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### Case Report

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## A Case Report of a Patient with Chronic Kidney Disease (Stage V), Coronary Artery Disease with Neuroglycopenia

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**Keywords:** Chronic kidney disease (CKD), Coronary artery disease (CAD), Neuroglycopenia, Hyperhomocysteinemia, and Immunosuppressants, Atherosclerosis, insulin resistance syndrome, reactive hypoglycemia

### ABSTRACT

Coronary artery disease is the leading cause of morbidity and mortality in patients with CKD. Chronic kidney disease (CKD) is an independent risk factor for coronary artery disease (CAD). The outcomes of CAD are poorer in patients with CKD. In addition to traditional risk factors, several uremia-related risk factors such as inflammation, oxidative stress, endothelial dysfunction, coronary artery calcification, hyperhomocysteinemia, and immunosuppressants have been associated with accelerated atherosclerosis and some studies suggest that CKD with cardiovascular disease may cause insulin resistance and can also lead to hypoglycemia. We report a patient with recurrent symptoms of neuroglycopenia due to the defective glucose transport into the brain. To characterize neuroglycopenic symptoms in the clinical presentation of patients with chronic kidney disease (CKD) and coronary artery disease (CAD). Patient symptoms and clinical features of the CKD stage 5 were obtained by medical record review with special attention to Neuroglycopenia and Coronary artery disease. In this case study 78 years old female patient was admitted to the tertiary care hospital with chief complaints of Drowsiness, decrease responsiveness, body weakness, dizziness, seizures, SOB, Chest pain, 3 episodes of documented hypoglycemia, Low appetite and poor oral intake, and was on dialysis for CKD- Stage V. Case report of CKD, CAD with Neuroglycopenia have been conducted providing the detailed information of the Case in SOAP format, Pharmacists intervention and Patient Counseling and Lifestyle modifications.

## INTRODUCTION

### I. CHRONIC KIDNEY DISEASE

1. Structural or functional abnormalities of the kidneys for  $\geq 3$  months, as manifested by either<sup>1</sup>:

- Kidney damage with or without decreased GFR, as defined by:
  - Pathologic abnormalities
  - Markers for kidney disease, including abnormalities in the composition of the blood or urine or abnormalities in the imaging tests

2. GFR  $\leq 60$  ml/min/1.73m<sup>2</sup>, with or without kidney disease.

### STAGES:

STAGE	DESCRIPTION	GFR	ACTION
1.	Kidney damage with normal or $\uparrow$ GFR	$\geq 90$	Diagnosis and treatment, Treatment of comorbid conditions, Slowing progression, CVD risk reduction
2.	Kidney damage with mild $\downarrow$ GFR	60-89	Estimating progression
3.	Moderate $\downarrow$ GFR	30-59	Evaluating and treating complications
4.	Severe $\downarrow$ GFR	15-29	Preparation for kidney replacement therapy
5.	Kidney failure	$\leq 15$	Replacement (if uremia present)

Chronic kidney disease is defined as either kidney or GFR  $\leq 60$  ml/min/1.73m<sup>2</sup> for  $\geq 3$  months. Kidney damage is defined as pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

