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Case Study 1

Acute Renal Failure

and

Co-Morbidities

Patient Profile

- **77 yr old**
- **White Male**
- **Single, lives alone.**
- **Only one living relative.**
  - A niece in Virginia
- **Caretaker** – Every other day.

Patient Profile (cont.)

- **Ht**: 5’10
- **Wt:**104.7kg
- **BMI:** 33
- No weight history available

Past Medical History

- Poor Historian-gathered from pt records.
  - Prostate Cancer
  - Hypertension
  - Past decubitus ulcers
  - Possible CKD-
    - suggested by MD based on lab values

Circumstances Surrounding Admission

September 8th 2010

- Presented to ER after being found on toilet in his home by his caregiver.
- Poor PO intake and weakness for previous 2-3 days.
- Admitted to hospital
  - Change in mental status
  - Respiratory distress

Disease Background

Acute Respiratory Distress Syndrome (ARD)

- **Lung injury**
  - Acute arterial hypoxemia
  - Cannot be corrected by oxygen therapy alone
- **Core of treatment: Mechanical ventilation**
  - To properly oxygenate the patient
- **Hypercatabolic**
  - Increased protein and energy needs
  - Protein 1.5- 2 g/kg/day needed to restore nitrogen balance
- **Avoid overfeeding:**
  - Exceeding CO_2 capacity of respiratory system
  - Exasperates the problem of weaning

Decubitus Ulcers (pressure ulcers)

- Shortly after admission Pt found to have at least one ulcer

Inflammations, sores, or lesions of the skin over a bony prominence.

Occur most commonly in the obese, chronically ill, elderly, infected, and malnourished.

Decubitus Ulcers: Nutrition for healing

- **Macronutrients:**
  - 30 to 35kcal per kilogram
  - 1.25 to 2g of protein per kilogram

- **Enteral formula research**:
  - ↑ pro formulas > decrease in size of wound compared to standard

- **Specific Amino acids**:
  - Arginine, glutamine, and leucine metabolite HMB
  - play a role in collagen and epithelial cell production

- **Micronutrients:**
  - Daily MVI, vitamin C, A, and zinc commonly supplemented

- **Avoid Overfeeding:**
  - Hyperglycemia can ↑ risk of infection in the healing wound.

Acute Renal Failure (ARF)

- **An abrupt and sustained reduction in renal function**
  - ↓ in GFR→ Waste and fluid buildup
    - causing: hyperkalemia and metabolic acidosis
  - rarely occurs without a co-existing disease process
  - 5-20% of critical care pts have ARF during course of illness

- **Causes:**
  - Multi-organ dysfunction syndrome
  - Sepsis
    - renal vasoconstriction and hypoxia→ necrosis and ARF
  - Hypovolemia
    - congestive heart failure or decompensated cirrhosis

- **Prognosis:** 50-80% mortality rate
  - strongly correlated with a pre-albumin less than 11 mg/dl

Medical Treatment for ARF

- **Treatment of underlying disease**

- **Reperfusion** (restoration of blood flow)
  - diuretics, volume therapy, and dopamine as a vasodilator

- **Preventing complications:** Renal Replacement therapy (dialysis)
  - cardiac compromise and pulmonary edema
    - acid/base imbalance
    - electrolyte abnormalities
    - fluid overload

Metabolism in the ARF Patient

- **Hypercatabolic**
- **Negative nitrogen balance**

- **Unique Protein Metabolism:**
  - Metabolic acidosis: ↑ muscle protein catabolism
  - Insulin resistance: ↓ amino acid(AA) uptake into muscle cells
  - More AA in bloodstream: ↑ hepatic cell uptake
    - increased production of glucose and urea

- **Hyperglycemic**
  - ↑ glucose production
  - aforementioned insulin resistance

- **Hyperlipidemic** : lipolysis is impaired

Nutrition for ARF

- **Risk, Injury, Failure, Loss, and End-stage kidney (RIFLE) criteria:**
- needs are based on amount of protein catabolism in each patient
  - determined by the Urea Nitrogen Appearance rate (UNA).

  - **UNA <6g** above intake: limit to **0.6-0.8g/Kg** of protein
    - Mildly catabolic
    - Prevents need for dialysis; should not be used long term
  - **UNA of 6-12g** above intake: need **0.8 to 1.2g/kg**
    - hypercatabolic patients with coexisting infections and injury
  - **A UNA greater than 12g** above intake: may require **1.2-1.5 g/kg**
    - severe underlying disease, dialysis, infection or trauma
  - **malnutrition will further increase protein needs**
  - However: **> 1.7g/kg will not improve nitrogen balance**
    - 1.5 g/kg should be used as the upper limit

