

Week #7: Week #7 - Conditions of the Renal and Genitourinary Systems

NRNP 6550: Advanced Care of Adults in Acute Settings II
i-Human: Ken Fowler V5

FILL OUT THIS TEMPLET AS YOU GO THROUGH THE I-HUMAN PATIENT MODULE SO YOU KNOW WHAT YOU ARE DOING AS YOU GO.

YOU ARE ALL WELCOME!!!

Name: Ken Fowler

Age: 70 years

Sex: M

Ht: 5'10" (178.0 cm)

Wgt: 190 lb (86.0 kg) (BMI 27.3)

NOTES FROM i-HUMAN ASSESSMENT:

- 1) Observations: warm and sweaty
- 2) Chief complaint: Nausea and fatigue

QUESTIONS: (ask the patient up to 100 questions)

- 1) **How can I help you today?** "I went to see my doctor this morning because I have been feeling bad for the past few days. I'm tired, with **nausea & vomiting**. Well, he examined me and ordered some labs, and then told me that "kidneys are failing," something about a big change in my creatinine and that I needed to come to the emergency department. He told me to bring the test results here with me. [Test results today: creatinine 3.2 mg/dL; 1 month ago Test results 1.1 mg/dL; urine protein = 400 mg microalbuminuria] Do you understand what all that means? I sure don't!"
- 2) **Do you have any other symptoms or concerns we should discuss?** I also feel **exhausted**, probably from all the **vomiting** and not eating.
- 3) When did your nausea start? It started **three days ago**, I woke up feeling nauseous and started throwing up everything I ate.
- 4) What are the events surrounding this start of your nausea and vomiting? **Nothing really happened that I can think of.**
- 5) Do you have difficulty breathing? Uh... no.
- 6) When do you fatigue start? **Just the last few days.**
- 7) Do you have a problem with **fatigue/tiredness**? **Yup**
- 8) Does your fatigue come and go? **No.**
- 9) Have you gained or lost weight or intentionally, despite normal appetite and exercise? Uh... no.
- 10) Have you gained weight? **No.**

- 11) Has there been a change in your urination frequency? *Actually, I have been peeing less recently.*
- 12) What is the color of urine, has it changed recently? *It's usually fine, but I have been peeing less recently*
- 13) Does anything make your fatigue/tiredness better or worse? *No.*
- 14) Do you have pain anywhere? If so where? *I hurt my back last week, but that's fine now.*
- 15) Have you noticed swelling in any part of your body? *No*
- 16) *Can you tell me about any current or past medical problems she had? I have high blood pressure. I take medications for that. I was told last month my blood pressure has caused some kidney damage. Something about my protein in my urine. Oh, about a week ago I pulled my back lifting a heavy carton when I was cleaning out my garage. It was pretty painful so I took something for the pain. My back is really pretty good right now, but then this nausea vomiting began.*
- 17) Any previous medical, surgical, or dental procedures? *Yes. I had my tonsils out as a kid and then my appendix out about 35 years ago now.*
- 18) What treatments have you had for the pain in your back? *Just Naproxen.*
- 19) *Are you taking any prescription medications? I take lisinopril, metoprolol, and hydrochlorothiazide for BP. I have not taken anything for the last 24 hours because I feel so sick, can't keep the pills down.*
- 20) Do you have any pain in your back? *Not anymore*
- 21) *When you urinate, have you noticed any pain, burning, blood, difficulty starting or stopping, dribbling, incontinence, urgency during day or night, or any changes in frequency? Uh, no. In fact, I am barely peeing at all.*
- 22) When are the events surrounding the start of your difficulty urinating? *That's not a problem for me.*
- 23) When you pee, is a stream or flow of urine weak or do you dribble? *No*
- 24) *Do you have problems with nausea, vomiting, constipation, diarrhea, coffee grounds in your vomit, dark tarry stool, bright red blood in your bowel movements, early satiety or bloating? Yes, I have already told you about my nausea and vomiting. But none of the other stuff. My poop is normal*
- 25) *How severe is your nausea and/or vomiting? I have not eaten much of anything in the last three days, so I am not sure how to answer that question. Vomiting is and miserable business so for me it is bad.*
- 26) *Does anything make your nausea and/or vomiting better or worse? It does get worse when I eat, that's why I haven't eaten much.*
- 27) What treatments have you had for nausea and/or vomiting? *Nothing*
- 28) *Do you have any problems with fatigue, difficulty sleeping, or intentional weight loss or gain, fevers, or night sweats? Yeah I feel exhausted, but I think it is because of my nausea... just keeps me up at night. No fevers*
- 29) Does your fatigue/tiredness improve after a good night's rest? *No*
- 30) *What does your vomit look like? Clear or residual food particles, but I haven't eaten for over 24 hours*
- 31) When do you nausea and/or vomiting start? *It started 3 days ago, I woke up feeling nauseous and started throwing up everything I ate.*
- 32) Do you have diabetes? *Uh... no.*

- 33) What are the events surrounding the start of your back pain? *I picked up a box the wrong way.*
- 34) When was the last physical? *Don't remember*
- 35) Do you have kidney problems? *Not up to now. My doctor sent me here because he was worried about that.*

HINT: 1 of 5

You have asked 10 key questions. 23 key questions remain.

You need:

- 4 more in Patient Orientation
- 4 more in Chief Complaint Sx/Sx Characteristics
- 3 more in Associated Symptoms
- 2 more in PMH
- 1 more in SH
- 9 more in ROS

Your current Hx efficiency is 9%.