## SIGNS AND SYMPTOMS OF CHRONIC KIDNEY DISEASE:

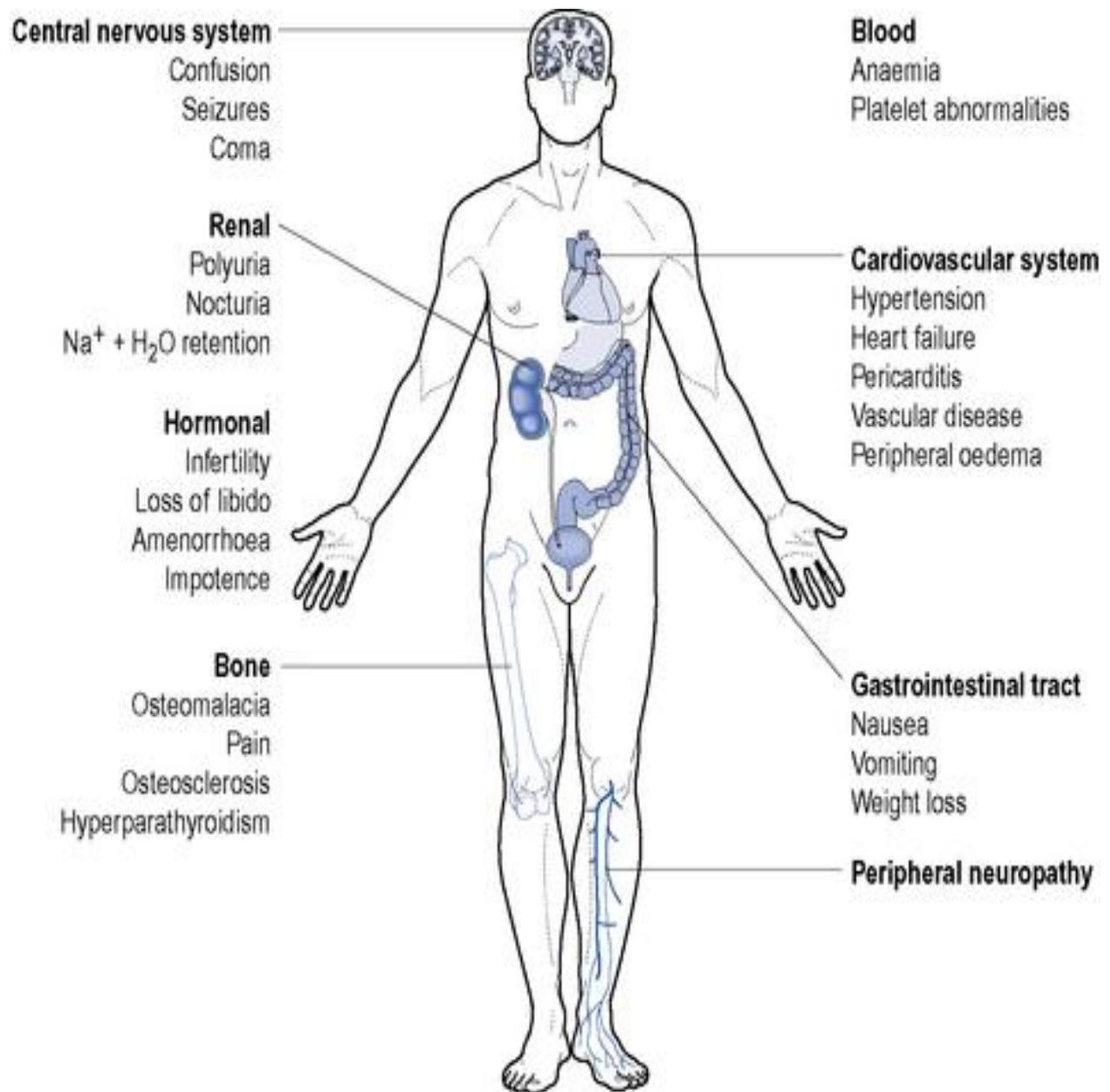


Figure 1: Signs and Symptoms of Chronic Kidney Disease (CKD).

## II. CORONARY ARTERY DISEASE:

- Coronary heart disease is usually caused by a condition called atherosclerosis, which occurs when fatty material and a substance called plaque buildup on the walls of arteries.
- This causes them to get narrow. As the coronary arteries narrow, blood flow to the heart can slow down or stop.

➤ This can cause chest pain (stable angina), shortness of breath, heart attack, and other symptoms<sup>2</sup>.

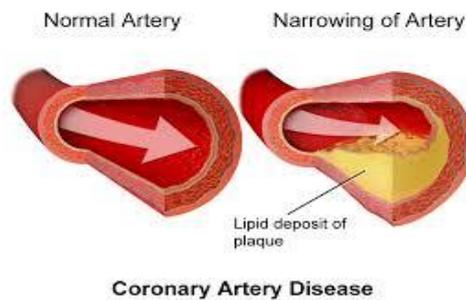


Figure 2:Coronary Artery Disease(CAD)

### SYMPTOMS OF CORONARY ARTERY DISEASE:

#### Symptoms for coronary artery disease

- Angina
- Palpitations
- Sweating
- Weakness
- Shortness of breath
- Rapid heartbeat
- Dizziness
- Nausea