Nutrition for ARF

- Energy expenditure is usually not more than 130% of normal
- **ESPEN**: **20-30kcal/kg** for enterally fed ARF patients
- **National Kidney Foundation**: baseline of **25-30kcal/kg**
  - **35kcal/kg as the upper limit**
- Avoid overfeeding:
  - complications outweigh risks of underfeeding

Current Admission: Diagnoses and Treatment

- **Pneumonia with secondary hypoxia** (respiratory distress)

- **Sepsis** –likely secondary to the pneumonia

- Progressed to **Hypercapnic Respiratory Failure**
  - **endotracheal intubation**
    - Necessitating **nasogastric feedings**
      - **dobhoff tube** placed

- failed to wean from ventilator
  - **Excessive mucociliary secretions**
  - **percutaneous tracheostomy** was performed on day 8 of stay

Current Admission: Diagnoses and Treatment

- **Possible myocardial infarction** explored
  - elevated levels of WBC and cardiac troponin
  - **echocardiogram** performed. Grossly normal; mildly enlarged left atrium and grade I diastolic dysfunction(relaxation abnormality)

- **Acute renal failure**
  - attributed to sepsis and intravascular volume depletion
  - **Foley catheter** placed
  - A **Quinton catheter** was placed
    - Anticipation of hemodialysis

- Total of **8 pressure ulcers**
  - Varying stages
  - Including full thickness eschar on the buttocks in shape of toilet

Current Admission: Medications and Interactions

Antibiotics: Levofloxacin, Linezolid, Vancomycin, Meropenem

- Diarrhea
- Levofloxacin: NO→OJ, antacids, mg, ca, Fe, Zn or EF

Anti-Htn: Amlodipine, Hydralazine, Metoprolol, and Lisinopril

- Avoidance of natural licorice
- Anorexia: Lisinopril and Hydralazine
- Diarrhea: Hydralazine and Metoprolol
- Food: ↓ absorption Hydralazine, ↑availability of Metoprolol

Furosemide (lasix):

- anorexia, thirst, cramps, hyperglycemia
- and N/V, diarrhea, constipation,

Risperidone: antipsychotic

- ↑appetite, weight gain, constipation

Nutrition Care Process

Initial Nutrition Assessment

GFR 33 BUN 85 CREAT 1.97

- Automatic wound care consult
- Day after admission
- A number of Pressure ulcers-
  - WOCN consult not complete
- Believed to have CKD
- Renal Diet- 75-100% of meals PO with help from RN

Nutrition Diagnoses:

Increased nutrient needs
related to wound healing and chronic kidney disease
as evidenced by GFR 33 and unstageable pressure ulcer.

Self feeding difficulty
related to altered mental status
as evidenced by need for nurse assistance with feeding

Nutrition prescription:

Ht: 5’10
Wt:104.7kg
BMI: 33
AdjBW: 83kg

2500kcal per day (30kcal/Kg Adj BW)

66-100 g Pro/day (0.8- 1.2 g/kg Adj BW)

- upper end for CKD - lower end for wound healing.

Interventions:

Modify type of food within meals to mechanical soft consistency

- At request of RN- to aid in feeding

Supplements-

- (commercial beverage)Nepro BID- for an additional 40gm pro
- (knowing that NCBH renal diet= 60gm pro)

