiba, insulatard, toujeo, humulin	Reduce dose by 20%	Reduce dose by 20%	Take at usual times once eating and drinking normally*
Twice daily long acting insulins	No dose change	Reduce first dose by 50%	Take usual evening dose once eating and drinking
Mixed insulins – novamix 30, humalog mix 50,	No dose change	Reduce dose by 70%	Take usual evening dose once eating and drinking.

Recommendations for adjustment of insulin in patients with diabetes undergoing surgery (short starvation period)

Insulins Patients on:	Adjustment on day before admission	Adjustment on day of surgery	Adjustment post surgery
Short acting insulin e.g novarapid, humulin, humalog.	No dose change	Omit while patient not eating.	Take at usual times once eating and drinking normally.

Variable rate intravenous insulin infusion (VRIII)

- Are advised when:
- Patients will miss more than one meal
- Those with type 1 diabetes undergoing surgery who have not received background insulin.
- Those with poorly controlled diabetes (HBA₁C >69mmol)
- Patients requiring emergency surgery.
- VRIII are associated with hypoglycaemia, hyperglycaemia, ketosis and hyponatremia.
- AAGBI recommended that glucose 5% in saline 0.45% should be administered with VRIII to maintain pts fluid requirements.
- Check pts potassium at least 6 hrly while pt is on VRIII
- Replace as per hospital policy- CHB- if serum <3.5 mmol/l add 40mmol KCL to each litre, if serum K is 3.5-5.1 mmol add 20mmol to each litre.

Example of VRIII- Majority of patients

(Different rates for insulin –sensitive pts <24iu day or insulin resistant pts >100iu day) (CBG measured hourly)

CBG(Capillary blood glucose reading	Standard insulin infusion rates for majority of patients
<4mmol	STOP & give 100ml Dextrose 20% IV
4.1-6.0 mmol	STOP & consider 50ml Dextrose 20% IV
6.1-8.0 mmol	1 international unit per hour
8.1-12.0mmol	2 international units per hour
12.1-16.0mmol	4 international units per hour
16.1-20.0	5 international units per hour
20.1-24mmol	6 international units per hour (ensure insulin running)
>24.1mmol	8 international units per hour (ensure insulin running, contact team)

Intra-op care and monitoring.

- Aim of intra-op care is to maintain good glycaemic control and normal electrolyte concentration while optimising cardiovascular function and renal perfusion.
- Intra-op BSL of 6-10mmols should be aimed for (upper limit of 12 if poorly controlled and not on VRIII)
- CBG checked before induction of anaesthesia and at least hourly or more frequently if results outside target range

Management of intraoperative hyperglycaemia



- If CBG ≥ 12 mmols and insulin has been omitted capillary blood ketones should be measured, if capillary blood ketones are >3 or significant ketonuria $>2+$ on urine stick ? Diabetic ketoacidosis (DKA)
- To confirm DKA: ketonaemia >3 mmol
 - BSL > 11 mmol
 - Bicarbonate < 15
 - Venous pH < 7.3

If DKA not present CBG should be corrected using SC insulin or altering rate of VRIII or commencing VRIII.

Treatment of Hyperglycaemia in patient with type 1/type 2 diabetes

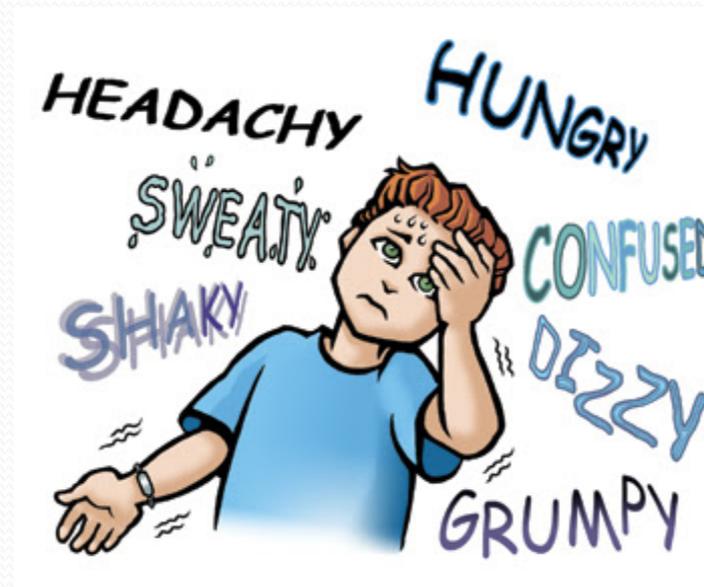
- Subcut rapid acting insulin (novarapid) up to a maximum of 6IU . (each iiu will drop CBG by 3 mmol)
- CBG checked hourly
- Second dose only considered after 2 hours.
- Consider VRIII if patients remain hyperglycaemic.