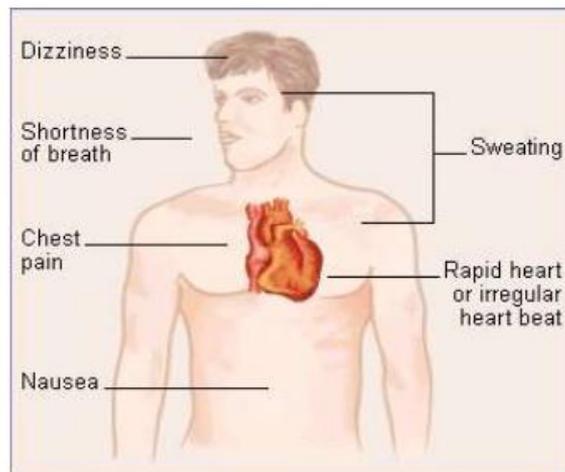


Figure 3:Symptoms for Coronary Artery Disease

### III. NEUROGLYCOPENIA:

1. Neuroglycopenia is a medical term that refers to a shortage of glucose (glycogen) in the brain, usually due to hypoglycemia<sup>3</sup>.
2. Glycopenia affects the function of neurons and alters brain function and behavior
3. Prolonged or recurrent neuroglycopenia can result in loss of consciousness, damage to the brain, and eventual death<sup>4-6</sup>.

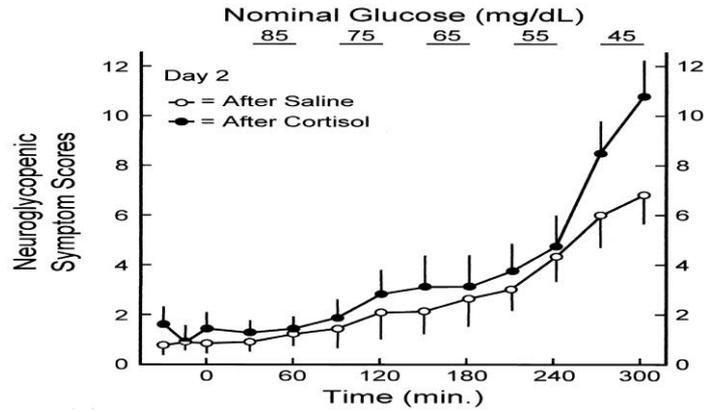


Figure 4: Neuroglycopenia

**SIGNS AND SYMPTOMS OF NEUROGLUCOPENIA:**

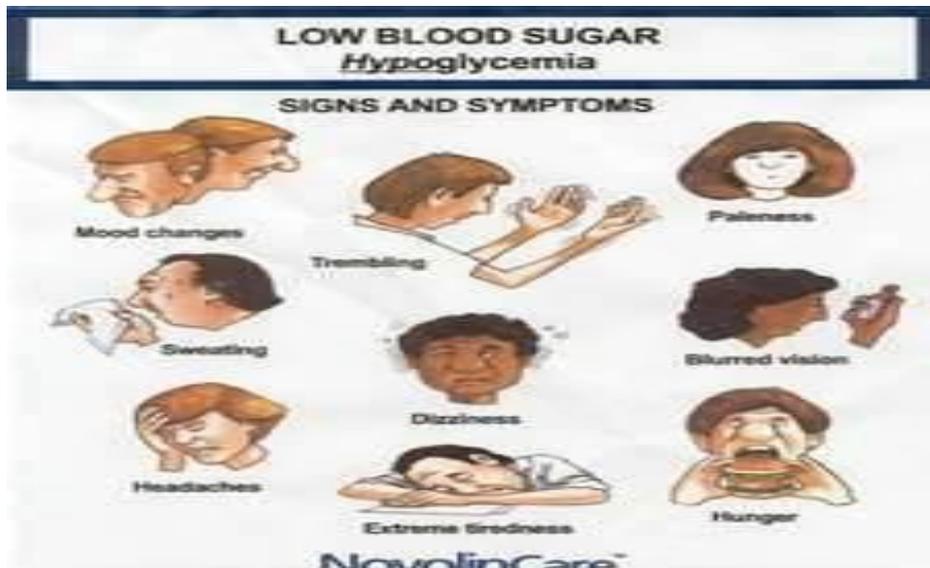


Figure 5: Signs and Symptoms of Neuroglycopenia

**CASE PRESENTATION:**

❖ **SUBJECTIVE DATA:**

PATIENT DETAILS	
Name	XYZ
Age	78
Sex	Female
Occupation	Housewife
Date of Admission	Jan 10 <sup>th</sup> 2017
Date of Discharge	Jan 17 <sup>th</sup> , 2017

**COMPLAINTS:**

Drowsiness, decrease responsiveness, body weakness, dizziness, seizures/SOB/ Chest pain

**HISTORY:**

- The patient had a fall from bed leading to head injury.
- Post which she has 3 episodes of documented hypoglycemia.
- Low appetite and poor oral intake.
- On dialysis for CKD- Stage V