- 36) **What is your name?** *Ken Fowler*
- 37) **Where are you?** *In the Emergency Room*
- 38) **What time is it?** *Around 4:50 pm*
- 39) How old are you? *Didn't you read my chart?*
- 40) Do you leak urine (urine incontinence)? *No.*
- 41) When and what were the results of your last prostate exam? *Not that long ago. It was normal.*
- 42) Does anything make you fatigue tiredness better or worse? *No.*
- 43) How often are you nauseous or vomiting? *It's just been the last few days.*
- 44) What are the events surrounding your fatigue/tiredness? *It started about the same time as all the vomiting.*
- 45) Do you have any other symptoms associated with your fatigue/tiredness? *Just a nasty I'm vomiting. I feel so weak with it*
- 46) Do you become more weak or tired with exertion? *I am so tired without even doing anything.*
- 47) Do you have any muscle pain or cramping? *My back hurt last week, but it's better now.*
- 48) How much water/Floyd do you drink a day? *It is hard to keep anything down, I have not been able to drink even water.*
- 49) **Do you drink alcohol? If so, what do you drink and how many drinks per day?** *I drink a glass of wine with dinner frequently once or twice per week, but I have not done that for over a week now.*
- 50) Do you now or have you ever smoked or chewed tobacco? *I've never smoked*
- 51) Do you use any recreational drugs? If So what? *Uh... no*
- 52) Do you drink caffeine beverages or eat chocolate? *Usually two cups of coffee in the morning.*
- 53) **Do you have any allergies?** *No*

- 54) Are you taking any over the counter or herbal medication? *I am not taking anything now, but when I strained my back I started taking naproxen. I guess that was about 7 to 10 days ago. It took a couple of pills twice a day. It really helped my pain. Do you think they screwed my stomach and that is why I have so much nausea?*
- 55) When that you last take your medication? *This morning.*
- 56) Do you have any problems with itchy scalp, skin changes, moles, thinning of the hair, or brittle nails? *Uh... no*
- 57) Do you have any problems with headaches that don't go away with aspirin or Tylenol, double blurred vision, difficulty with night vision, problems hearing, ear pain, sinus problems, chronic sore throat, or difficulty swallowing? *Nope*
- 58) Do you experience chest pain discomfort or pressure, pain/pressure/dizziness with exertion or getting angry, palpitations, decrease exercise tolerance, or blue/cold fingers and toes? *Not at all. But I am not worried about my heart or anything should I be?*
- 59) Do you experience shortness of breath, wheezing, difficulty catching your breath, chronic cough, or speeding production? *No*
- 60) Do you have problems with muscle or joint pain, redness, swelling, muscle cramps, joint stiffness, joint swelling or redness, back pain, neck or shoulder pain, or hip pain? *Nope*
- 61) Have you noticed any bruising, bleeding gums, nosebleeds, or other sites of increase bleeding? *No.*
- 62) Do you have problems with heat or cold intolerance, increased thirst, increase sweating, frequent urination, or change in appetite? *I feel a bit thirsty, but the nausea keeps me from drinking because I am afraid all I will do is vomit it up back up. I just hate vomiting.*
- 63) Do you have any problems with, fainting, spinning room, seizures, weakness, numbness, tingling, or tremor? *No this is, but I am a bit lightheaded when I stand up and when I feel weak and exhausted. Not tingling or numbness or actually passing out.*
- 64) Do you have problems with nervousness, depression, lack of interest, sadness, memory loss, or mood changes, or ever hear voices or seen things that you know are not there? *Before getting sick, no.*
- 65) Have you been feeling sad, depressed or hopeless, if so how often do you feel this way? *Uh, no.*
- 66) Have you been more irritable or angry lately? *No.*
- 67) How would you describe your moods? *Pretty good. I don't think that's my problem.*

HINT: 2 of 5

You have asked 25 key questions. 8 key questions remain.

You need:

- 1 more in Patient Orientation
- 4 more in Chief Complaint Sx/Sx Characteristics
- 3 more in Associated Symptoms

Your current Hx efficiency is 28%.

- 68) Can you describe how you fell? *Uh... why are you asking me this?*
- 69) Can you describe what you were doing when you felt like headed? *Nothing. I just stood up is all.*
- 70) Do you have any other symptoms or concerns we should discuss? *I also feel exhausted, proud from older vomiting and not eating.*
- 71) Do you have any pain in your flanks? *Uh... no*
- 72) Do you ever feel/have a problem with Lightheadedness?
- 73) When did your lightheadedness start? *Just the last day or so.*
- 74) Have you had problems with low blood pressure before? *I don't have that problem*
- 75) How severe is your blood pressure? *Not bad period when I check it my blood pressure is usually 124 to 134*
- 76) Do you have any history of high lipids or triglycerides? *Uh... no*
- 77) When do you have blood pressure start? *About 10 years ago*
- 78) What do you think might be causing your symptoms? *It's all jumbled to me. The lab results and all that. I hope you can figure out and make me feel better.*
- 79) What did the pain in your back feel like? *My back does not hurt anymore*
- 80) Have you recently lifted something heavy or used your back initial waist or posture? *Yes the box in my basement and that's what caused the pain in my back. But that's gotten better now.*
- 81) How do you injure yourself? *I didn't hurt myself*

HINT: 2 of 5

You have asked 25 key questions. 8 key questions remain.

