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Medi Quest BRS Hospital

A monthly News letter from BRS Hospital

Usage of Insulin in Type 2 diabetes for the Practitioner

Part II

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This issue of Mediquest covers the following aspects of insulin

A. 1. Intravenous Insulin Infusion
2. Transition from iv to sc insulin

B. Insulin use in special situations
1. Elderly
2. Fasting
3. Sick day fasting

C. Others
1. Hepatic impairment
2. Cardiovascular disease

D. Hypoglycemia

E. Blood glucose monitoring Self monitoring of blood glucose Continuous glucose monitoring

F. Insulin pump

G. The future of insulin

A. 1. Intravenous insulin infusion is used in following clinical conditions

- Uncontrolled hyperglycemia despite the use of multiple SC insulin injections
- DKA or HHS
- During childbirth and before an emergency surgery
- People who are extremely ill, such as those with sepsis and septic shock
- Perioperative period
- People with NBM status, or who have inconsist ent meal patterns in terms of timing or nature
- Organ transplantation
- High-dose glucocorticoid treatment
- Dose-finding strategy prior to conversion to SC insulin

The important precaution to take while a patient in IV insulin is to avoid hypokalemia

In the majority of cases Blood glucose targets of 140-180 mg /dl should be maintained . A tighter control of 110 to 140 mg/dl may be warranted in certain situations. In the terminally ill with significant co morbidities, a target of less than 250 mg/dl can be accepted

2. Transition from intravenous to subcutaneous insulin

The insulin dosage is determined based on insulin infusion rate during last six hours when stable glycemic targets were met , the last six hours insulin administered is multiplied by four , 80% of this value is total

daily dose of SC insulin . If BBR is used 40 % of this dose is given as basal insulin and 60% is divided into 3 bolus doses of premeal insulin.

There needs to be an overlap of 30 minutes of IV insulin , after SC bolus is given while transitioning from IV to SC Insulin .

B. Insulin in special situations

1. Insulin in elderly

Elderly adults with no coexisting chronic illnesses as well as unimpaired cognitive function and good functional status may aim for stringent glycemic goals (HbA1c <7.0-7.5%) if achievable without hypoglycemia

Older adults with multiple coexisting chronic illnesses, cognitive impairment, or functional dependence should have less stringent goals (HbA1c < 8.0%).

For older adults on insulin, CGM can be recommended where appropriate

Usage of pens over syringes and analog insulins over human insulin needs to be considered for safety, flexibility, and convenience in the geriatric population.

Older adults with diabetes on insulin have a greater risk of hypoglycemia hence episodes of hypoglycemia should be ascertained and addressed at every visit.

2. Insulin and fasting

Many people fast for religious reasons .

Persons on insulin should be discouraged from fasting .
If they persist in their desire to fast, the following precautions to be taken

Encourage frequent self monitoring of blood glucose with glucose strips or CGM

The Patient should be educated about carbohydrate counting and modify insulin accordingly. Counsel the patient about the risk of hypoglycemia and hyper glycemia. Hyperglycemia in a fasting patient is due to enhanced glucagon breakdown and gluconeogenesis . During non fasting hours plan meals with low glycemic index CHOs, including fruits, vegetables and lean meats. Sweets, sweetened beverages and fried meals should be avoided

If hypoglycemia develops the person should be advised to break the fast immediately

3. Sick Day Management

Sickness is frequently associated with elevated blood glucose levels and increased risk of ketoacidosis. Insulin requirement increases significantly during acute sickness, which in return requires a increase in frequency of BGM. Additionally ketone testing is needed if there are episodes of vomiting, stomach discomfort or rapid breathing

The following are important measures to take in a sick day by the patient

Getting in touch with the doctor. Checking blood glucose every four hours , increasing insulin dosing as needed

If blood sugar is consistently above 250mg/dl , and or signs and symptoms of DKA occur to get admitted immediately

4. Hepatic Impairment

Individuals with hepatic impairment and diabetes needing insulin should select regimens with reduced risk of hypoglycemia . Insulin analogs should be considered

5. Chronic Kidney Disease

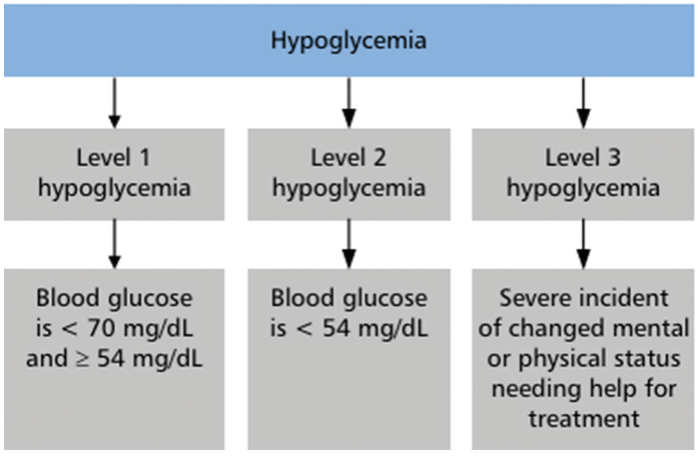
People with diabetes and chronic kidney disease have a biphasic pattern in their insulin needs. In early stages more insulin is needed due to insulin resistance, but as advanced renal failure progresses and creatinine clearance falls <50ml/min insulin need decreases, and in extreme cases it may have to be stopped