**EXPERIMENTAL OR SAMPLING**

❖ **OBJECTIVE DATA:**

1. VITAL DATA



2 .LABORATORY INVESTIGATIONS

- BIOCHEMICAL INVESTIGATIONS
- HAEMATOLOGICAL INVESTIGATIONS

3. OTHER INVESTIGATIONS

**1. VITAL DATA:**

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
P.R	70/min	72/mint	75/mint	74/mint	75/mint	70/mint	72/mint
B.P	150/90m mHg	170/100mm Hg	150/70mm Hg	150/mm Hg	140/80mm Hg	110/70mm Hg	120/80mm Hg
R.R	20b/min	22b/min	24b/min	22b/mint	22b/mint	22b/mint	22b/mint

**2. LABORATORY INVESTIGATIONS:**

<b>ROUTINE BIOCHEMICAL INVESTIGATIONS</b>	<b>HAEMATOLOGICAL INVESTIGATIONS</b>
RBS: 70mg/dl	RBC: 4.1millions/cum
FBS: 49mg/dl	WBC: 5200cells/cum
Na+/K+:129mmol/L, 3.8meq/L	Hb: 4g/dl

**3. OTHER INVESTIGATIONS:**

<b>TESTS</b>	
RFT, LFT, 2D-ECHO, HbA1C	
BAE	POSITIVE
CVS-S1S2	POSITIVE

❖ **ASSESSMENT:**

**SIGNS AND SYMPTOMS:**

By examining the symptoms we can assess that Drowsiness, decrease responsiveness, body weakness, dizziness, seizures we can predict that it may be due to hypoglycemia.SOB, Chest pain is due to renal impairment and CAD

**DIAGNOSIS:**

**CKD( STAGE-5):**

➤ GFR:13ml/mint/1.73m<sup>2</sup>

According to the National Kidney Foundation, normal results range from **90 to 120 mL/min/1.73 m<sup>2</sup>**. Older people will have lower than normal GFR levels because GFR decreases with age if GFR <15 mL/min then recommended for dialysis. By seeing patient's case report it was clear that patient was already on dialysis

**CAD:**

➤ HEART(Stress EC)- Positive

➤ CT-SCANNING-≤50% OTELECTROCARDIOGRAM-ST & Q WAVE DEPRESSION

- ULTRASOUND OF THE F PLAQUE WAS FOUND
- CALCIUM SCORING-109-HIGH SCORE-ABOVE AVERAGE CARDIAC EVENT IN THE FOLLOWING 5 YEARS

**NEUROGLYCOPENIA:**

- Was diagnosed based on the complaints given by the patient caretaker (3 episodes of documented hypoglycemia, head injury, seizure)
- Hypoglycemia is diagnosed by
- Hypoglycemia in nondiabetic CKD may be due to
  1. Concomitant medication
  2. Peripheral insulin resistance which is caused by renal impairment
  3. Starvation in uremic patient, patient had complaint of low appetite which could cause malnutrition very common in CKD patient this can lead to hypoglycemia



❖ **PLANNING:**

**DAY 1**

PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
70/mint	150/90mmHg	20b/mint	109 F

**DRUG TREATMENT CHART**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	IVF- DEXTROSE	DEXTROSE	1000ml	IV	STAT
INJ	IVF-NS	NaCl	500ml	IV	STAT
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID

**DAY 2**

PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
72/mint	150/90mmHg	22b/mint	98F

**DRUG TREATMENT CHART:**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	IVF- DEXTROSE	DEXTROSE	1000ml	IV	STAT
INJ	IVF-NaCl	NaCl	500ml	IV	STAT
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID

**DAY 3**

PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
75/mint	170/90mmHg	24b/mint	98F

**DRUG TREATMENT CHART:**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	IVF- DEXTROSE	DEXTROSE	1000ml	IV	STAT
INJ	IVF-NaCl	NaCl	500ml	IV	STAT
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID
TAB	MINIPRESS XL	PRAZOSIN	5mg	PO	OD

**DAY 4**

PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
74/mint	170/90mmHg	22b/mint	98F

**DRUG TREATMENT CHART:**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	IVF- DEXTROSE	DEXTROSE	1000ml	IV	STAT
INJ	IVF-NaCl	NaCl	500ml	IV	STAT
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID
TAB	MINIPRESS XL	PRAZOSIN	5mg	PO	OD
TAB	NIKORAN	NICORANDIL	5mg	PO	OD
TAB	ATORLIP	ATORVASTATIN	10mg	PO	HS
TAB	CARVIL	CARVIDILOL	6.25mg	PO	OD
TAB	LOSACAR	LOSARTAN	25mg	PO	BD
CAP	GEMCEL	CaCO <sub>3</sub>	1cap	PO	OD
NEB	DUOLIN	LEVOSALBUTAMOL	25ml	PN	SOS

