

S/O - MS

MS is a 62 year old african american man presenting to clinic for 3 month follow up management of Stage 5 CKD & Hepatitis C. PMH: Stage V CKD, Anemia in CKD, Nephrotic syndrome, Secondary hyperparathyroidism, Hepatitis C, Thrombocytopenia, Hypertension, T2DM , Malnutrition, Erectile dysfunction.

Patient's primary complaint today is frequent episodes of hypoglycemia. In regards to CKD he has been referred for a low Phos diet and has scheduled for an appointment with nephrology. For his HepC he has a scheduled ultrasound for hepatocellular carcinoma. Follow up on the patient's behalf has been a limiting factor in this patients care plan.

Family History: both parents deceased, one brother with unspecified heart problems.

Social History: Pt admits to drinking alcohol socially, and is a current smoker, he denies illicit drug use and has NKDA.

**Labs ordered:** CMP, CBC with differential / platelet, Microalbumin:SCr Ratio, PTH, Serum Phosphorus, Serum Ferritin, A1c, AFP, HbSag, Hep Be Ag, HepA IgM, Hep B Core Ab IgM, HIV 1/0/2/ Ab with reflex, HCV RNA by PCR, HCV FibroSure, B12 and Folate,

<u>Medication</u>	<u>Regimen</u>
Ergocalciferol 1.25mg (50,000 IU) Capsule	Take one capsule by mouth once weekly
Amlodipine 5ng	Take one tablet by mouth once daily
Furosemide 40mg	Take one tablet by mouth once daily
Novolog Mix 70/30	Inject 40 units SQ every morning and 20 units every evening
Nephro Vite 0.8mg	Take one tablet by mouth once daily

<u>CBC</u>			
	03/09/2021	01/26/2021	12/07/2020
WBC (3.4-19.80)x10E/uL	4.7	2.7 (L)	4.6
RBC (4.12-5.80)x10E/uL	2.71 (L)	2.66 (L)	2.9 (L)
Hemoglobin (13.0-17.7 g/dL)	7.4 (L)	7.6 (L)	8.3 (L)
Hematocrit (37.5-51.0%)	23.2 (L)	23.2 (L)	24.7 (L)
RDW (11.6 - 15.4%)	15.6 (H)	15.1	15.2
Platelets (150-450 x 10E3/uL)	115 (L)	101 (L)	105 (L)

<b><u>BMP</u></b>				
	04/14/2020	03/09/2021	12/07/2020	05/27/2020
eGFR ml/min/1.73	15 (L)	22(L)	23(L)	27(L)
Serum Glucose (80-130) mg/dL	103	160 (H)	185 (H)	185(H)
BUN (8-27mg/dL)	55 (H)	46(H)	35(H)	29(H)
SCr (0.76-1.27mg/dL)	4.61 (H)	3.31 (H)	3.22(H)	2.76 (H)
K (3.5-5.2mmol/L)	5.7 (H)	5.4 (H)	5.2 (H)	5.8 (H)
Cl (96-106 mmol/L)	116 (H)	116 (H)	113(H)	107 (H)
CO2 (20-29mmol/L)	15 (L)	15 (L)	15 (L)	18(L)
Ca (8.6-10.2 mg/dL)	8.7	8.4 (L)	8.2 (L)	8.8

Albumin:SCr (0-20mg/g)	2447 (H)
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<b><u>Hepatitis C</u></b>		
	1/26/2021	12/07/2020
Hepatitis C Viral Quantitation IU/mL	5,570,000 (H)	4,720,000 (H)
HCV FibroSure (0.00-0.21)	0.81 (H)	
ALT (0-40 IU/L)	66 (H)	
AST (0-44 IU/L)	65 (H)	

Overview - Treatment plan follows

- **Stage 5 CKD** -
  - Labs
    - eGFR: 15
    - SCr of 4.6
    - Albumin:SCr 2447
  - **Secondary hyperparathyroidism / Bone mineral density loss**
    - Likely due to lack of renal hydroxylation → decreased intestinal absorption of Ca → PTH activation of osteoclast and increased intestinal absorption
    - Labs
      - PTH - 94 (15-65pg/ml) - FARO 2 study???
      - Calcium 8.7 (8.6-10.2mg/dL)
    - Meds - Ergocalciferol 1.25mg once weekly
  - **Anemia in CKD - Likely due to kidneys inability to secrete erythropoietin**
    - Labs
      - Hb: 7.4
      - Ferritin - 210ng/mL
        - Ferritin levels would be down if iron deficiency
          - If iron is low and ferritin is high may be do to inflammatory mediators from lupus and other chronic inflammatory disorders
  - **Metabolic acidosis** - due to impaired kidney production of bicarb
    - Labs
      - CO2: 15 (20-29mmol/L)
  - **Electrolyte disturbances: Hyperkalemia / HyperPhosphatemia** - lack of renal clearance
    - Labs
      - K : 5.7mEq/L
      - Phosphorus - 4.9 [2.8-4.1mg/dL]
  - **Malnutrition**
    - **Labs:**
    - **Meds**
      - Nephro Vite 0.8mg QD - B complex vitamin
- **Hepatitis C**
  - Labs
    - HCV Log10:6.746
    - FibroSure Score: 0.81 (0.0-0.21) → F4 Cirrhosis
    - AST: 66 (0-40 IU/L)
    - ALT:65 (0-44 IU/L)
  - **Meds: none**
  - **Thrombocytopenia**
    - HCV induces an autoimmune reaction that produces anti-platelet antibodies, and causes direct bone marrow suppression → thrombocytopenia.
    - The fibrosis/cirrhosis leads to sequestration of platelets → thrombocytopenia
- **T2DM** - Decreased renal clearance of insulin
  - **Labs:**
    - A1c 4.6
  - **Meds**
    - Novolog Mix 70/30 40 units QAM and 20 units QPM
- **Hypertension:**
  - **Vitals:** 155/90
  - **Meds**
    - Furosemide 40mg QD
    - Amlodipine 5mg QD