6. Cardiovascular Disease

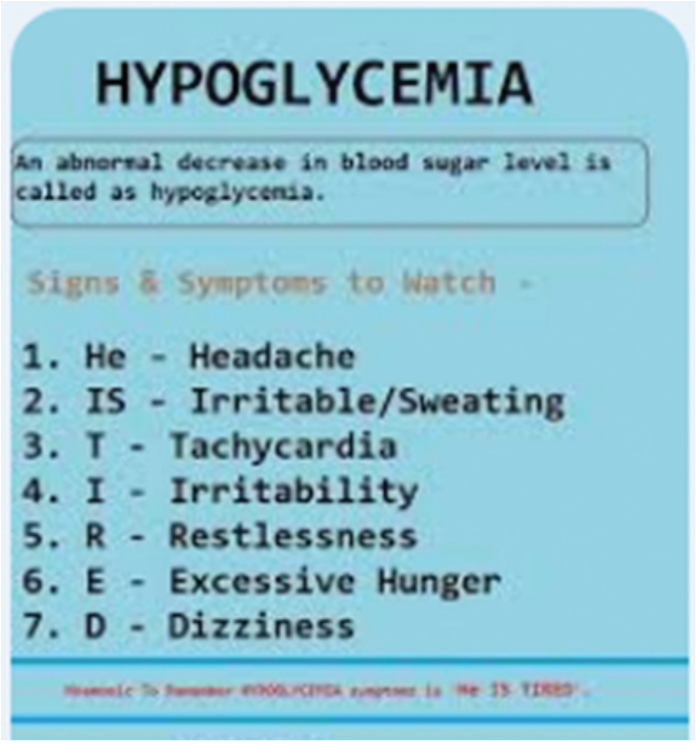
Premix insulins are more successful in lowering PPG than basal insulin analogs. It the glycemic objective is not met after adding basal insulin , a basal plus/premix regimen should be explored before moving on to a BBR

C. Hypoglycemia

Classification of Hypoglycemia



Pneumonic to remember symptoms and signs of Hypoglycemia " He is tired"



It is worth considering insulin analogs for managing blood glucose in people with T1D or T2D and more frequent SMBG (3 times or more) who frequently experience severe hypoglycemia with human insulin .

Most episodes of hypoglycemia can be treated by ingestion of glucose or CHO containing juices, soft drinks, sweets or a meal. A good amount of CHOs (15-20 gm) can be given again in 15-20mins

It is often advised to consume a larger snack or meal soon after the plasma glucose level is corrected to normal range with oral glucose

Unconscious person with hypoglycemia blood glucose less than 70 mg /dl should be given IV bolus of 60 ml of 25% glucose . Recheck blood glucose after 10 mins and if still less than 70 mg/dl repeat treatment. Once blood glucose is >70mg/dl and person is conscious and safe to swallow 15-20 gm of glucose (glucose powder ,tablet , honey , sugar sweet chocolate.) If patient conscious but unable to swallow commence infusion with 5%GNS

Hypoglycemic unawareness is defined as having blood glucose < 70mg/dl without symptoms . Such patients should be referred to expert. They may encouraged to raise their glycemic goals .

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D. Self Monitoring of Blood Glucose

1. Self monitoring of blood glucose with glucose strips helps to improve glucose control , reduce hypoglycemia and boost self efficacy

2. Continuous Glucose Monitoring

CGM predicts blood glucose levels by monitoring the concentration of glucose in the interstitial fluid using a sensor implanted directly beneath the skin.

Time in range , time below range and time above range are useful metrics of CGM for glycemic control and it corelates well with HbA1c.

E. Insulin Pump

A continuous subcutaneous insulin infusion (CSII) pump, also known as an insulin pump, is a medical device used to manage diabetes. It delivers a continuous, measured dose of rapid-acting insulin into the body through a small catheter inserted under the skin, mimicking the way a healthy pancreas would release insulin. This method allows for more precise control of blood glucose levels compared to multiple daily injections . Insulin pump has to be used with continuous glucose monitoring

F. Future of insulins

Non invasive routes of Insulin

There is a perpetual quest to move from insulin injections to non invasive routes which mainly include buccal, oral, pulmonary nasal and transdermal systems. Some of these preparations are available in richer countries.

Biosimilar Insulins

Refers to a protein molecule which is similar to existing insulin , but is not an exact generic copy . It is produced in living organisms . The biggest advantage is the lesser cost

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