**DAY 5**

PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
75/mint	170/90mmHg	22b/mint	98F

**DRUG TREATMENT**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	IVF- DEXTROSE	DEXTROSE	1000ml	IV	STAT
INJ	IVF-NaCl	NaCl	500ml	IV	STAT
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID
TAB	MINIPRESS XL	PRAZOSIN	5mg	PO	OD
TAB	NIKORAN	NICORANDIL	5mg	PO	OD
TAB	ATORLIP	ATORVASTATIN	10mg	PO	HS
TAB	CARVIL	CARVIDILOL	6.25mg	PO	OD
TAB	LOSACAR	LOSARTAN	25mg	PO	BD
CAP	GEMCEL	CaCO <sub>3</sub>	1cap	PO	OD
NEB	DUOLIN	LEVOSALBUTAMOL	25ml	PN	SOS

**DAY 6**



PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
70/mint	170/90mmHg	22b/mint	98F

**DRUG TREATMENT CHART:**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID
TAB	MINIPRESS XL	PRAZOSIN	5mg	PO	OD
TAB	NIKORAN	NICORANDIL	5mg	PO	OD
TAB	ATORLIP	ATORVASTATIN	10mg	PO	HS
TAB	CARVIL	CARVIDIOL	6.25mg	PO	OD
TAB	LOSACAR	LOSARTAN	25mg	PO	BD
CAP	GEMCEL	CaCO <sub>3</sub>	1cap	PO	OD
NEB	DUOLIN	LEVOSALBUTAMOL	25ml	PN	SOS
INJ	ERYTHROPOIETIN	ERYTHROPOIETIN	4000 V	SC	BD
INJ	VENOFAR	IRON SUCROSE	100ml	IV	BD

**DAY 7**

PULSE RATE	BP	RESPIRATORY RATE	TEMPERATURE
72/mint	170/90mmHg	22b/mint	98F

**DRUG TREATMENT CHART:**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID
TAB	MINIPRESS XL	PRAZOSIN	5mg	PO	OD
TAB	NIKORAN	NICORANDIL	5mg	PO	OD
TAB	ATORLIP	ATORVASTATIN	10mg	PO	HS
TAB	CARVIL	CARVIDIOL	6.25mg	PO	OD
TAB	LOSACAR	LOSARTAN	25mg	PO	BD
CAP	GEMCEL	CaCO <sub>3</sub>	1cap	PO	OD
NEB	DUOLIN	LEVOSALBUTAMOL	25ml	PN	SOS
INJ	ERYTHROPOIETIN	ERYTHROPOIETIN	4000 V	SC	BD
INJ	VENOFAR	IRON SUCROSE	100ml	IV	BD
TAB	TAXIM –D	CEFIXIME	400mg	PO	BD
INJ	AUGMENTIN	AMOXICILLIN	625mg	IV	STAT

**DISCHARGE MEDICATIONS:**

FORM	DRUGS	GENERIC NAME	DOSE	ROUTE	FREQUENCY
INJ	PAN	PANTOPRAZOLE	40mg	IV	OD
TAB	SORBITRATE	SORBITRATE	5mg	PO	TID
TAB	MINIPRESS XL	PRAZOSIN	5mg	PO	OD
TAB	NIKORAN	NICORANDIL	5mg	PO	OD
TAB	CARVIL	CARVIDIOL	6.25mg	PO	OD
TAB	LOSACAR	LOSARTAN	25mg	PO	BD
CAP	GEMCEL	CaCO <sub>3</sub>	1cap	PO	OD
INJ	ERYTHROPOIETIN	ERYTHROPOIETIN	4000 V	SC	BD
TAB	LIVOGEN XT	FOLIC ACID	1	PO	OD
TAB	DYTOR	TORSEMIDE	40mg	PO	OD