You need:

- 1 more in Patient Orientation
- 4 more in Chief Complaint Sx/Sx Characteristics
- 3 more in Associated Symptoms

Your current Hx efficiency is 23%.

- 82) Do you feel unwell, not normal or just "not yourself" (malaise) lately? *Not generally, but I sure don't feel well right now.*
- 83) How is your overall health? *Pretty good, up till now.*
- 84) Are there any diseases that run in your family? *My father had died when he was 65. He had high cholesterol and bad heart. My mother had rheumatoid arthritis but died from his stroke. My sister is in treatment for breast cancer.*
- 85) When did you last urinate? *Do you really need to know that?*
- 86) Do you urinate frequently during the night? *No more than most guys my age I suppose.*
- 87) Have you passed any stones in your urine? *No*
- 88) Is your urine pink or red in color (blood in the urine)? *No.*
- 89) When you urinate, do you feel that you could not completely empty your bladder? *Nope*
- 90) Does anything make your lightheadedness better or worse? *Standing up is what causes it. I haven't kept anything down for the last three days. Maybe if I felt better I will get better.*

- 91) Are you eating just before going to bed? *No*
92) Describe activities shortly before bedtime. *Nothing usual to tell you.*

HINT: 2 of 5

You have asked 25 key questions. 8 key questions remain.

You need:

- 1 more in Patient Orientation
- 4 more in Chief Complaint Sx/Sx Characteristics
- 3 more in Associated Symptoms

Your current Hx efficiency is 21%.

- 93) Are you having trouble concentrating or making decisions well? If so how often?
No, I don't have that problem
- 94) Have you had the pain in your abdomen before? *Why you asking me that? I don't have pain there*
- 95) Do you have any problem remembering things? *No*
- 96) Does your nausea and or vomiting come and go? *No.*
- 97) How quickly does your nausea and/or vomiting come on? *Pretty quickly. I mean when I had to throw up I run for the bathroom.*
- 98) Do you wake frequently from sleep? *Not usually*
- 99) Do you feel more fatigued tired in the morning? *No.*
- 100) How quickly does your fatigue/tiredness come on? *Within a day.*

Questions asked after Clinical feedback:

- 1) What happened? Not sure why you want to know? *I think told you about my PCP telling me to come in because of the lab results?*
- 2) Have you had nausea and or vomiting like this before? *No never. I just don't feel very well.*
- 3) Have you been vomiting anything that looks like blood or coffee grounds? *No. That will be horrible.*
- 4) Do you have any pain or other symptoms associated with your nausea or vomiting? *I pulled my back last week lifting a box out of my basement. The pain is finally getting better period but that doesn't have anything to do with my vomiting. Oh, I have been getting lightheaded if I stand up too quickly.*
- 5) Do you have frothy urine? *Not that I have noticed.*
- 6) Do you have any pain in your abdomen? *I don't really have any belly pain, but my stomach muscles seem a bit sore, probably from all the vomiting I have been doing.*
- 7) Have you lost weight? *I don't really know.*

CLINICAL FEEDBACK:

Hx Performance: You missed asking eight of the 33 key questions.

Missed questions:

Patient Orientation

- What happened?

Chief complaint Sx/ Sx characteristics:

- Have you had nausea and or vomiting like this before?
- Has there been any change in your nausea or vomiting overtime?
- Have you been vomiting anything that looks like blood or coffee grounds?
- Do you have any pain or other symptoms associated with your nausea or vomiting?

Associated symptoms characteristics:

- Do you have frothy urine?
- Do you have any pain in your abdomen?
- Have you lost weight?

Risk factors:**PMH:**

- N/A

Environmental:

- N/A

Etiology:

- N/A

HPI/ROS:

- N/A
-

Height/weight 5' 10" (178.0 cm) - 190 lb (86.0 kg) (BMI 27.3)

Temp: 99.9F

BP: Left arm, 108/60

Ortho BP (standing) 94/46

RR: 20

HR: 100 (normal)

A/Ox4

SpO2: 98%\$

SpCO2: 1%

eTCO2: 38 mmHg

PHYSICAL EXAM:**Assessment:****Skin, hair, nails:**

- Inspect skin overall: general skin warm, drying; no pallor, jaundice, rash, scaling, or ulceration; no clubbing or cyanosis; sparse peripheral hair.
- Inspect hair color, distribution, thickness: thickness and distribution pattern typical for patient's gender and age.
- Inspect nails: Nails without ridging, pitting, or peeling.
- Test capillary refills – fingers: blanche time of 3-4 seconds; suggestive of dehydration.
- Test capillary refills – toes: normal capillary refill
- Quincke's test: blanching observed

HEENT:

- Inspect/palpate scalp:
- Inspect/palpate head:
- **Inspect eyes:** Non-icteric; no conjunctival-rim pallor
- Perform ocular motor test:
- **Examine pupils:** right pupil and left people normal reactive.
- Look in eyes with ophthalmoscope:
- Inspect ears:
- Look in ears with otoscope:
- Test hearing:
- Inspect nose:
- Look up nostrils:
- **Inspect mouth/pharynx:** dry mucous membranes; No sublingual jaundice.
- Smell breath: no unusual odor

Neck:

- **Inspect neck:** no visible scars, deformities, or other relations; trachea is in the midline and fully mobile; No asymmetry or access respiratory muscle used with quiet breathing.
- Palpate neck:
- Ask patient to swallow:
- Evaluate neck range of motion:
- **Measure JVP (jugular venous pressure):** flat, nodular venous tension.
- **Auscultate carotid arteries:** no bruits auscultated