## Treatment Plan

### ● Stage V Chronic Kidney Disease

- Labs
  - EGFR: 15mL/min/1.73
  - Alb/SCr Ratio: 2,447mg/g creatinine
  - BUN: 55mg/dL
  - SCr: 4.61mg/dL
- Meds:
  - B12 NephroVite for nutrition
  - Has been referred to nephrology but hasn't gone in for HD yet
- Monitoring
  - Kidney function: eGFR, Alb:SCr
  - Nutrition status

### ○ Secondary hyperparathyroidism / Bone Mineral Density loss(renal osteodystrophy)

- Labs
  - PTH - 94 (15-65pg/ml)
  - Phosphorus - 4.9 [2.8-4.1mg/dL]
  - Calcium 8.7 (8.6-10.2mg/dL)
- Meds
  - DC - Ergocalciferol 1.25mg Capsule
    - inactivated form that requires Kidney activation
    - PTH is attempting to stimulate 1-25 Dihydroxy conversion
  - Initiate Calcitriol 0.25 mcg 1 Capsule Q MWF
    - - If Ca >10.2, Phosphate > 5.5 and PTH elevated
        - Consider discontinuing Calcitriol and adding sensipar 30mg once daily depending on severity
        - Increase by 30mg Q2W up to 180mg to maintain goal iPTH between 100-300???
      - If only Phos increases Consider Phosphate binder (Sevelamer) binder if Phos continues to increase
        - >5.5 mg/dL to <7.5 mg/dL: 800 mg 3 times daily
        - ≥7.5 mg/dL to <9 mg/dL: 1,200 to 1,600 mg TID
        - ≥9 mg/dL: 1,600 mg 3 times daily
  - Would not consider initiating SGLT2i - GLP1 decrease the progression of CKD and CV reduction benefit
    - Hyperkalemia risk
    - DAPA CKD went down to 25ml/minute
    - EMPA - Kidney went down to 20ml/minute
    - Unknown benefit when eGFR less than 20ml/min
- Counseling and monitoring
  - Electrolytes:
    - Phosphorus Goal: 2.8-4.1 mg/dL
    - Ca Goal: Ca 8.6-10.2 mg/dL
    - K Goal: 3.5-5 mEq/L
  - PTH: Goal of 130-600pg/mL according to KDIGO guidelines
  - Sevelamer
    - Diarrhea, dyspepsia, NV
    - Low Phosphorus
  - Sensipar
    - Hypocalcemia
    - Hypophosphatemia
    - Hypoparathyroidism

- iPTH should be measured 1 to 4 weeks after initiation or dosage adjustment

○ **Anemia in CKD**

- Labs
  - Hb:7.4 (13.0 - 17.7g/dL)
  - Ferritin 210ng/mL (CLD or any acute phase pt needs Tsat)
    - Use MCV to determine what type of anemia
      - MCV and B12, Folate, Hyperthyroid, alcohol, daryl multiple myeloma = macrocytic
      - Low = iron and thalassemia
      - CKD, Cancer, Bone marrow suppression, Micro + macrocytic
      - Low epo level = likely kidney, if normal → liver
  - Hematocrit 23.2 (37.5 - 51%)
  - RDW 15.6 (11.6 - 15.4%)
  - RBC:2.71 (4.14 - 5.8010E6/uL)
- Meds
  - Start Darbepoetin alfa (Aranesp) 26mcg once weekly - 0.45mcg/kg
    - CHOIR trial - ESA targeting a hg of 13.5 rather than 11.3 was associated with higher risk of death and hospitalizations
- Monitoring / Counseling
  - Monitoring and counseling
    - Anemia in CKD: check Hb once weekly Goal: 10-11, Ferritin
      - Aranesp
        - If hemoglobin increases >1 g/dL in any 2-week period: Decrease dose by ≥25%.
        - If hemoglobin does not increase by >1 g/dL after 4 weeks: Increase dose by 25%
      - Ferritin - No EPA Iron transport???
      - If drops below 100ng/mL administer supplemental iron
    - Folate < 4 ng/mL
    - B-12 < 400 pg/mL are likely low so treat if seen
      - if folate less than 4 always do supplementation