## DISCUSSION:

The problem of concern is neuroglycopenia caused by hypoglycemia so the patient is given Dextrose IV 1000 ml immediately for 5 days till his symptoms improve. In the 1980s, DeFronzo *et al.*, using the 'gold standard' euglycemic hyperinsulinemia clamp technique, found evidence of insulin resistance (IR) in CKD patients. They suggested that the site of this resistance lies in the binding of insulin to its receptor and can be reversed by dialysis. Research has shown that CKD patient demonstrates normal or mildly elevated glucose level during fasting and increased glucose following loading. Hyperinsulinemia patient may develop hyperglycemia or maintain normoglycemia which suggests peripheral resistance to the action of insulin all these changes is associated with the decline in metabolic clearance of insulin that occurs as GFR less than 15 -20 ml/min. when we compare this research with our patient we can also predict that patient may have insulin resistance which can be diagnosed by euglycemic hyperinsulinemic clamp technique. Our patient also has elevated RBS as shown in diagnosis which can be explain as postprandial hyperglycemia typically occurs 2-4 hours after food (especially high carbohydrate food) postprandial symptoms are typically due to reactive causes about 4-6 hour after food ingestion plasma glucose concentrations are 80-90 mg/dL, and rates of glucose utilization and production are approximately 2 mg/kg/min. Glucose production is primarily (70-80%) from hepatic glycogenolysis, with a lesser contribution (20-25%) from hepatic gluconeogenesis. A study by Feil *et al.* found a high risk of hypoglycemia among patients with dementia and cognitive impairment. Which suggests that patient might be having reactive hypoglycemic symptoms which are more common in patients with type 2 diabetes or insulin resistance syndrome (hypertension, hyperlipidemia, obesity) may be at higher risk for developing hypoglycemia which may lead to neuroglycopenia. Patient treatment should include reducing insulin resistance if diagnosed by reducing

CAD and hyperlipidaemia. The patient should be treated with keto-analogues and probiotics which may improve malnutrition and uremic conditions of a patient. Lipid profile test should also be considered at regular interval to know patient's condition

## STANDARD TREATMENT PROTOCOL:

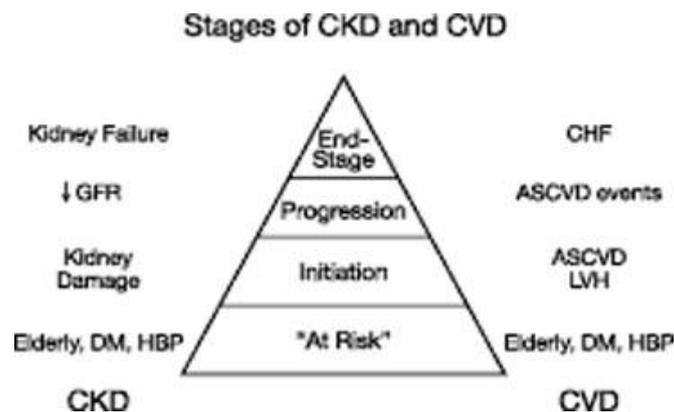
### CHRONIC KIDNEY DISEASE (STAGE)

The main aims of treatment for mild to moderate CKD include:

- If possible, treat any underlying kidney condition.
- Prevent or slow down the progression of CKD.
- Reduce the risk of developing cardiovascular disease.