Breast:

- Breast exam:

Lymphatic:

- Palpate all lymph nodes:

Chest Wall/lungs:

- **Visual Inspection** – anterior and posterior chest: normal respiratory efforts and his question; no gynecomastia.
- **Palpate** – anterior and posterior chest: normal tactile fremitus; thorax non tender to palpation throughout; no maxillary, supraclavicular, or infraclavicular adenopathy.
- **Percuss** – anterior and posterior chest:
- **Auscultate lungs:** (remember to do the back): left lung and right lung normal breath sounds

Heart:

- **Palpate for PMI (Point of Maximum Impulse):** slight lateral (left ward) and downward displacement of the PMI
- **Measure JVP (Jugular Venous Pressure):** flat, no jugular venous distention

- Auscultate heart: cardiac auscultation – murmur (systolic/diastolic) loudest heard over the aortic and pulmonic area, also overheard at the tricuspid area.
==NORMAL==
- Dynamic auscultation: no significant change while standing, squatting, during the Valsalva maneuver or with sustained handgrip.

Abdomen:

- Visual Inspection of abdomen: abdomen lean, non-distended, symmetrical; RLQ incisional scar consistent with surgical history
- Auscultate abdomen: hyperactive bowel sounds
- Auscultate abdominal/femoral arteries: normal
- Auscultate fetal heart:
- Palpate abdomen: Adam and soft, non-distended, mild tenderness in periumbilical region-more superficial; no HSM, mass, or herniation; no abnormal abdominal-aortic pulsation; no abdominal, renal, or femoral bruits.
- Percuss abdomen: abdomen normal to percussion: no tympany, shifting dullness, or because if evidence of hepatosplenomegaly.
- Measure girth:

Extremities:

- Visual Inspection of extremities: well perfused; No edema; no inflammatory joint signs.
- Palpate extremities:

Musculoskeletal:

- Inspect muscle bulk and tone:
- Inspect/palpate back and spine:
- Percuss back and spine: non-tender to percussion
- Knee drawer test:
- Test stability:
- Test strength:

Vascular:

- Auscultate carotid arteries: no bruits auscultated
- Auscultate abdominal/femoral arteries: normal
- Ankle branchial pressure index (ABI):

Neurological:

- Mini mental state exam (MMSE):
- assess cranial nerves: cranial nerves I-XII intact
- Assess gait and stance: normal gates and posture
- inspect for muscle bulk and tone:
- look for involuntary movements: none of the following involuntary movements found: revelations, fasciculations, asterixis, tics, dystonia's, chorea, athetosis, hemiballismus, nor seizure. ,
- point to point test arms (fingers to nose)

- point to point test legs (heels on shin):
- rapid altering movement – fingers:
- rapid altering movement – arms/hands:
- Romberg's and pronator drift test:
- test range of motion:
- test stability: normal
- test strength: no proximal muscle weakness; normal symmetrical strength throughout
- straight leg raise:
- reflexes - deep tendon: 2+ triceps (C6/C7); 2+ biceps (C5/C6); 2+ Brachioradialis (C5/C6); 2+ knee/patella (L3/L4); 2+ ankle/achilles (S1/S2)
- reflexes - plantar/Babinski (L5/S1): negative on right and left extremity
- administer grass pain stimulus:
- Skew deviation:
- Dix-Hallpike:
- examine pupils:
- monofilament test:
- perform ocular motor test:
- sensory test (light touch, pain, position, temperature, vibration):
- Vestibulo- ocular reflex (VOR):

Genitourinary:

- Genitourinary female exam:
- Genitourinary male exam: normal external genitalia; no masses for tenderness; no urethral discharge
- Prostate exam:

Rectal:

- Visual inspection rectal area:
- Rectal exam:

Vital signs tab:

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Blood Pressure Tab:

- Check blood pressure: ____/____
- Check orthostatic BP (if indicated): ____/____

Documentation tab:

- Lung auscultation:
- cardiac auscultation:

EXPERT FEEDBACK:

Vitals Documentation:

- Pulse: Good, all correct. (FYI actual rate: 98)
- Respiration: Good, all correct. (FYI actual rate: 18)
- BP: Good, all correct.
- Mental Status: Good, all correct

Exam documentation:

- Lung Auscultation: Good, all correct.
- Cardiac Auscultation: Incorrect sound documented (Murmur - systolic/diastolic).
Correct is Normal.
- Eyes - Pupils: Good, all correct.

Exams performed:**Good, you performed 21 key exams for this case:**

- 1) Vitals: Temperature (provided)
- 2) Vitals: BP
- 3) Vitals: Respiration
- 4) Vitals: Pulse
- 5) Vitals: Mental Status
- 6) Chest Wall & Lungs: auscultate lungs
- 7) Heart: auscultate heart
- 8) Vitals: orthostatic blood pressure
- 9) Skin, Hair, Nails: inspect skin overall
- 10) Skin, Hair, Nails: test capillary refill - fingers
- 11) HEENT: inspect eyes
- 12) HEENT: inspect mouth/pharynx
- 13) Neck: measure JVP (jugular venous pressure)
- 14) Chest Wall & Lungs: visual inspection - anterior & posterior chest
- 15) Chest Wall & Lungs: palpate - anterior & posterior chest
- 16) Heart: palpate for PMI (Point of Maximal Impact)
- 17) Abdomen: visual inspection abdomen
- 18) Abdomen: palpate abdomen
- 19) Abdomen: percuss abdomen
- 20) Extremities: visual inspection extremities
- 21) Musculoskeletal: test strength

You also performed/saw results of additional exams that were not required, but are never inappropriate.