Diabetic Ketoacidosis

- Diabetic ketoacidosis is a potentially life threatening complication of diabetes
- Surgery on pt with DKA should be avoided if at all possible.
- If surgery required, involvement of senior MDT should be considered to agree optimal peri-operative management.

Treatment of intraoperative hypoglycaemia

- BSL 4-6mmol, 50 ml glucose 20% should be given IV
- >4mmol , 100ml glucose 20% should be given.



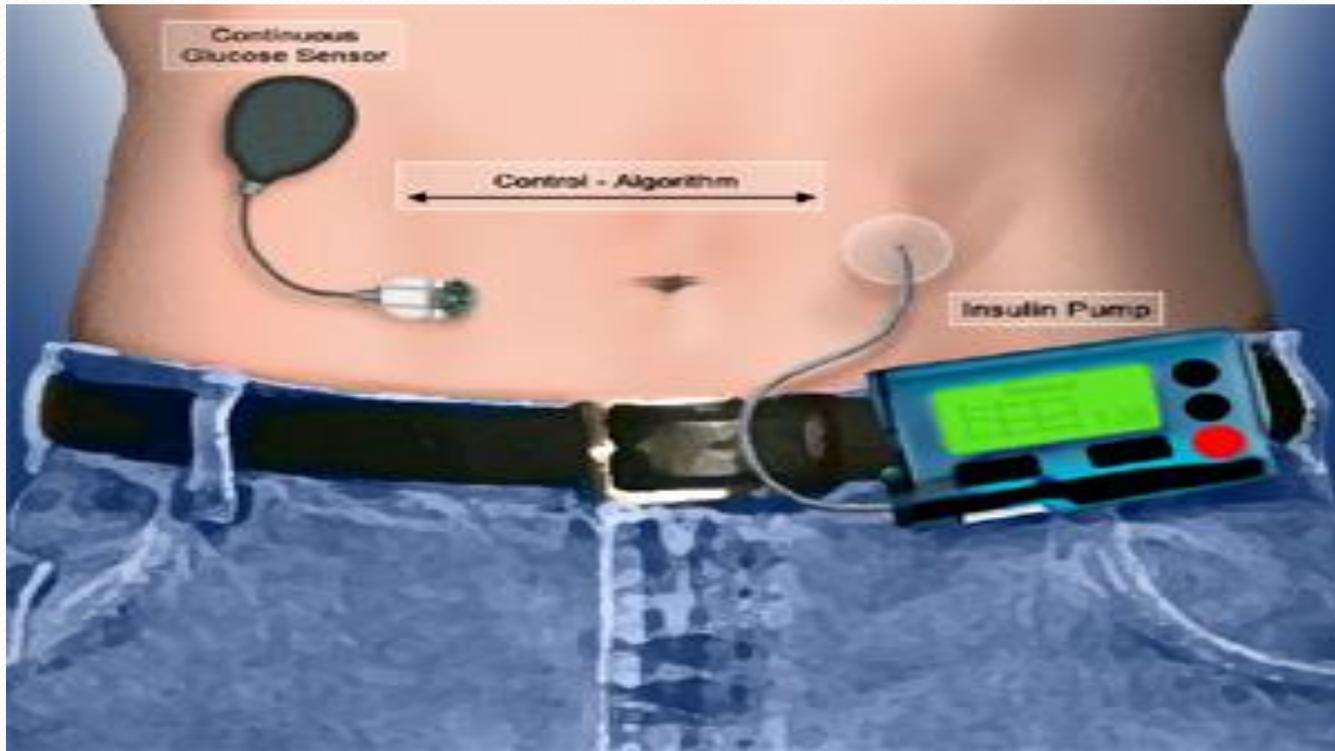
Other peri-op considerations

- Use Hartmanns or NACL (Hartmanns does not contribute to clinically significant hyperglycaemia)
- Avoid Dexamethasone if possible as can lead to hyperglycaemia- if given ensure CBG is measured hourly for 4 hrs.
- Safety issues with administration of insulin. (one third of all inpatient medical errors leading to death involve insulin administration.) Use insulin syringe.

Returning to 'normal' medication and diet post op.