○ **Metabolic Acidosis**

- Labs
  - CO2: 15 (20-29mmol/L)
  - Cl: 116 (96-106mmol/L)
- Meds
  - Initiate Sodium Bicarbonate 650mg 1 Tablet PO TID
    - Helps slow kidney disease and hyperkalemia
    - Will improve mineral nbone disorder
- Goal
  - Bicarb 22 to 28 mEq/L
    - Can titrate up to 1950 TID max

Furesomide - nephrotic syndrome to stimulate kidney

○ **Hyperkalemia**

- Labs
  - K : 5.7mEq/L
- Medications

- Potassium binder/? Start to get them on an ACEi
  - Not katexalate - colonic necrosis
- Consider increasing dose of Bicarb (Max 1950mg TID)
- Observe if furosemide has lowered the level of potassium to goal before increasing bicarb. If insufficient dc furosemide and increase bicarb
- Monitoring
  - Goal K: 3.5 - 5 mEq/L

## ● Hepatitis C

- Labs
  - **HCV Log10: 6.746 (6 million)**
  - **FibroSure: 0.81 (0.0-0.21) → Cirrhosis**
  - **AST: 66 (0-40 IU/L)**
  - **ALT:65 (0-44 IU/L)**
  - ALT(SGPT) PSP: 74 (0.0-0.55 IU/L)
  - Necroinflammatory Activity Score: 0.63 (0.00 - 0.17) → Grade A3 (Severe activity)
  - AFP Tumor Marker: 38.9 (0-8.3ng/mL)
  - AG ratio: 1.1 (1.2-2.2)
  - Alpha-2 macroglobulins: 366 (110 - 276mg/dL)
  - Haptoglobin:12 (32 - 363mg/dL)
  - GGT: 125 (0-65 IU/L)
- Meds - Needs ultrasounds Q6M to rule out hepatocellular carcinoma
  - He's chirotic but not decompensated → Start Eplusa (Sofobuvir/Velpatasvir) 400mg/100mg once daily with or without food for 12 weeks
    - DOI:<https://doi.org/10.1016/j.jhep.2019.05.028> Sofobuvir/velpatasvir in 59 HepC patients with ESRD undergoing HD for 12 weeks, was both safe and effective
- Counseling / Monitoring
  - Eplusa
    - Monitor Viral load: Goal undetectable
    - HA and Fatigue likely
    - Monitor for hypoglycemia
  - Complete abstinence of alcohol
    - Criteria for transplantn
- Thrombocytopenia
  - Labs
    - Platelets 115 (150-450 10E3/uL)

## ● Hypertension

- Labs
  - BP 155/90mmHg
- Meds
  - Discontinue Amlodipine 5 mg 1 Tablet PO QD due to proteinuria
    - Verapamil or Dilt will dilate both efferent and afferent
  - No ACE right no bc of K
    - 2006 study with benazepril in SCrs up to 5.0 shows that aces are safe and effective to initiate but 5.5 is too high for ACE right now
  - Considering Initiate indapamide 1.25mg
    - Safe down to CrCl of 10ml/min
    - Similar BP reduction Improves eGFR by 28% when compared to HCTZ which reduced eGFR by 17.4%
- Monitoring / Counseling
  - Goal 130/80mmHg
  - Dietary and lifestyle changes if possible

- **Type 2 Diabetes: - ACCOMPLISH Diabetes arm tell us the Goal**

- Labs
  - A1c: 4.6%
- Meds: B12, Folate Novolog mix 70/30
  - Hold Novolog due to stacking from diminished renal clearing
  - Atorvastatin 10mg -
    - CARDS Trial : Atorvastatin 10mg in 2400 patients age 40-75 with LDL < 160 decreases CVD risk and improves eGFR in albuminuria
    - SHARP - Simva-Ezetimibe in 9200 patients (3000 on dialysis) with SCr >1.7 in men and 1.5 in women - reduces CV events in patients CKD. There is high uncertainty in Stage 5 disease and on dialysis.
    - Aurora and 4D DOI: 10.1056/NEJMoa043545 - Atorvastatin had no statistically significant impact on CV death, MI , and stroke in patients with diabetes receiving hemodialysis.
- Monitoring
  - Goal: No episodes of hypoglycemia | A1c of 6.5-7%
  - Fasted and prandial readings

- **Vaccines**

- Received
  - Tdap on 5/27/20
  - Quadrivalent Flu Vaccine on 12//0720
- Needs
  - Pevnar (PCV13) ACIP considers CKD meet criteria taking before 65
    - Pneumovax (PPSV23) 8 weeks later if less than 65
  - Shingles
  - Zostavax