- 1) Vitals: SpO2 (provided)
- 2) Vitals: Skin (provided)
- 3) Vitals: SpCO (provided)
- 4) Vitals: eTCO2 (provided)

Missing:

Oops. You missed 1 key exam. It is:

- 1) Chest Wall & Lungs: percuss - anterior & posterior chest (Thorax normal/symmetrical to percussion)

Percussion of the thorax differentiates abnormal processes on the basis of the following:

Dullness to percussion: e.g., lung consolidation

Hyperresonance; e.g. hyperexpansion

Tympany; e.g., displaced stomach

Incorrect: You performed 19 exams not required by expert.:

- 1) HEENT: examine pupils
- 2) Neck: auscultate carotid arteries
- 3) Abdomen: auscultate abdomen
- 4) Abdomen: auscultate abdominal/femoral arteries
- 5) Skin, Hair, Nails: inspect hair color, distribution, thickness
- 6) Skin, Hair, Nails: test capillary refill - toes
- 7) Skin, Hair, Nails: Quincke's test
- 8) Skin, Hair, Nails: inspect nails
- 9) HEENT: smell breath
- 10) Neck: inspect neck
- 11) Heart: dynamic auscultation
- 12) Musculoskeletal: percuss back and spine
- 13) Neurological: assess cranial nerves
- 14) Neurological: assess gait & stance
- 15) Neurological: look for involuntary movements
- 16) Musculoskeletal: test stability
- 17) Neurological: reflexes - plantar/Babinski (L5/S1)
- 18) Neurological: reflexes - deep tendon
- 19) Genitourinary: genitourinary male exam

ASSESSMENT:

Organize Key findings:

My key findings:

- Nausea and vomiting (x3 days)
- Fatigue (x3 days)
- Lightheadedness
- Decreased appetite (x3 days)
- Decrease steering output
- Back injury with acute back pain (week ago)
- Unable to hold in medications
- renal failure
- Today: Cr 3.2 mg/dL; Last month Cr 1.1 mg/dL; 400 microalbuminuria.
- Dehydration (dry mucous membranes)

Expert's feedback:

- Orthostatic hypotension - MSAP
 - history of grinding through queen 2 with microalbuminuria - Related
 - nausea and dry hiving x 24 hours - related
 - reduced during output - related
 - nausea and vomiting 3-4 days – resolved - related
 - tachycardia - related
 - light headed when standing up quickly - related
 - New NSAID use - related
 - Fatigue - related
 - Dry mucous membranes - related
 - mild tenderness in epigastric and perumbilical region – unknown
 - Back pain last week, now significantly better - related
- The medical problem list do you have compile should be at least that includes everything that is out of the ordinary about the patient, even when it is not a problem in the true sense of the word.

In this case, the most significant active problem (MSAP) is his orthostatic hypotension. It may feel hard to determine which is the most active problem, but since decreased intravascular volume can be life-training as well as cause kidney injury, this problem is the MSAP.

Your approach to the other complaints should be to determine which ones might be the consequences of his dehydration and/or elevated creatinine and which might be either causal or not involved. For dehydration, as reflected by his orthostatic hypotension, tachycardia would be normal compensation as would a reduced urine output and Lightheadedness upon standing. He also complaints of nausea and vomiting that started a week ago that now has him dry heaving due to lack of oral intake. The question is whether the real problem with the elevation in his creatinine is causal in his nausea and vomiting or if he has a GI issue that has resulted in dehydration causing his renal issue? Review his presentation history and his physical findings to try to determine which is etiologic.

Next, you have two different sites of pain. One is a mild tenderness in his epigastrium while the other is resolved back pain. What was the timing of each? How was each treated? How could either of these things be related to his current complaints or are they irrelevant?

Finally, remember his chief complaint of fatigue and nausea and vomiting, that prompted his visit to his PCP. How are they related to his orthostatic hypotension and elevated creatinine? What things in the physical exam are helpful in ranking the diagnosis you are considering?

Write Problem statement: (your own)

Mr Ken Fowler is a 70-year-old male who arrived at the ED after being told by his PCP to come here because the results of his current labs. The patient was told the "his

kidneys are failing" and his current creatinine is 3.2 mg/dL. A month ago, his Creatinine was 1.1 mg/dL and urine protein was 400 mg microalbuminuria. He has been experiencing nausea, vomiting, fatigue, tiredness, lightheadedness upon standing, decrease PO intake, dry heaving, and decreased urine output. During assessment he was noted to be dehydrated with dry mucous membranes and positive for orthostatic hypotension. Sitting BP 108/60 and standing 94/46. Patient has a history of hypertension.