- Renal multivitamin-recommendation in note to doctor

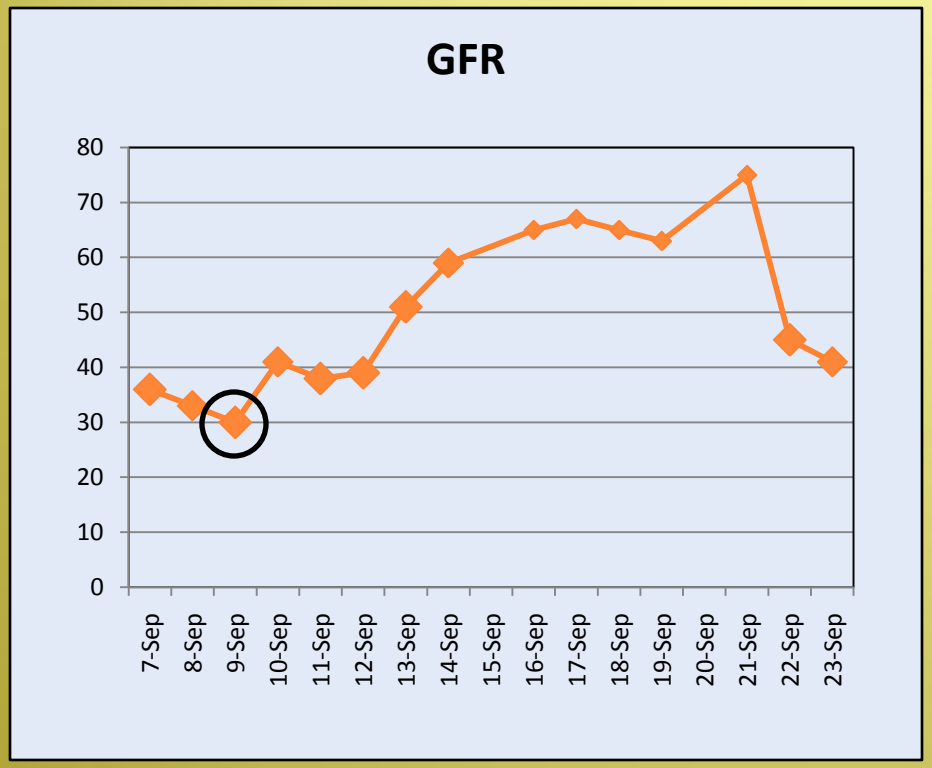
Assessment 2

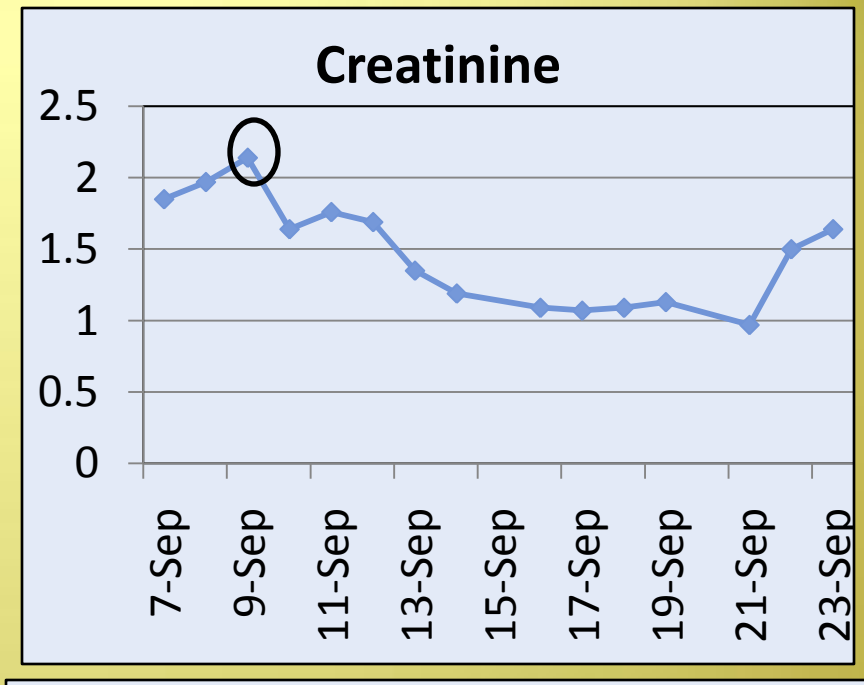
PAB: 9

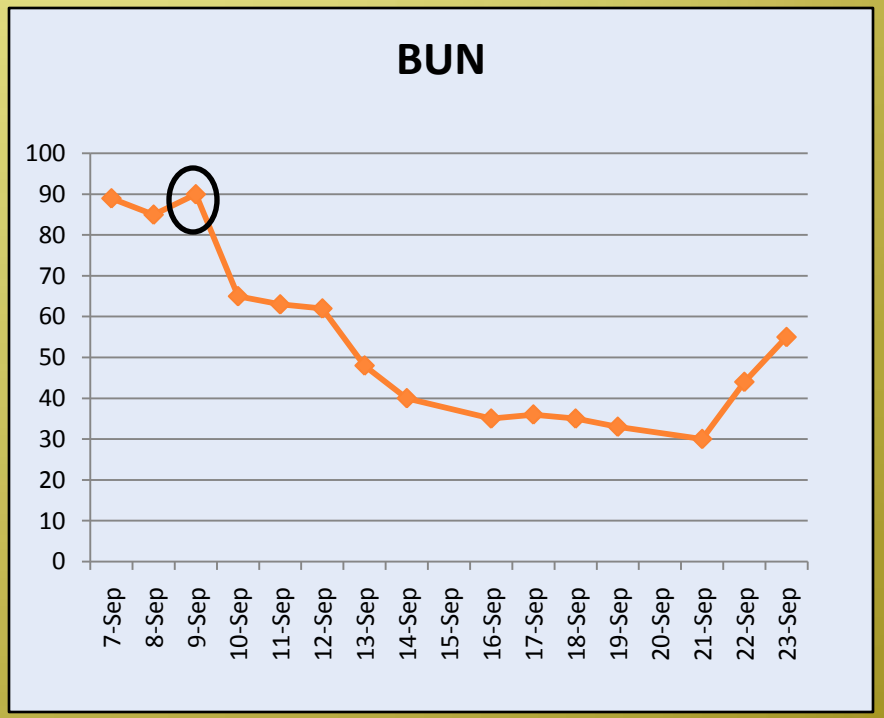
Day 1 ICU

- Catheter in anticipation of hemodialysis placed
- Pt: Intubated
- Pulmocare 60ml/hr (Dr. orders)
  - 2160kcal (26kcal/kg), 90gpro(1.1g/kg) -using adj BW