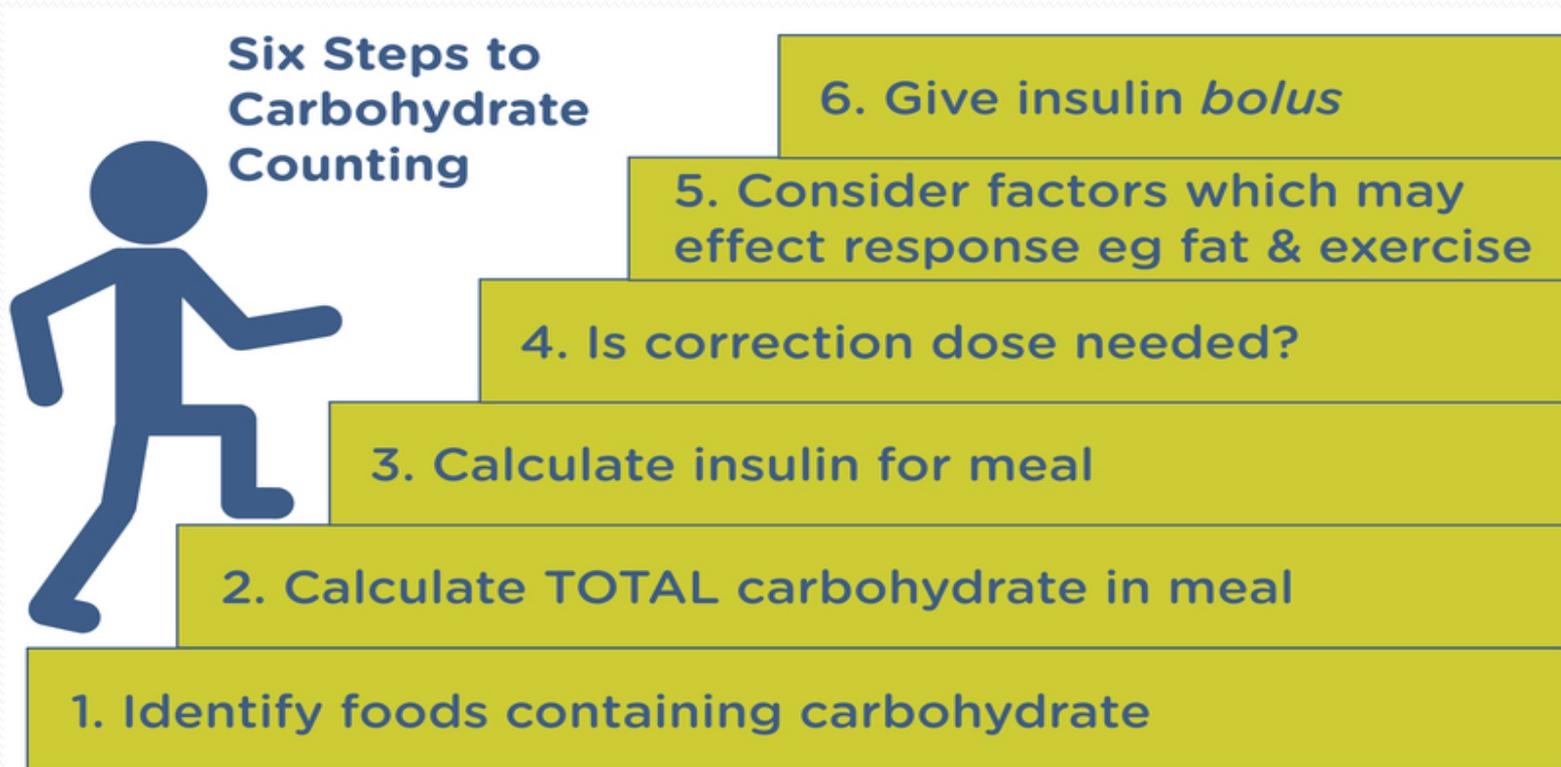
- Return to eating and drinking as soon as possible.
- Oral hypoglycaemics agents should be recommenced at pre-op doses once patient is eating and drinking. Withholding of sulphonylureas may be required if food intake is reduced.
- Monitor GFR with metformin ($> 50\text{ml/min}$)
- VRIII should be continued until 30-60 min after the patient has received sc insulin.
- Transition from iv to sc insulin should take place when next meal related sc insulin dose is due.
- Seek advice from Diabetic Nurse specialist.

What's new?





Carbohydrate Counting



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COUNTERTHINK

FINISH YOUR DESSERT!
THERE ARE CHILDREN
STARVING IN CHINA!



CONCEPT-MIKE ADAMS ART-DAN BERGER

DON'T EAT THE WHOLE
CAKE! THERE ARE CHILDREN
WITH DIABETES IN AMERICA!



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