Expert's feedback:

Mr Fowler it's a 7 year old male who is sent to the Ed by his primary care physician for further evaluation of a grinding of 3.2 mg/dL following a three day history of nausea and vomiting now with dry hives, poor PO intake, fatigue, the crazy rain volume and orthostatic hypotension (108/60) and tachycardia (98 bmp). PMH it's significant for lifting a heavy object resulting in a low back pain one week prior. He self-medicated with NSAIDS (Naproxen) BID. His medications include lisinopril, metoprolol, and HCTZ. His PMH is also significant for mild chronic renal disease with a creatinine (one month ago) of 1.1 with 400 mg albuminuria. Physical exam is notable for dry mucous membranes, mild perumbilical tenderness and lack of CVA tenderness or bladder distention

Select Problem Categories:

My selection:

- Cardiovascular
- Gastrointestinal
- Genitourinary/Renal

Expert's statement problem:

- Gastrointestinal
- Genitourinary/Renal

Gastrointestinal needs to be considered since he presents with nausea, vomiting, and perumbilical tenderness as a cause of his orthostatic hypotension.

Genitourinary/Renal needs to be considered in light of his previous history of renal insufficiency and proteinuria and presentation of orthostatic hypotension.

Comparison to expert:

Correct/Incorrect/Missing:

(TABLE GOES HERE PROVIDED BY i-HUMAN)

Feedback:

Select Differential Diagnosis:

Student Differential Diagnosis:

- Acute renal failure

- chronic renal failure
- orthostatic hypotension
- dehydration
- heart failure/congestive heart failure
- urinary tract infection (UTI)
- renal artery thrombosis/stenosis
- chronic kidney disease
- nephrolithiasis/kidney calculi
- Acute glomerulonephritis

Expert's feedback:

Correct:

- **WTF!!!!!!**

Missing:

- 1) **Medication related (side effect):** this differential diagnosis should be included because NSAIDS inhibit the cyclooxygenase (COX) enzymes. This results in a reduction of prostaglandin (PG) synthesis which can lead to reversible renal ischemia, Eddie Klein in glomerular hydraulic pressure and AKI. ACE inhibitors and their attics are thought to make the incidence of AKI frequent.
- 2) **Uremia (intrarenal azotemia):** Differential diagnosis should be included because intrarenal azotemia is intrinsic disease of the kidney. This may be due to: renal failure, TTP, glomerulonephritis, ATN, AIN
- 3) **Uremia (prerenal azotemia):** this differential diagnosis should be included because prerenal azotemia is a result of decreased renal perfusion. The BUN to creatinine ratio is > 20 and it is also defined as an increase in creatinine of >3.0 mg/dL over 48 hours or 1.5 X baseline within seven days. The causes of hypo perfusion can be: hemorrhage, sepsis, heart failure, invalid to the kidneys, shock, dehydration, add renal insufficiency, medications.
- 4) **Urinary obstruction:** this differential diagnosis should be included because signs and symptoms of urinary track obstruction (e.g. BPH) may include: feeling or having a full bladder, delayed urination, weak urine flow, abdominal pain, dysuria, oliguria, anuria, hypertension.

Incorrect:

- All the fucking diagnosis I mentioned.

Rank Differential diagnosis:

-
-

-
-
-

Expert's feedback:

Diagnosis ranking:

Correct:

- Medication related (side effect)
- Uremia (intrarenal azotemia)
- Uremia (prerenal azotemia)
- Urinary obstruction

Incorrect:

-

Diagnosis Must-not-Miss (MnM):

Correct:

- Medication related (side effect)
- Uremia (prerenal azotemia)
- Urinary obstruction

Incorrect:

- Uremia (Intrarenal):

Discussion:

This is unusual case in which there are two leading diagnosis. The first is medication related side effects and the second is prerenal azotemia. both medications, in particular NSAIDS, as well as hypovolemia, from a variety of causes, can cause prerenal azotemia.

there is a medication side effect E leading diagnosis is that it is important to stop medication in order to reverse the azotemia.

Prerenal azotemia is a must-not-miss diagnosis because if left untreated, it can progress to permanent kidney damage or intrarenal azotemia. repeat myologie data has found the incidence of NSAIDS-induced prerenal azotemia can be as high as 5% of those individuals that use this type of medication. Furthermore, the combination of NSAIDs diuretics, and ACE inhibitors are implicated as cofactors in causing and/or exacerbating an acute kidney injury in a volume depleted state.

Prerenal azotemia is a *must-not miss* diagnosis because if left untreated, it can progress to permanent kidney damage or intrarenal azotemia. Epidemiology data has found the incidence of NSAIDS-induced prerenal azotemia can be as high as 5% of those individuals that use this type of medication. Furthermore, the combination of NSAIDs, diuretics and ACE inhibitors are implicated as co-factors in causing and/or exacerbating an acute kidney injury in a volume-depleted state. Mr. Fowler was taking all of these medications. However, it is also important to remember that a vast majority of individuals use NSAIDS without issue. Therefore, it is important to look for all possible causes of his creatinine elevation.

The presentation of poor oral intake, fatigue, dry mucous membranes and reduced urine output are highly suggestive of volume depletion. However, keep in mind that sepsis can present looking like hypovolemia. In addition, many elderly patients have a poor fever response to infections. The cause of an occult infection in men might be urinary obstruction resulting in an UTI and subsequent sepsis. Thus, urinary obstruction should be considered on the differential as an alternative, but *must-not-miss*.

Finally, note that there are a variety of etiologies for intrarenal azotemia including: AIN, ATN, TTP, glomerulonephritis, renal failure. Before considering these diagnoses, you should focus on the first order diagnosis.