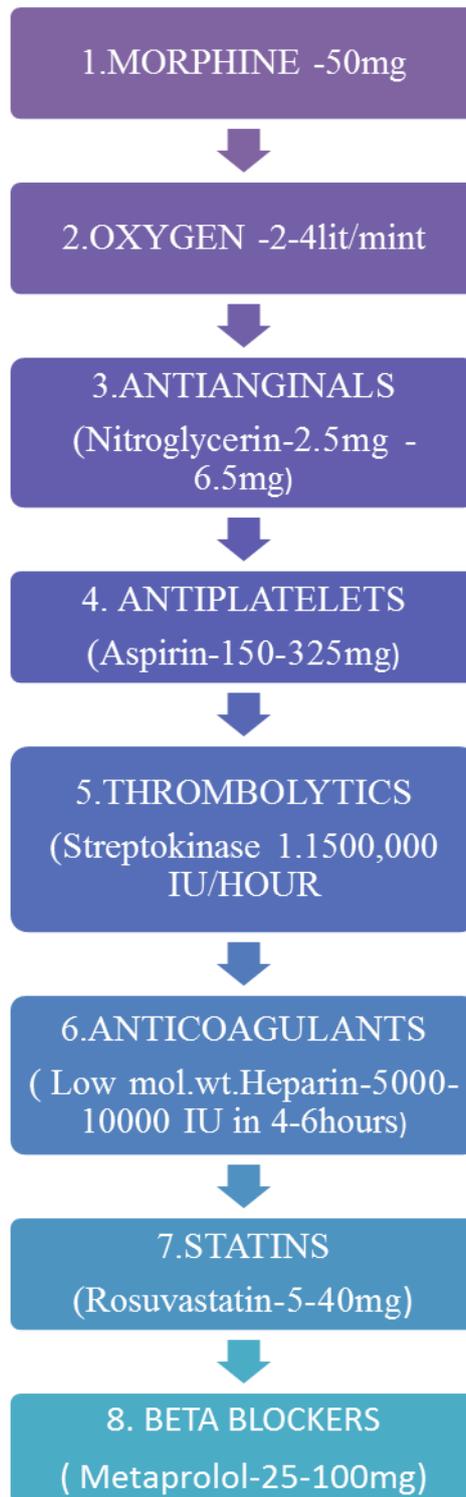
**TREATMENT:**

- Angiotensin converting enzyme inhibitors (ACEs) or angiotensin II receptor antagonists (ARBs) are used, as they have been found to slow the progression of CKD to stage 5.
- Although the use of ACE inhibitors and ARBs represents the current standard of care for patients with CKD.
- Replacement of erythropoietin and calcitriol two hormones processed by the kidney is often necessary for people with advanced disease.
- Guidelines recommend treatment with parenteral iron prior to treatment with erythropoietin. A target hemoglobin level of 9-12g/dl is recommended. Phosphate binders are also used to control the serum phosphate levels, which are usually elevated in advanced chronic kidney disease.
- When one reaches stage 5 CKD, renal replacement therapy is usually required, in the form of either dialysis or a transplant



**Figure 6: Standard Treatment Protocol of Chronic Kidney Disease**

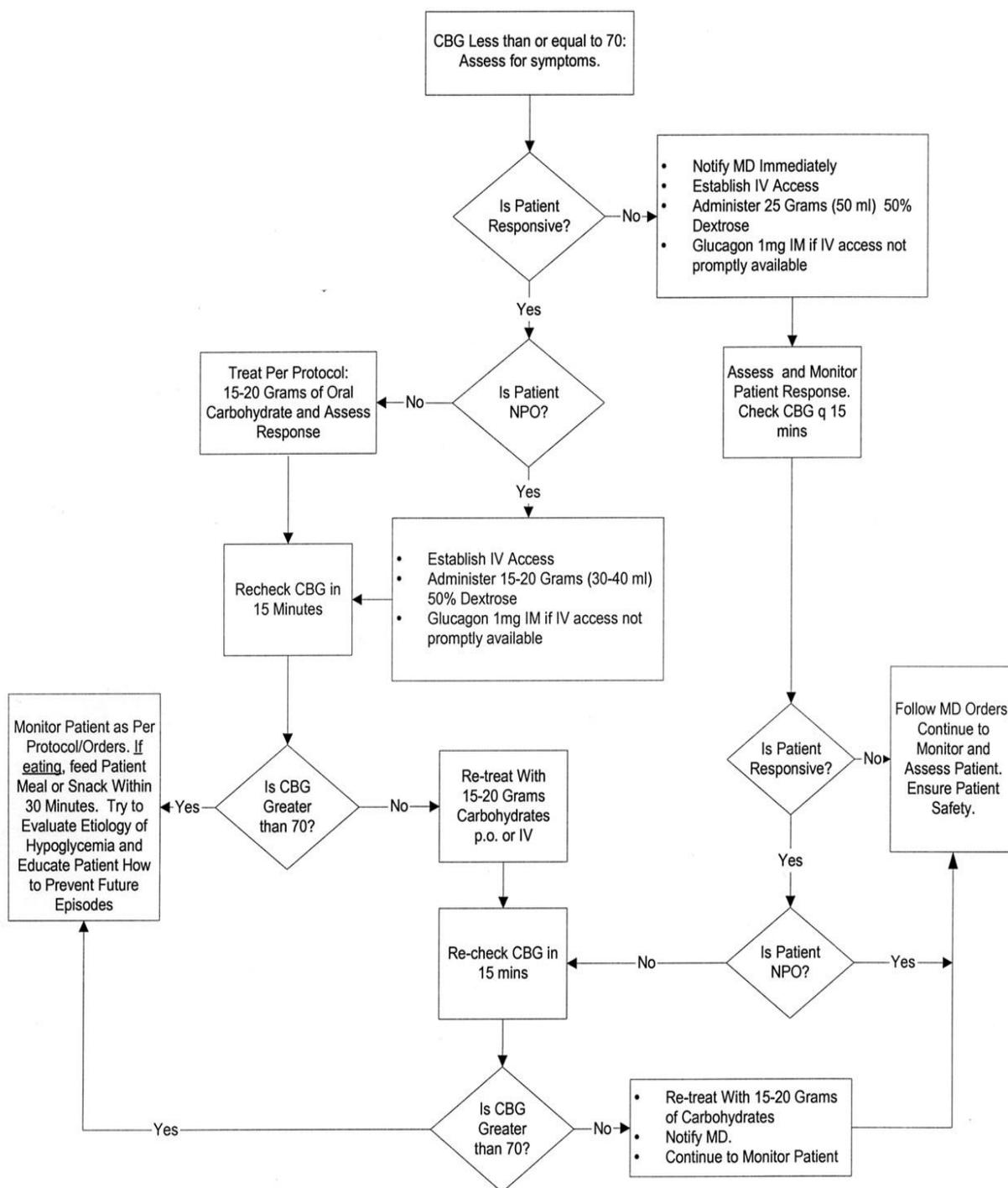
**CORONARY ARTERY DISEASE:**



**Figure 7: Standard Treatment Protocol of Coronary Artery Disease**

NOTE: If the blockage in the arteries is more than 50% and it is a double vessel block either PTCA or CABG is done.

**NEUROGLYCOPENIA:**



**Figure 8: Treatment algorithm of the patient suffering from Neuroglycopenia**

The following are the examples of readily available sources offering 15grams of carbohydrate:

- 4OZ apple juice or orange juice (DO NOT give orange juice to renal patients).

- 4OZ regular sugar-sweetened cola.
- 6OZ sugar-sweetened ginger ale.
- 3BD glucose tablets.
- 4Dex 4 glucose tablets.

**INDICATIONS:**

DRUG PRESCRIBED	INDICATIONS FOR USE
Erythropoietin	It is given to increase the reticulocyte formation. It is given in above case of chronic kidney disease.
Pantoprazole	This medication is a proton-pump inhibitor, prescribed for gastroesophageal reflux disease (GERD). It decreases the amount of acid made in the stomach.
Sorbitrate	It is given as prophylaxis in angina pectoris (Acute), as a treatment in angina pectoris (Chronic). In this case for treating hypotension
Nicorandil	This medication is a vasodilator, in this case, it is prescribed for angina pectoris( Chest pain)
Carvedilol	It is indicated for the treatment of mild to severe chronic heart failure of ischemic or cardiomyopathic origin, usually in addition to diuretics, ACE inhibitors, and digitalis
Prazosin	It is indicated for the treatment of hypertension, to lower blood pressure Lowering blood pressure reduces the risk of fatal and nonfatal cardiovascular events, primarily strokes and myocardial infarctions.
Calcium carbonate	Calcium carbonate is a dietary supplement. It works by providing extra calcium to the body. Antacids are taken by mouth to relieve heartburn, sour stomach, or acid indigestion
Torsemide	It is indicated for the treatment of edema associated with congestive heart failure, renal disease or hepatic disease. In this case use of torsemide has been found to be effective for the treatment of edema associated with chronic renal failure

### **PHARMACISTS INTERVENTION:**

The above prescription order prescribed to the patient Neelamma is found to be rational and reasonable.

### **PATIENT COUNSELING:**

#### **COUNSELLING ON MEDICATIONS:**

- ✓ Take the prescribed medicines on time.
- ✓ Do not take any OTC without the consultation of the physician or specialist.
- ✓ Take the medication in the prescribed form only.(i.e., Tab, Cap, or Inj etc)
- ✓ Do not skip a medicine and take it during unrequired time
- ✓ Refill of the prescription on monthly basis to be done
- ✓ Do not panic as some of the drugs may have non-significant side effects( Headache, Flushing, Hunger, Dry mouth).



#### **IMPORTANT ABBREVIATIONS:**

- OD-ONCE DAILY
- BD-TWICE DAILY
- TID-THRICE DAILY
- QID-FOUR TIMES DAILY
- STAT- IF REQUIRED

#### **LIFESTYLE MODIFICATIONS:**

- Defer from severe physical activity as the patient is 78yrs old and has shortness of breath, chest discomfort.
- Avoid intake of too much of water as the patient is on the course of dialysis.

- A healthy eating pattern includes mainly plant-based foods e.g: Fruits, Vegetables, Pulses and a wide selection of whole grain foods, the moderate amount of low-fat or reduced-fat dairy products, polyunsaturated and monosaturated fats( e.g: Olive oil, Canola Oil, reduced – salt margarines).
- Salt restricted diet to be followed.
- Eat three times a day, do not skip meals.

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