↑BUN: 90 ↑ Creat: 2.14 ↓GFR 30







Needs re-assessed:

- via Ireton Jones ventilator formula:**1970kcal**
  - Only 200kcal less than doctors TF
- Protein: **85-110g** per day (1-1.3g/kg adjBW)\
  - MD TF providing lower end of range at 90g

Care plan:

- Continue current tube feeding regime
- Monitor and evaluate:
  - Tolerance to TF
  - Lab values; BUN, Creat, K+, Phos

Assessment 3:Follow up

ICU Day 5

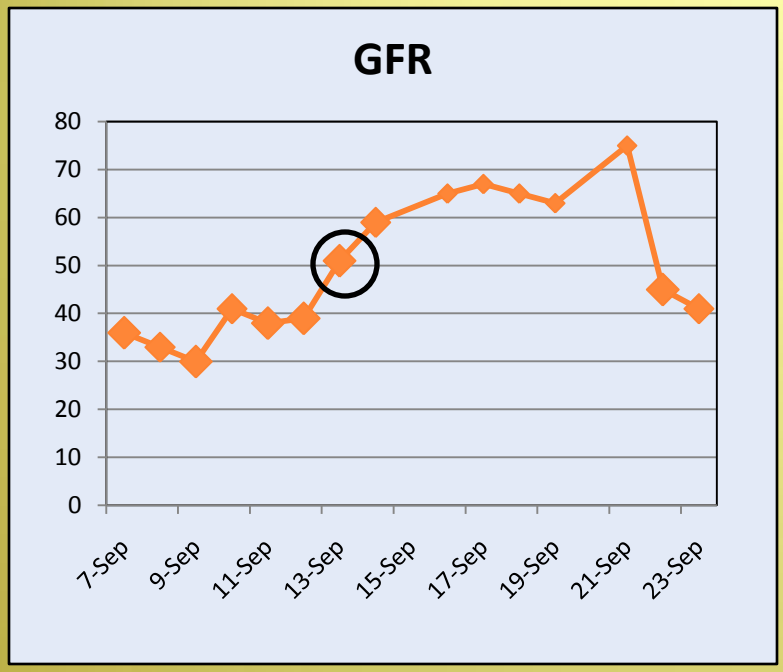
- Per WOCN: 8 pressure ulcers of varying stages
- Tolerating TF

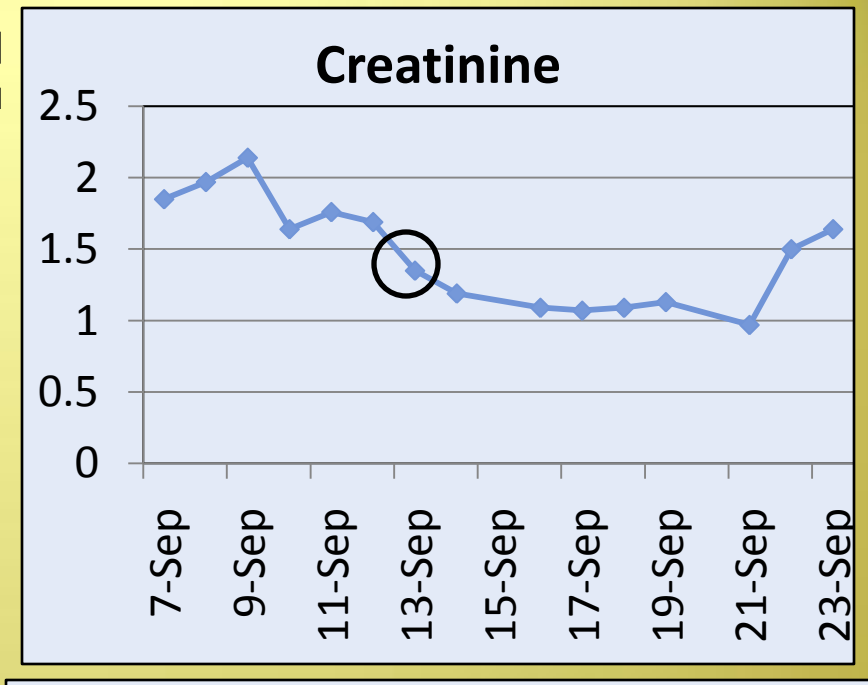
Care Plan:

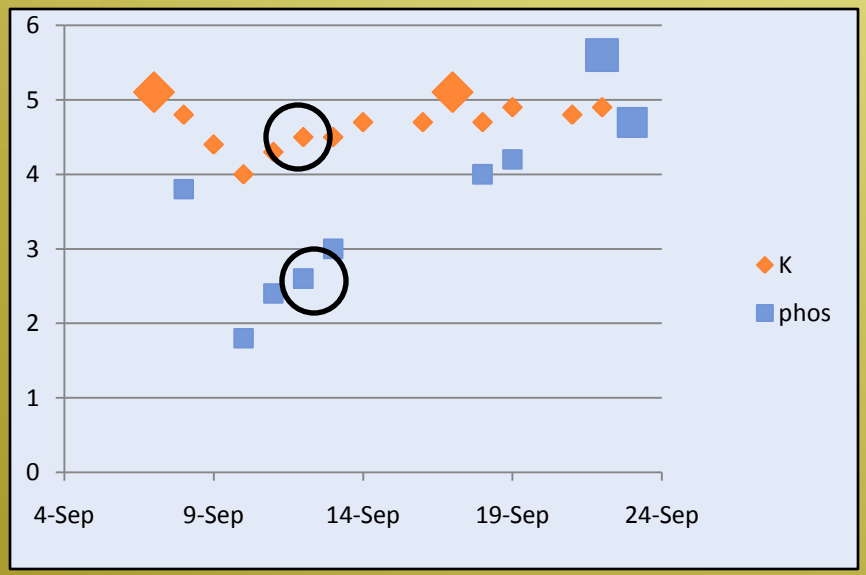
Medical Food Supplement: **Prostat 64**

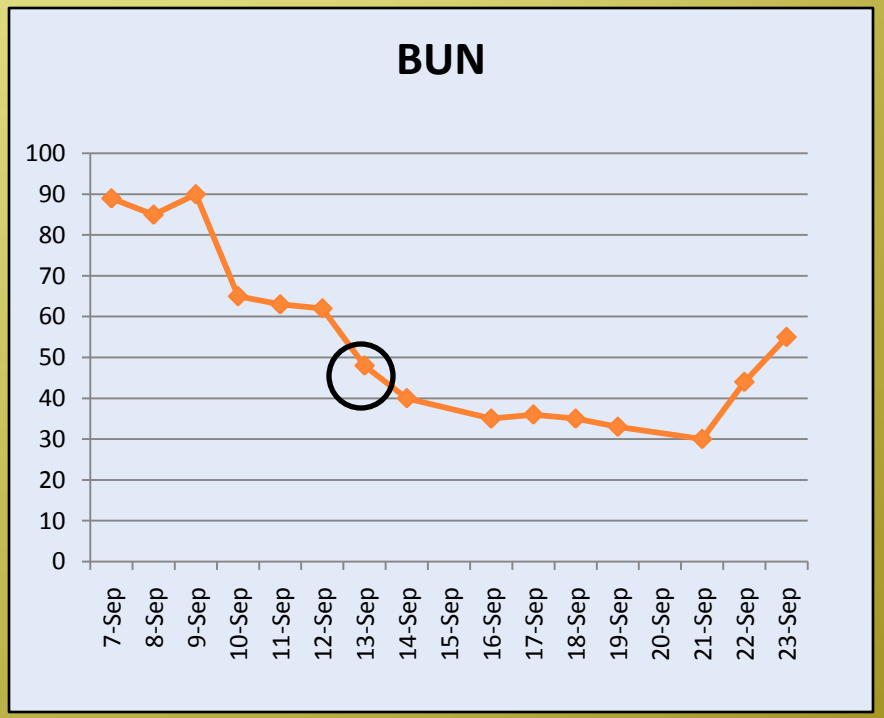
- Ordered **1 pkt** (30ml) to be administered **daily**
- To provide **an additional 15g of Protein**
  - already receiving 90g from EF

