Drug: EMPAGLIFLOZIN  
  
# Available Drug Strengths  
EMPAGLIFLOZIN 10MG TAB;  
EMPAGLIFLOZIN 25MG TAB  
  
# Mechanism of Action & How it Works / Helps  
Empagliflozin is a sodium-glucose co-transporter 2 (SGLT2) inhibitor. SGLT2 inhibitors work by preventing the kidneys from reabsorbing sugar (glucose) back into the blood, and this increases the amount of sugar that is removed in the urine. It works together with lifestyle changes, such as having a healthy diet and regular exercise, to reduce blood sugar levels.   
If you suffer from heart failure, this medication can also be given to you to help with your heart condition, even if you do not have diabetes.  
  
###CHUNK\_DELIMITER###  
  
# Indication Information for Empagliflozin  
  
## Indication 1: Type 2 Diabetes (T2DM)  
  
### Summary Of Disease Condition  
Diabetes means your blood sugar level is higher than normal. Type 2 Diabetes, is usually found in people aged 40 and above who are overweight and physically inactive. In some people, the condition is mild and they are able to control their blood glucose with just diet and exercise. However, if the condition gets worse, they may require oral medication or insulin injections in addition to making lifestyle changes.  
  
### Additional Information On Disease  
People with Type 2 diabetes can feel well and not experience any symptoms at all. However, there may also be symptoms that develop gradually and are sometimes so mild they go unnoticed, such as the following: Having blurred vision, feeling thirsty despite drinking lots of water, poor healing of cuts and wounds, feeling tired, feeling hungry all the time, losing weight despite good appetite or frequent urination. The high blood glucose (hyperglycemia) levels in uncontrolled diabetes can damage both nerves and blood vessels. As blood vessels supply blood to various organs, this can eventually lead to complications such as:   
Kidney disease  
Foot disease such as numbness, ulcers, and even gangrene  
Eye disease  
Nerve disease which can lead to problems such as erectile dysfunction and diarrhoea  
Heart disease such as angina and heart attack  
Stroke  
  
### Disease Aetiology  
Type 2 Diabetes usually occurs when the body's cells do not respond well or are resistant to the body's own insulin. It is commonly associated with being overweight and having excessive body fat (under the skin and around the internal organs). Typically, it develops in older adults (risk increases for those above 40 years).  
  
### Non Pharmacological Counselling  
Here are some lifestyle tips if you have diabetes:  
1. Lose weight if you are overweight. Aim for a healthy Body Mass Index (BMI) ranging from 18.5 to 22.9kg/m2 to reduce the risk of heart disease and insulin resistance.   
2. Maintain an active lifestyle. This helps to maintain healthy body weight. Engage in 150 minutes of moderate-intensity activity per week e.g. brisk walking, cycling, jogging, swimming, dancing where possible or as advised by your doctor.  
3. Follow the healthy plate concept which helps you remember the right proportions of each food group in a well-balanced meal. Here's how:  
Fill Quarter plate with wholegrains  
Fill Quarter plate with good sources of protein  
Fill Half plate with fruit and vegetables  
4. Eat more fibre-rich food. Fibre helps to slow down the rate at which sugar is being released into the bloodstream, keeps you full and improves bowel function.  
Include two servings each of fruit and vegetables daily.  
1 serving of fruit = 1 small apple or 1 wedge papaya or 10 grapes (small)  
1 serving of vegetables = 100g cooked vegetables (¾ mug) or 150g raw vegetable  
4. Include wholegrain products in your diet such as wholegrain or whole-meal bread, oats, chapati, brown rice, whole-meal biscuits etc.  
5. Have regular meals at similar timings each day. This provides a regular and constant amount of sugar from the food you eat to reduce fluctuations in your blood sugar level.  
This is also important for those on medications and/or insulin therapy to allow the action of the medication/insulin to match your food intake, hence preventing hypoglycaemia (low blood sugar).  
6. Quit smoking as smoking increases insulin resistance, risk of diabetes and its complications.  
  
## Indication 2: Chronic Kidney Disease (CKD)  
  
### Summary Of Disease Condition  
Chronic kidney disease (CKD) is due to the gradual loss of the kidneys' filtering ability, usually due to high blood pressure or diabetes. When kidney function is seriously impaired, dangerously high levels of fluid and wastes can accumulate in the body.  
  
### Additional Information On Disease  
Our kidneys play a crucial role in maintaining the body's internal balance by adjusting the composition of the urine they produce, and are critical for our survival. 1) They regulate the amount of salt and water in the body, ensuring proper fluid balance, and 2) they eliminate waste products from the body through urine, helping to cleanse the system. Additionally, 3) the kidneys produce a hormone called erythropoietin, which is essential for the formation of adequate red blood cells. 4)They also contribute to bone health by converting vitamin D into its active form and regulating calcium and phosphate levels. 5) The kidneys help maintain the body's chemical balance by controlling acid levels and managing various minerals and salts.  
  
### Disease Aetiology  
There are many reasons why a kidney stops working. Diabetes and high blood pressure are two major causes of kidney disease. Other risk factors include a family history of kidney disease, cardiovascular disease, older age and abnormal kidney structure. For many people, kidney failure is often the result of complications caused by an unhealthy lifestyle. Diabetic nephropathy is kidney failure resulting from long-standing and poorly controlled diabetes. When diabetes is poorly controlled and blood sugar levels are high, the kidney have to work extra hard to filter the blood, causing damage to the blood vessels in the kidney and decline in its filtering ability over time.  
  
### Non Pharmacological Counselling  
The main goal of CKD treatment is to halt or delay the progression of the disease, usually by controlling the underlying cause such as controlling high blood pressure and diabetes. CKD can progressively worsen over time and end up with kidney failure, which can be fatal if not treated with dialysis or a kidney transplant.   
Here are some lifestyle tips if you have CKD:  
1. Opt for less sugar, salt, and fats when dining out. Consider home cooked meals to better control the amount of sugar and salt. Have a healthy diet with at least 2 servings of fruits and 2 servings of vegetables every day. Consider whole grains and lean meat.  
2. When kidney function starts to decrease, CKD patients may need to adjust their diet to prevent excess waste and fluid from building up. Diet modification varies for individuals due to their age, body size, symptoms, stage of CKD, activity level, and other health conditions. It is thus important to discuss with your doctor or dietician, for example regarding the right amount of protein, phosphorous, potassium, sodium and fluids you should be consuming.   
3. Quit smoking and limit alcohol. Smoking can damage your blood vessels, which reduces blood flow to the kidneys and reduce their ability to function normally. Smoking can also increase the risk of developing kidney cancer. Drinking too much alcohol can also increase blood pressure over time, which is one of the common causes of kidney disease.  
4. Maintain an active lifestyle to maintain a healthy body weight. Engage in 150 minutes of moderate-intensity activity per week e.g. brisk walking, cycling, jogging, swimming, dancing where possible or as advised by your doctor.  
  
## Indication 3: Heart Failure (HF)  
  
### Summary Of Disease Condition  
The heart is a very important organ that pumps blood to all parts of the body. In the more common cases of heart failure, the heart is weak is unable to pump enough blood to meet the body's demands. Due to the abnormal function of the heart, patients with heart failure experience may experience other symptoms too, for example, difficulty breathing, fatigue, water retention, and high blood pressure. When left untreated, heart failure will worsen over time.  
  
### Additional Information On Disease  
There are two main ways by which heart function can become abnormal:  
More commonly, the heart which is weak is unable to pump enough blood to meet the body's demands. Any disease condition or injury to the heart muscles, heart valves or electrical conduction system of the heart can damage and weaken the heart causing heart failure.  
Another way is a stiff heart that is unable to fill properly with blood even though it may still be able to "pump" well. This situation leads to increased pressures within the heart chambers and eventually in the blood vessels of the lungs, causing heart failure.  
Both conditions eventually cause a decrease in cardiac output and inadequate blood supply to the rest of the body. When this occurs, the body will compensate for the lack of blood supply through a number of ways.  
For instance, certain hormones and the nervous system (also known as the neurohormonal systems) become active, making the injured heart contract harder and faster. These systems also cause the kidneys to retain salt and fluid in order to increase blood volume, and also make the blood vessels in the body and limbs become narrower to increase blood pressure. While these processes may initially improve the heart function and cardiac output, in the long run, they damage the body and the heart, particularly if the heart remains injured. Altogether, these processes produce the syndrome of heart failure.  
  
### Disease Aetiology  
One or a combination of these various conditions can cause the heart to function inefficiently:  
- Heart muscle damage due to heart attack or when the heart arteries become severely narrowed  
- Poorly controlled long-term high blood pressure  
- Faulty heart valves  
- Cardiomyopathy (disease of the heart muscle due to genetic causes, or damage to the heart muscle by external causes like a virus or alcohol)  
- Congenital heart disease (heart defects present since birth)  
- Infection of the heart and/or heart valves  
- Arrhythmia (heart rhythm disorder)  
- Certain toxins (alcohol, cocaine, certain chemotherapy drugs)  
- Other medical conditions (e.g. thyroid disease, autoimmune conditions, tumours affecting the heart, etc)  
  
### Non Pharmacological Counselling  
Here are some lifestyle tips if you have heart failure:  
1. Eat less salt, cholesterol-rich food and saturated fat. Avoid egg yolks, organ meats, seafood (e.g. squid) as they contain high amounts of dietary cholesterol. Choose the healthier types of fat (unsaturated fats such as olive oil, corn oil and sunflower oil instead of saturated such as coconut oil).   
2. Eat more fibre as a high fibre diet (particularly soluble fibre) will improve your blood cholesterol level. Good sources of fibre are vegetables, fruits and whole grain  
3. You may need to limit your fluid intake if instructed by your doctor.  
4. Quit smoking if possible and limit alcohol beverages if possible.  
5. Many people can continue to carry out their daily activities and lead a relatively normal lifestyle, despite having a heart condition. If you had a recent heart failure event, it is important that you return to your previous home, leisure and work activities gradually to help your heart to heal. Some energy conservation techniques you can try are:  
Approach your day calmly.  
Allow enough time for each task so that you do not have to rush.  
Plan realistically and prioritise the things you need to do for the day.  
Take short breaks and rest between tasks, even when not feeling tired  
   
6. Remain active as much as possible and continue to do the activities you enjoy. Heart failure can cause symptoms of breathlessness on exertion and muscle tiredness, thus do consult your doctor or therapist for the kind of exercise(s) that you can do safely and avoid overexertion. You may also find out more about cardiac rehabilitation, supervised exercise training and educational programmes.  
7. Monitor your weight daily as rapid weight gain may be a sign that you are retaining fluid or that your heart failure condition is getting worse. Try to weigh yourself in the morning (at the same time each day), after emptying your bladder and before breakfast. Wear the same amount of clothes each time you weigh yourself and record it daily in your diary or chart. Use the same weighing scale. Watch for sudden weight gain and contact your doctor if you suddenly gain more than 1 kg of weight a day for three days.  
  
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# Administration Instructions  
- You may take this medication before food or after food.   
- Dosage form: tablet  
- Can it be crushed: Yes  
  
# Counselling Points for Empagliflozin  
  
## Counselling Point 1: Sick Day Dosing  
Temporarily stop if experiencing acute illness, especially when you have very poor appetite  
  
## Counselling Point 2: Fasting Blood Glucose Testing  
If you need to do fasting blood tests, do not take your medication until your blood has been taken and you have eaten.  
  
## Counselling Point 3: Procedures  
If you have planned surgery and procedures, please inform your healthcare professional. You may need to stop taking this medication for a couple of days.  
  
# Medication Storage  
Store your medication in a cool, dry place away from heat, moisture and direct sunlight, such as in a cupboard  
  
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# Pregnancy & Breastfeeding Considerations  
- Pregnancy: please inform your healthcare professional if you are pregnant, planning to become pregnant or breastfeeding  
- Breastfeeding: please inform your healthcare professional if you are pregnant, planning to become pregnant or breastfeeding  
  
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# Side Effects of Empagliflozin  
  
## Side Effect 1: Allergy Reaction  
  
### Likelihood of side effect  
Rare but severe  
  
### Side effect symptoms  
Swelling of eyes and/or lips; rashes throughout the body; difficulty breathing; faintness  
  
### Management of side effects  
Seek immediate medical attention or visit the emergency department if symptoms are severe  
  
## Side Effect 2: Low Blood Pressure (Hypotension)  
  
### Side effect class specificity  
SGLT-2  
  
### Likelihood of side effect  
Common  
  
### Cause of side effect  
Dehydration as the medicine removes the excess sugar in your body through increased passing of urine.  
  
### Side effect symptoms  
Giddiness or light-headedness, especially when you get up from a lying or sitting position  
  
### Management of side effects  
This is more likely to happen in the morning or when you first get out of bed. Getting up slowly may help. You should take an extra 1 to 2 glasses of water every day unless your doctor tells you to control your fluid intake.  
  
## Side Effect 3: Low Blood Sugar (Hypoglycaemia)  
  
### Likelihood of side effect  
Common  
  
### Side effect symptoms  
Weakness, dizziness, hunger, sweating, trembling, blurred vision. There is increased risk if you are elderly above 65 years old, are exercising more than usual, or are eating less than usual due to sickness  
  
### Management of side effects  
How to treat low blood glucose using the 15/15 rule  
Step 1:  
If you experience symptoms of hypoglycemia, check your blood glucose using your glucometer. If your blood glucose is < 4.0 mmol/L, eat or drink 15 g of fast-acting carbohydrates immediately.  
Examples of fast-acting carbohydrates include: 4-5 glucose tablets, 1/2 can of soft drink (150ml-200ml), 1/2 glass of fruit juice (150ml), or 3 teaspoons honey.  
If you have symptoms of low blood glucose, but cannot check your blood glucose immediately, eat or drink 15g of fast-acting carbohydrates to be safe.  
Avoid ice cream, cakes, chocolate with high fat content as it will take too long to increase your blood glucose levels: Any item that requires a lot of prolonged chewing/sucking  
Step 2:  
Wait for 15 minutes, and then re-test your blood glucose.  
Step 3:  
If your blood glucose is still low (< 4.0 mmol/L), repeat steps 1 to 3. If your blood glucose is 4.0 mmol/L and above, proceed to step 4.  
Step 4:  
Blood glucose levels may fall again about 1 hour after you have treated your hypoglycaemia. If your next meal is more than 1 hour away, eat an additional snack containing 15g of longer-acting carbohydrates.  
Examples include: 3 pieces of biscuits, 1 slice of bread,   
Carry quick-acting carbohydrates with you at all times, so that you are always prepared to treat hypoglycemia.  
However, if hypoglycemia frequently occurs, please inform your doctor as your diabetes medicines may need to be adjusted.  
A family member or friend should take you to the hospital or call an ambulance (995) immediately if you:  
Continue to have low blood glucose (< 4.0 mmol/L) after repeated treatments with fast-acting carbohydrates  
Have a seizure  
Are unconscious because of a hypoglycemia episode  
  
## Side Effect 4: Diabetic ketoacidosis (DKA)  
  
### Side effect class specificity  
SGLT-2  
  
### Likelihood of side effect  
Rare but severe  
  
### Cause of side effect  
Dehydration, extended periods of fasting or large reductions in food intake may increase the chances of DKA happening. It is a life-threatening problem that occurs when the body starts breaking down fat at a fast rate. The liver processes the fat into a fuel called ketones, which causes the blood to become acidic.  
  
### Side effect symptoms  
Stomach pain, nausea, vomiting, confusion, unusual tiredness, shortness of breath, thirst, sweet fruity smell in your breath  
  
### Management of side effects  
Seek immediate medical attention at the hospital emergency department  
  
## Side Effect 5: Genitourinary Infection  
  
### Side effect class specificity  
SGLT-2  
  
### Likelihood of side effect  
Common  
  
### Cause of side effect  
The medicine removes the excess sugar in your body through your urine, resulting in increased risk of infections around the gential area.  
  
### Side effect symptoms  
Itch or unusual discharge from the genitals, burning feeling when urinating, the need to pass urine more often, blood present in urine.  
  
### Management of side effects  
To minimise the chances of this happening, always practise good genital hygiene such as:  
Regular cleaning of your genitals using warm water and a plain, mild soap. Avoid harsh cleansers or scented soaps.  
Avoid holding your urine in. Go to the bathroom as soon as you feel the need and empty your bladder completely.  
Avoid douching for females which strips away the vaginal flora and creates the ideal environment for a bacterial infection.  
Wipe from front to back from females.  
Wear breathable cotton underwear as synthetic fabrics trap moisture and create the perfect breeding ground for infection.   
  
## Side Effect 6: Fournier's Gangrene  
  
### Side effect class specificity  
SGLT-2  
  
### Likelihood of side effect  
Rare but severe  
  
### Cause of side effect  
Serious bacterial infection in the genital or perineal area   
  
### Side effect symptoms  
Fever above 38 °C, pain, redness or swelling in your genitals  
  
### Management of side effects  
Seek immediate medical attention at the hospital emergency department  
  
###CHUNK\_DELIMITER###  
  
# Drug Interactions of Empagliflozin  
  
## Interaction 1: Alcohol  
  
### Drug interaction class specificity  
Anti-diabetics  
  
### Impact of interaction  
Alcohol affects the ability of your liver to control sugar level. This may put you at risk of very low blood sugar levels (hypoglycaemia) which is dangerous.  
  
### Management of interaction  
Avoid taking alcohol when taking diabetes medications.  
  
## Interaction 2: Charcoal, Kaolin and Smecta  
  
### Impact of interaction  
These anti-diarrhoeal medication may reduce the absorption of other medication  
  
### Management of interaction  
Take these medication at least 2 hours apart from other medications/.  
  
## Interaction 3: Traditional Medicines  
  
### Impact of interaction  
Traditional medicines, such as traditional chinese medication, may lead to certain, unexpected interactions that could be harmful.   
  
### Management of interaction  
In general, it is always check with your doctor or pharmacist if it is ok to take particular traditional medicine.