TESTS FOR DIFFERENTIAL Dx:

1) medication related (side-effect)

- 12 lead electrocardiogram (ECG)
- comprehensive metabolic panel (CMP)
- basic metabolic panel (BMP)

2) Uremia (intrarenal azotemia)

- 12 lead electrocardiogram (ECG)
- comprehensive metabolic panel (CMP)
- basic metabolic panel (BMP)

3) Uremia (prerenal azotemia)

- urinalysis (UA)
- sodium (Na^+), urine
- creatinine, urine (24 hour)
- basic metabolic panel (BMP)
- renal ultrasound
- osmolality, urine
- echocardiogram, transesophageal (TEE)
- 12 lead electrocardiogram (ECG)
- kidney scan

4) urinary obstruction

- CT abdomen/pelvis without contrast
- renal ultrasound
- urinalysis (UA)

Expert's feedback:

Correct:

- BMP
- Renal US
- Sodium Urine

- Urinalysis
- CBC

Missing:

- Eosinophils, urine
- Pelvic US

Incorrect:

TEST:

Tests and results: (write them here so you can use them for your Dx and note)

BMP:

Name	Value	Units	Reference Range
Sodium (Na+)	132	mmol/L	135-145
Potassium (K+)	4.5	mmol/L	3.5 to 5.1
Chloride (Cl-)	98	mmol/L	95-102(1mo-adult), 91-118(1d-1mo)
Carbon dioxide, total (CO2)	23	mmol/L	22-29(15y-adult), 20-28(1y-15y)
Glucose (BG/Glu)	98	mg/dL	70-110(fasting), 70-130(non-fasting)
Urea nitrogen (BUN)	72	mg/dL	8-21(15y-adult), 5-18(1mo-15y)
Creatinine (Cr)	3.2	mg/dL	0.6-1.3(♂), 0.5-1.1(♀)
Calcium (Ca2+)	9	mg/dL	8.7-10.7(1 mo-adult), 8.7-11.9
*Anion Gap	11	mEq/L	10-20 [(Na+ + K+) - (Cl- + HCO3-)]

CBC:

Name	Value	Units	Reference Range
White blood cells (WBCs)	8535	mm ³	4,000-10,000
Red Blood Cell Count (RBC)	5.3	million/ μ L	4.5-5.9(♂), 4.0-5.2(♀), adults
Hemoglobin (Hgb)	14.3	g/dL	14-18(♂), 12-16(♀), adults
Hematocrit (Hct)	42	%	42-54(♂), 37-47(♀), adults
Mean corpuscular volume (MCV)	85	fL	82-103, adults
Mean corpuscular hemoglobin (MCH)	29	μ g	26-34, adults
Mean corpuscular hemoglobin concentration (MCHC)	30	%	30-37, adults

Platelets (thrombocytes)	282	k/dL	150-399, adults
Red cell distribution width (RDW)	12.7	%	11.5-14.5, adults
Neutrophils	63	%	46-78, adult
Lymphocytes	24	%	18-52, adult
Monocytes	8	%	3-10, adult
Eosinophils	4	%	0-6, adult
Basophils	1	%	0-3, adult
Segmented neutrophils	59	%	36-72, adult
Band Cells	4	%	0-6, adult

Renal US: kidneys are normal in size, location, and echogenicity; no hydronephrosis, focal mass, or shadowing stones period



Urinalysis:

Name	Value	Units	Reference Range
Color	Dark		Interpreted by physician
Clarity	Clear		clear
Odor	Strong		slightly nutty
pH	4.8		4.5-8
Protein	1	mg/dL	0-8
Specific gravity	1.018		1.002-1.030
Osmolarity	450	mOsm/L	>400
Leukocyte esterase	Negative		negative
Nitrites	Negative		0
Ketones	Negative		negative
Bilirubin	Negative		negative
Blood (heme)	Negative		negative
Urobilinogen	0.5	EU/dL	0.2-1.0
Crystals	None		Interpreted by physician
Casts	1	hyaline casts/lpf	0-4
Glucose, urine	Negative		negative
White blood cells (WBCs)	3	hpf	0-5
Red blood cells (RBCs)	0	hpf	0-5
Red blood cell casts	None		none
SQEP	None	lpf	<5
Bacteria	Negative		negative on spun specimen
Creatinine	7		5-19
Occult blood	Negative		negative

Sodium (Na+) Urine:

Name	Value	Units	Reference Range
Sodium (Na+), urine	7	mEq/24 hr	40-220

Eosinophils urine

Name	Result
Eosinophils, urine	negative

Pelvic Ultrasound:

Normal bladder size, no masses seen,

DIAGNOSIS:

What is the correct diagnosis for this patient? (select the main Dx)

- Uremia (prerenal azotemia)

Expert's feedback:

- Uremia (prerenal azotemia)
- Medication related (side-effect)

Clinical Exercises:

1) Which of the following findings are consistent with a patient with prerenal volume depletion?

Answer: Urine sodium concentration 15 mEq/L and urine osmolarity 500 mOsmol/kg

Expert's Feedback

Discussion

- Loss of concentrating ability is an early and almost universal finding in ATN.
- Urine osmolality will be below 450 mosmol/kg in almost all cases of ATN, and usually will be below 350 mosmol/kg.
- Urine sodium concentration is widely used in evaluating patients with suspected volume depletion. In the absence of a sodium-wasting state, the urine sodium concentration in hypovolemic states should be less than 20 meq/L. Measurement of the fractional excretion of sodium is the preferred test for distinguishing prerenal disease from ATN as the cause of AKI.
- Urine sediment, per microscopy, is normal or near normal in prerenal disease. Hyaline and/or fine granular casts may be seen, but this is not an abnormal finding.
- In comparison, the classic urinalysis findings in ATN include muddy-brown granular casts, epithelial-cell casts, and free renal-tubular epithelial cells.