↓BUN 48 ↓Creat 1.35 ↑GFR 51









↑ PAB 11

Assessment 4: Follow up

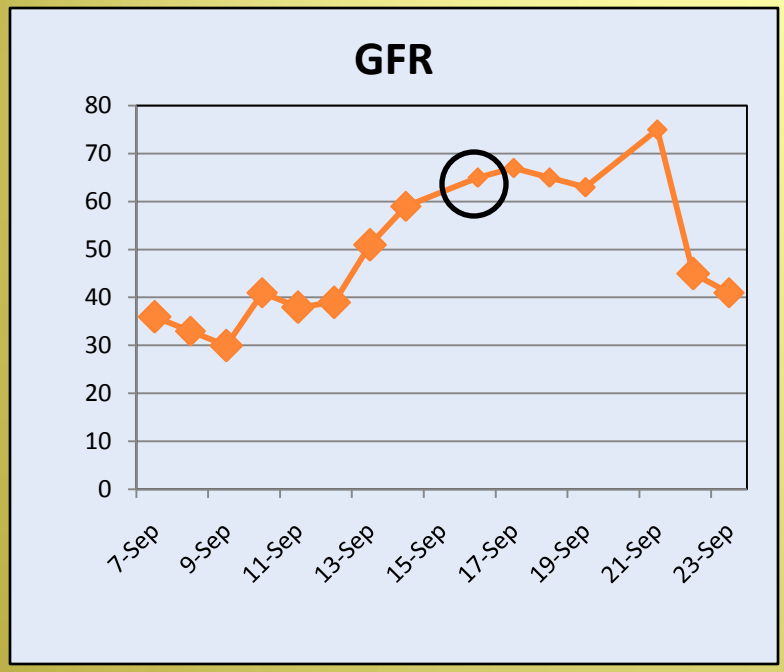
ICU day 9

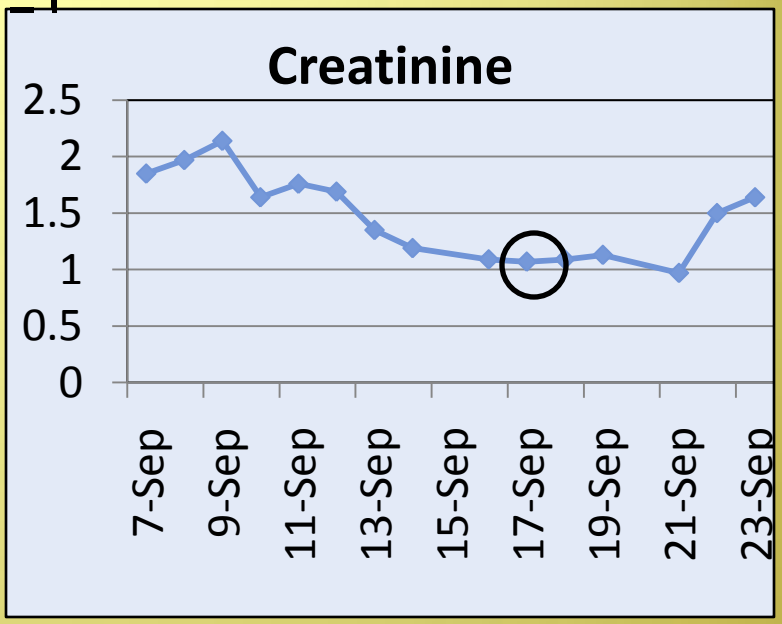
- After brief transfer to PCU, pt returned to ICU
  - This time TF rate cut to 50ml/hr

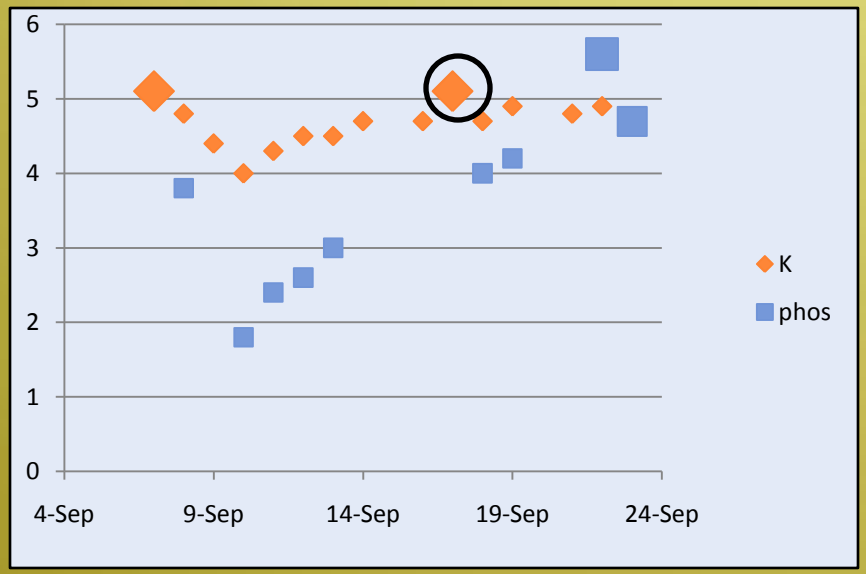
Care Plan:

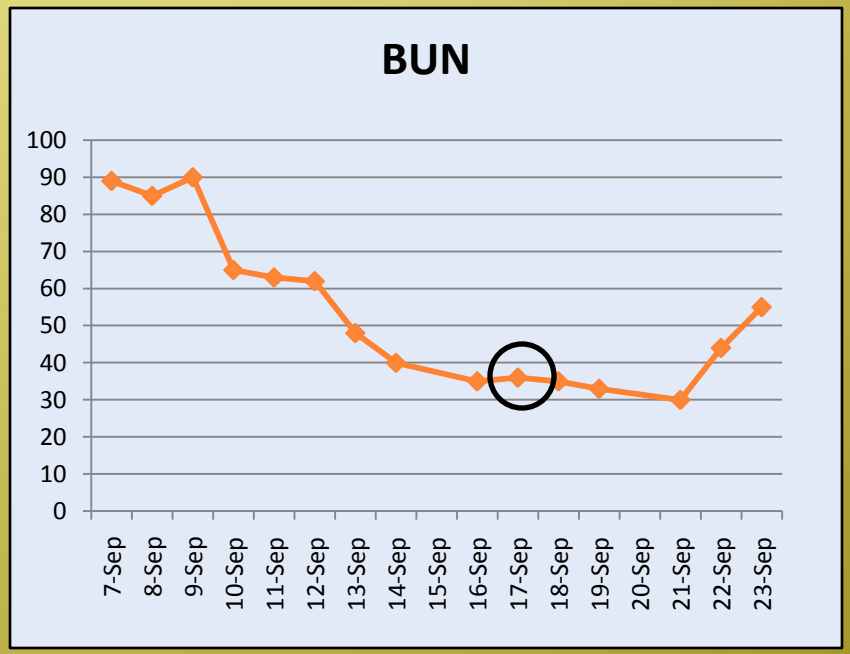
- Recommended increasing Prostat TID
  - recommendations not followed by doctor

↓BUN 36 ↓Creat 1.07 ↑GFR 67 **K 5.1**









Assessment 5: Follow up

ICU day 15

- ❖Discharge planning for Hospice
- ❖Swallow evaluation: high risk for aspiration
- ❖Per PT wishes: TF discontinued
- ❖In favor of pleasure feedings

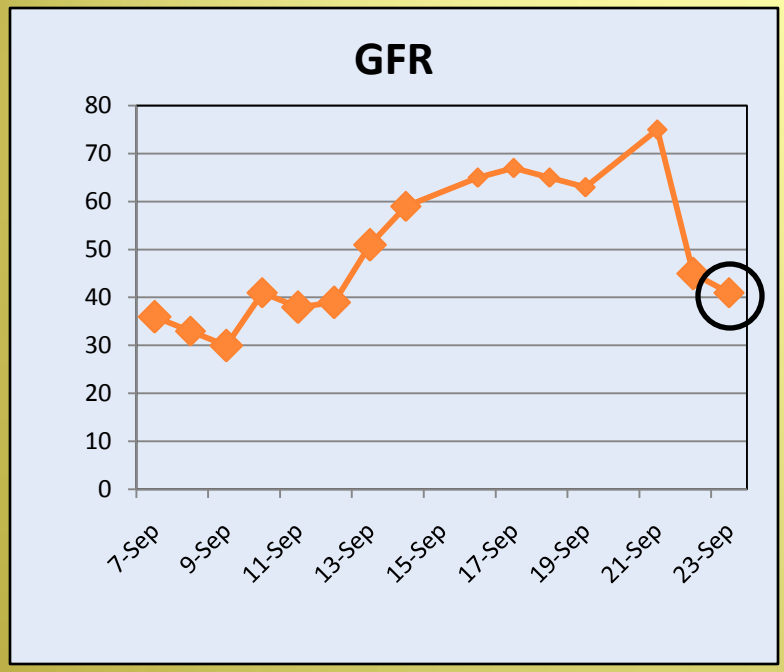
Nutrition Diagnosis:

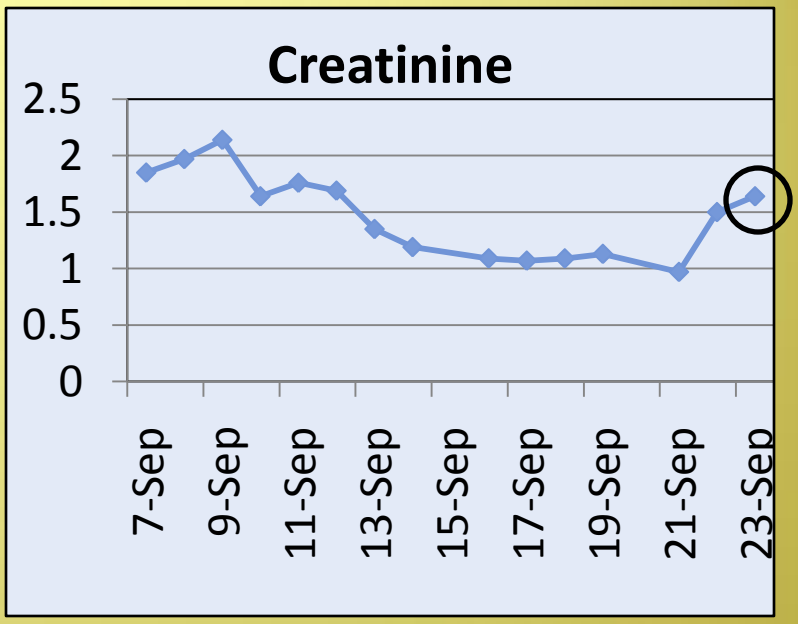
Poor nutrition quality of life
Related to dysphagia, ARDS
As evidenced by need for enteral feedings vs. desire for PO diet

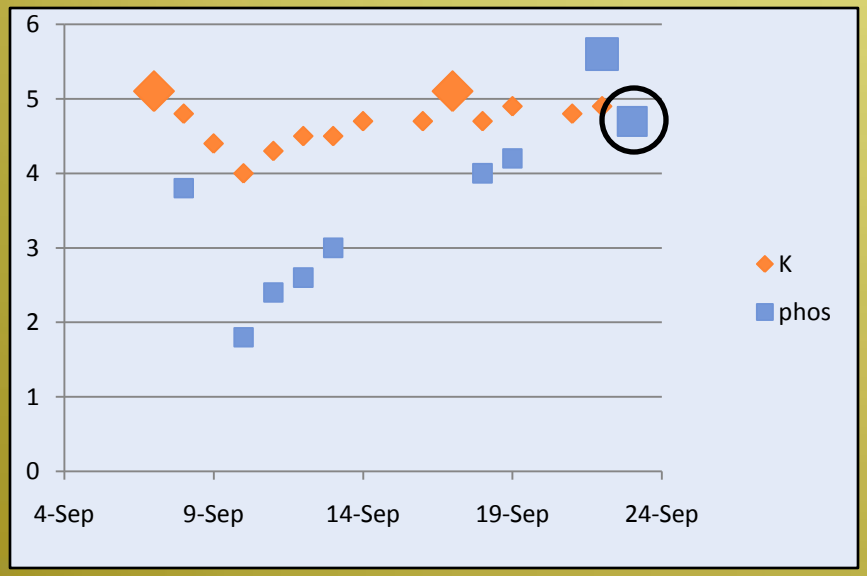
Care plan:

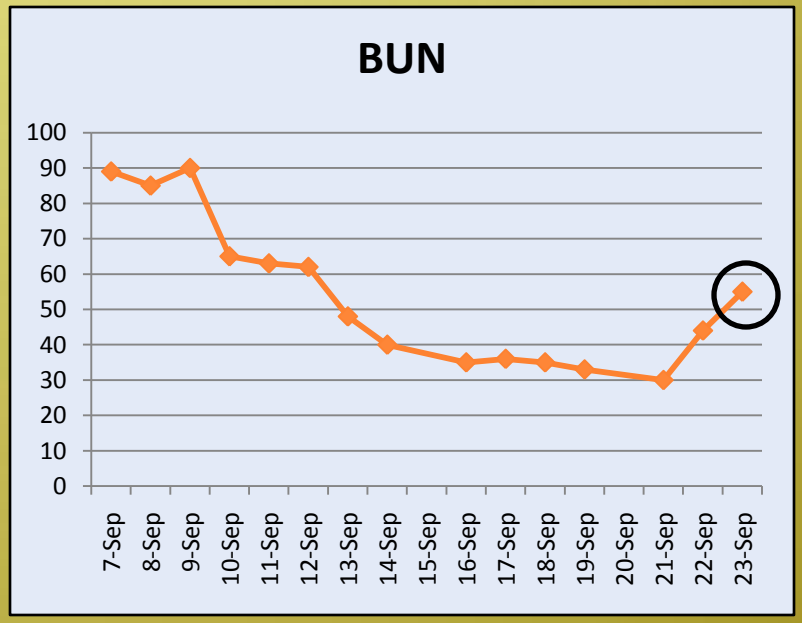
- •Honor pt wishes and provide palliative/pleasure feedings at consistency per speech evaluation.

↓GFR 41 ↑Creat 1.64 ↑BUN 55 Po4 4.7









Summary/Conclusion

Typical ARF presentation

- Common co-morbidities: Sepsis
- Competing metabolic demands: Wound healing
- Outcome poor (prognosis 50-80% mortality rate)
    - Influenced by pre-existing malnutrition

Nutrition therapy must be tailored to the individual ARF Pt.

- Degree of metabolic changes can vary greatly
- RIFLE criteria is helpful tool
- Knowing specific changes to metabolism/limits of MNT on clinical outcomes

Personal Impressions/ Group Discussion

Most difficult decisions

- Balancing extreme needs for wound healing with:
  - Preserving the function of kidneys
  - Limits of CO_2 capacity/ vent weaning

What would you have done differently?

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