2) a 74 year old man with long standing histories of diabetes, CD, and PVD, is seen in the clinic for evaluation of a new rash involving his lower extremities. He underwent a go to catheterization one month prior and had a drug eluting stent placed. At this time, labs are

notable for a creatinine of 2.7 mg/dL (baseline 1.2), eosinophil count of 700 cells/mcL, and urine protein 200+ mg/dL on an otherwise unremarkable UA. What is the likely diagnosis?

Answer: atherosclerotic disease

Expert's Feedback

Discussion

- Renal and systemic atheroemboli usually affect older patients with diffuse erosive atherosclerosis. Cholesterol-crystal embolization is iatrogenic in more than 70 percent of cases, and is often seen following manipulation of the aorta or other large arteries during angiography, angioplasty, or cardiovascular surgery.
- Embolization to the kidney typically produces a subacute kidney injury observed several weeks or more after a possible inciting event. The clinical presentation is more frequently related to atheroembolization affecting the skin and produces *blue toe syndrome* or *livedo reticularis*.
- The urinalysis in patients with renal atheroemboli is typically benign (with few cells or casts present), a finding consistent with ischemic atrophy. Proteinuria is usually not a prominent feature, except in patients with underlying diabetic nephropathy. Eosinophiluria, eosinophilia, and hypocomplementemia commonly occur during the acute phase.
- Renal-vein thrombosis typically presents with symptoms of renal infarction: flank pain, microscopic or gross hematuria, a marked elevation of serum LDH, and an increase in renal size per imaging studies. The incidence of both venous and arterial thromboses are much higher in patients with nephrotic syndrome, when compared to the estimated incidence in the general population.
- The clinical manifestations of contrast nephropathy are observed within the first 24 to 48 hours after the contrast study. Most patients are nonoliguric and the only detectable abnormality is a mild increase in the serum creatinine, which starts to decline within three to seven days. The urinary sediment may show classic findings of ATN; protein excretion is absent or mild. FENa is often below 1%; versus > 3%, as seen in AKI due to ischemic or toxin-induced ATN.

3) an 80 year old female is admitted to the hospital for management of community acquired pneumonia. She received IV fluids, ceftriaxone, and consider missing, and experiences notable clinical improvements. On hospital day 5, she develops a new fever and rash; her creatinine has increased from baseline value of 1 mg/dL to 1.8 mg/dL. Which of this will lead you to the likely diagnosis?

Answer: WBC on urinalysis.

Expert's Feedback

Discussion

- Acute interstitial nephritis (AIN) should be suspected when a patient presents with an elevated serum creatinine and urinalysis findings of white cells, white-cell casts and, in some cases, eosinophiluria.
- Drug-induced AIN should be suspected when the detection of characteristic laboratory findings are temporally related to the initiation of a new drug.
- The classic presentation for drug-induced AIN includes signs/symptoms of an allergic-type reaction: rash, fever, and eosinophilia.
- Drugs that are commonly associated with AIN include penicillins and cephalosporins.

4) Which of the following does not represent a case of prerenal acute kidney injury?

Answer: FeNa 0.28 after contrast exposure

Expert's Feedback

Discussion

- In general, a FENa below 1% suggests prerenal disease; where near total reabsorption of all filtered sodium represents an appropriate response to decreased renal perfusion.
- Patients with AKI are often treated with diuretics. If effective, this can raise the FENa, even in patients with prerenal disease.
- Potential alternatives in such patients include the fractional excretion of molecules that are primarily reabsorbed in the proximal tubule; that is, proximal to the sites of action of loop diuretics (loop of Henle) and thiazide diuretics (distal tubule).
- The measurement of the fractional excretion of urea (FEUrea) may be useful in patients with AKI. FEUrea will be 50 to 65% in ATN, and usually below 35% in prerenal disease.
- The clinical manifestations of contrast nephropathy are observed within the first 24 to 48 hours after the contrast study. The urinary sediment may show classic findings of ATN. Protein excretion is absent or mild. FENa is often below 1%; versus > 3%, as seen in AKI due to ischemic or toxin-induced ATN.

5) an 80-year-old male is brought to the ED for evaluation of confusion, nausea, and abdominal discomfort. BP 160/100, HR 98, afebrile, BUN 110, Cr 4, Na 146, K 4.6. What is the next step in the work-up and management of the patient with acute kidney injury?

Answer: Diagnosed catheterization and renal ultrasound

Expert's Feedback

Discussion

- The clinical presentation of urinary tract obstruction (UTO) depends upon the site of obstruction; the degree of obstruction (i.e., partial or complete); and, the rapidity with which the obstruction developed.
- Signs and symptoms may include pain, change in urinary output, hematuria, and hypertension. In those patients with bladder-outlet obstruction, lower-abdominal distension or an apparent abdominal mass (distended bladder) may be detected. Serum creatinine will be elevated.
- Imaging should be performed in all patients who present with acute kidney injury (AKI) of unknown cause. Pelvic ultrasound (along with bladder catheterization) can diagnose or exclude urinary retention secondary to bladder-outlet obstruction.
- Renal ultrasound is the preferred imaging test for most patients. A negative renal ultrasound is usually sufficient to exclude acute or chronic intrarenal or postrenal obstruction as the cause of renal failure.

PLAN: