A DAY IN THE LIFE OF A HOSPITALIST PA

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Disclosures

- This presentation has no current affiliation or financial arrangements.

Objectives

At the end of this presentation, the learner should be able to:

1. Discuss basic concepts of hospital medicine including hospital admissions, daily rounds, nurse calls, and the importance of appropriate communication.
2. Recognize commonly encountered inpatient diagnoses including: *Clostridioides difficile*, diabetic ketoacidosis, community acquired pneumonia, delirium, pulmonary embolism, alcohol withdrawal, and hypertensive crises.
3. Differentiate which patients need more urgent evaluation or treatment.
4. Discuss the monitoring of several common inpatient conditions listed above.
5. Develop appropriate treatment plans for the conditions listed above.

First Thing's First…

Morning Rounds

1. Mr. Smith
2. Mrs. Johnson
3. Mr. Daniels
4. Mrs. Sullivan

ER Pager: New admissions

Floor Pager: RN calls

#1. MR. SMITH

Mr. Smith

Sign out:

- 72-year-old male with type 2 DM, CKD stage II, depression

- HD #4: Admitted with sepsis 2/2 influenza A, placed on oseltamivir + supportive care

- He is improving and likely ready for discharge today.

Mr. Smith

- He appears well when you enter the room, PE is unremarkable, and all vital signs are WNL.

- He reports his symptoms are improving and he feels well enough to go home. He has been afebrile > 24 hours.

- Ready for discharge?

Mr. Smith

- As you are walking out the door… “Hey, what should I do about this diarrhea I started having?”

- He reports 6 episodes of loose, watery diarrhea over the past 12 hours; He denies abdominal pain, n/v, and he has been tolerating a diet.

Mr. Smith

- What is at the top of your differential?

Clostridioides (Clostridium) difficile

- Most commonly recognized cause of infectious diarrhea in healthcare settings
  - ***Healthcare-onset (HO) CDI:*** *on or after hospital day #4*

- **Risk Factors:** antibiotics*, advanced age, recent hospitalization, severe comorbid illness, enteral feeding, GI surgery, IBD, chemotherapy, gastric acid suppression

- Responsible for 15-25% of antibiotic associated diarrhea

C. Diff Testing

- **Who to test:** new and unexplained ≥3 unformed stools in 24 hours
- Colonization vs. infection
- Repeat testing?
- Imaging?

C. diff and Antibiotics

- D/C inciting antibiotic ASAP
  - *If ongoing abx indicated, consider those with lower CDI incidence*

- High-Risk antibiotics:
  - *Fluoroquinolones*
  - *3rd/4th generation cephalosporins*
  - *Carbapenems*
  - *Clindamycin*

- Practice antibiotic stewardship!

C. Diff Treatment

- **Initial CDI:** Either vancomycin 125mg PO QID or fidaxomicin 200mg PO BID x 10 days
- **Fulminant CDI**: Vancomycin 500mg PO QID + metronidazole 500mg IV q8 hours
  - *If ileus, consider rectal vancomycin*
- **First recurrence**: Fidaxomicin x 10 days OR vancomycin tapered + pulsed regimen
- **Multiple Recurrences**: Fecal microbiota transplant

2018 IDSA *C. Diff* Guidelines

Table 1. Recommendations for the Treatment of *Clostridium difficile* Infection in Adults

Clinical Definition	Supportive Clinical Data	Recommended Treatment[a]	Strength of Recommendation/ Quality of Evidence
Initial episode, non-severe	Leukocytosis with a white blood cell count of ≤15 000 cells/mL and a serum creatinine level <1.5 mg/dL	• VAN 125 mg given 4 times daily for 10 days, OR	Strong/High
		• FDX 200 mg given twice daily for 10 days	Strong/High
		• Alternate if above agents are unavailable: metronidazole, 500 mg 3 times per day by mouth for 10 days	Weak/High
Initial episode, severe[b]	Leukocytosis with a white blood cell count of ≥15 000 cells/mL or a serum creatinine level >1.5 mg/dL	• VAN, 125 mg 4 times per day by mouth for 10 days, OR	Strong/High
		• FDX 200 mg given twice daily for 10 days	Strong/High
Initial episode, fulminant	Hypotension or shock, ileus, megacolon	• VAN, 500 mg 4 times per day by mouth or by nasogastric tube. If ileus, consider adding rectal instillation of VAN. Intravenously administered metronidazole (500 mg every 8 hours) should be administered together with oral or rectal VAN, particularly if ileus is present.	Strong/Moderate (oral VAN); Weak/Low (rectal VAN); Strong/Moderate (intravenous metronidazole)
First recurrence	…	• VAN 125 mg given 4 times daily for 10 days if metronidazole was used for the initial episode, OR	Weak/Low
		• Use a prolonged tapered and pulsed VAN regimen if a standard regimen was used for the initial episode (eg, 125 mg 4 times per day for 10–14 days, 2 times per day for a week, once per day for a week, and then every 2 or 3 days for 2–8 weeks), OR	Weak/Low
		• FDX 200 mg given twice daily for 10 days if VAN was used for the initial episode	Weak/Moderate
Second or subsequent recurrence	…	• VAN in a tapered and pulsed regimen, OR	Weak/Low
		• VAN, 125 mg 4 times per day by mouth for 10 days followed by rifaximin 400 mg 3 times daily for 20 days, OR	Weak/Low
		• FDX 200 mg given twice daily for 10 days, OR	Weak/Low
		• Fecal microbiota transplantation[c]	Strong/Moderate

Abbreviations: FDX, fidaxomicin; VAN, vancomycin.

[a]All randomized trials have compared 10-day treatment courses, but some patients (particularly those treated with metronidazole) may have delayed response to treatment and clinicians should consider extending treatment duration to 14 days in those circumstances.

[b]The criteria proposed for defining severe or fulminant *Clostridium difficile* infection (CDI) are based on expert opinion. These may need to be reviewed in the future upon publication of prospectively validated severity scores for patients with CDI.

[c]The opinion of the panel is that appropriate antibiotic treatments for at least 2 recurrences (ie, 3 CDI episodes) should be tried prior to offering fecal microbiota transplantation.

Thanks, Dr. Google

- He has a few questions after he googles *C. diff*….

1. *“Can I take an anti-diarrheal to slow it down?*
2. *“I take omeprazole because my neighbor told me it was good for me…do PPIs contribute to C. Diff?”*
3. *“Should I be taking a probiotic?”*
4. *“Can I spread this to my family?”*

IT'S THE ER CALLING…

"I have a new admission for you…Mrs. Teal"

Mrs. Teal

- 36-year-old female with history of type 1 DM, hypothyroidism, and morbid obesity presents with abdominal pain, nausea, and vomiting x 2 days. She has been compliant with her insulin regimen, but notes that her blood sugar has been elevated despite poor oral intake.

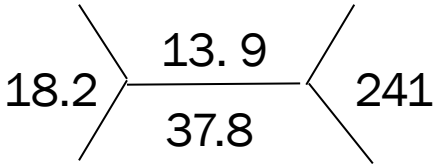
- **VS:** HR 110 bpm, BP 102/68, RR 21 br/min, T 101 F, SpO2 99% on RA

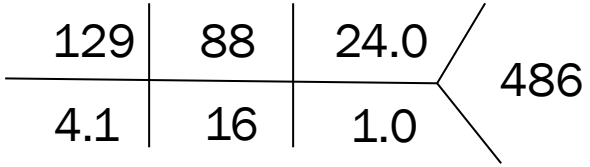
Mrs. Teal

- **PE:**
  - *Gen → WDWN, obese female. Curled up on her side in hospital gurney. A&O x3. She appears diaphoretic.*
  - *Heart → Tachycardic, regular rhythm, no m/r/g.*
  - *Lungs → CTA b/l no w/r/r. Slightly tachypneic.*
  - *Abdomen → Diffuse TTP, most severe in suprapubic region. No r/r/g. Normoactive BS in all 4 quadrants.*
  - *GU → No CVA tenderness.*

- What is your differential diagnosis?

Mrs. Teal



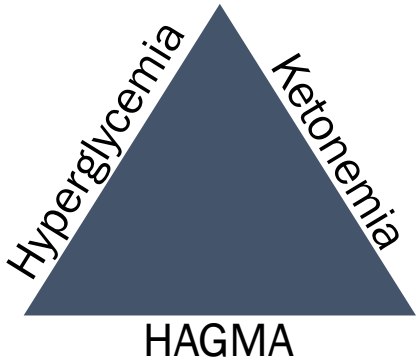


<u>URINALYSIS:</u>
COLOR - YELLOW
CLARITY - CLOUDY
PH - 4.8
SPEC. GRAVITY - 1.034
GLUCOSE - >1000
KETONES - 80
NITRITES - POSITIVE
LEUKOCYTE ESTERASE – 3+
WBC – 40-100/hpf
RBC – 1-3/hpf
BACTERIA – 3+

<u>ECG</u>: TACHYCARDIA, OTHERWISE NORMAL

ANION GAP = 28
PLASMA OSMOLALITY = 290
ALK PHOS = 120
ALT = 32
AST = 30
T. BILI = 1.0
CA = 8.5
PHOS = 2.1
ALBUMIN = 3.4
LIPASE = 39
BETA-HYDROXYBUTARATE = 3.2
LACTIC ACID = 3.6
ABG = PH 7.28, PCO2 = 30,
PO2 = 89, HCO3 = 17

Diabetic Ketoacidosis (DKA)



- **Diagnostic criteria:**
  - *Glucose > 250 mg/dL*
  - *Arterial pH < 7.3*
  - *Serum bicarb < 18 mEq/L*
  - *At least moderate ketonuria/ketonemia*
- Typically evolves rapidly, within 24 hours or so
- Polyuria, polydipsia, weight loss are common
- Look for precipitating cause

DKA Precipitating Causes

Major Illness	Insulin Issues	Medications	Drugs	Other
Acute MI	Noncompliance	Glucocorticoids	Cocaine	New onset
Sepsis	Malfunction of insulin pump	High-dose thiazide diuretics		Inadequate fluid intake
Infection	SGLT2 inhibitors	Sympathomimetics		
Pancreatitis	Purposeful omission due to reduced oral intake	2nd gen atypical antipsychotics		
Pulmonary embolism	Psychologic issues/eating disorders	Pentamidine		
		Immune checkpoint inhibitors		

DKA vs. HHS

	DKA	HHS
Plasma glucose (mg/dL)	>250, often 350-500	>600, often >1000
Serum bicarbonate (mEq/L)	Moderate-severely reduced	Normal or mildly reduced
Arterial pH	Usually 7.0-7.3	>7.3
Serum osmolality	Variable	Always elevated
Urine ketones	Positive	Small amount
Serum ketones	Positive	Negative
Anion gap	Elevated	Variable

DKA Treatment

- **Mainstay of treatment:**
  - *ABC's*
  - *IVF*
  - *Insulin*
  - *Potassium*
  - *+/- bicarbonate*
  - *Underlying cause*
- **Goals:**
  - *Close the gap!*
  - *Normalize serum ketones (beta-hydroxybutarate)*
  - *Adequate PO intake*

Monitor electrolytes, venous pH, +/- BUN/Cr q 2-4 hours **and** glucose q 1 hour until stable!

*Let your clinical exam, UOP, and other factors help guide fluid choices, these are not absolute values

Initial evaluation, ABCs, STAT labs, start 0.9% NS at 1L/hr

IVF (determine volume status)

- Mild hypovolemia
  - Determine hydration with **corrected** serum Na
    - Serum Na normal to high
      - 0.45% NaCl at 250-500 mL/hr
    - Serum Na low
      - 0.9% NaCl at 250-500 mL/hr
- Severe hypovolemia
  - 0.9% NaCl at 1L/hr

Insulin

- Regular 0.1 units/kg bolus + 0.1 units/kg/hr continuous

Potassium

- K < 3.3 mEq/L
  - Hold insulin and give 20-40 mEq oral K until > 3.3
- K 3.3 – 5.3 mEq/L
  - Give 20-30 mEq K in each liter NS, goal K 4-5
- K > 5.3 mEq/L
  - Do not administer K, but check every 2 hours

Bicarbonate

- pH < 6.9
  - Give 100 mmol diluted in 400 mL H20 + 20 mEq K (repeat q2 hours until pH > 7.0)
- pH ≳ 6.9
  - No bicarb administration

When glucose reaches 200 mg/dL, change IVF to 5% dextrose + 0.45% NaCl at 150-250 mL/hr

Insulin

- **IV Insulin** → double the dose if glucose does not fall by 50-70 mg/dL in first hour
  - *Goal serum glucose 150-200 until ketoacidosis resolves*
  - *Transition to SC insulin after resolution, with next meal, and continue IV for at least 2 hours after*
  - *Basal-bolus regimen*
  - *Can use pre-DKA regimen unless IV insulin needs have increased significantly*

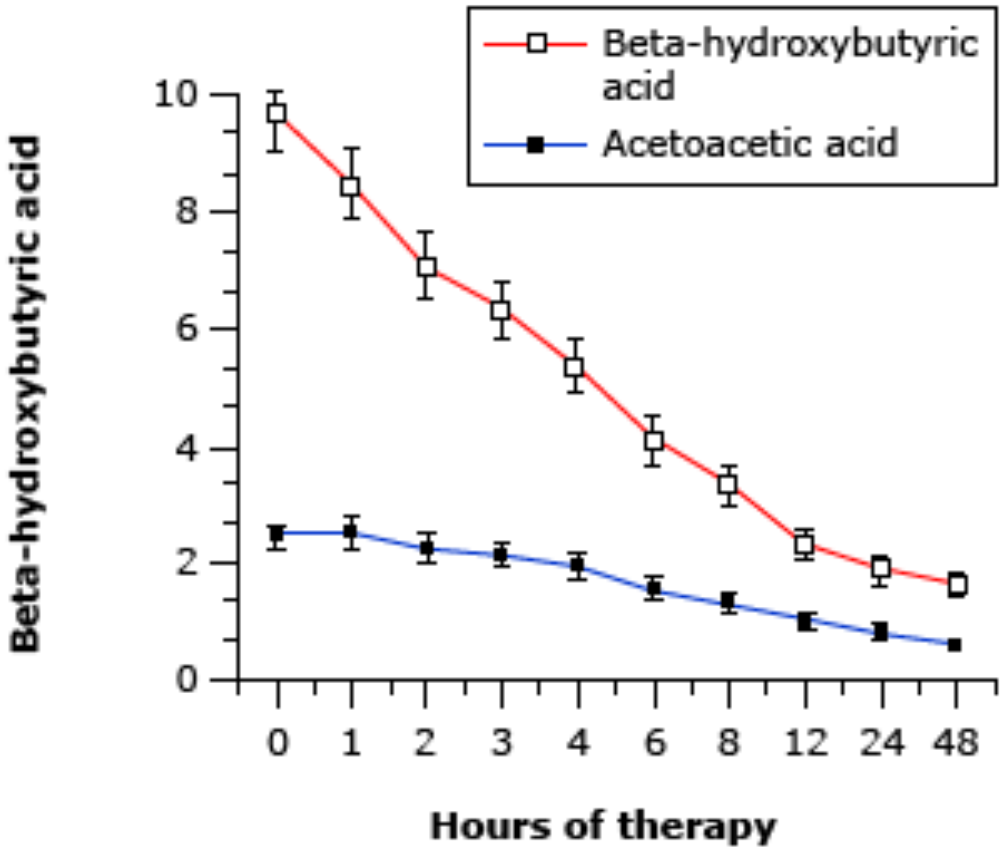
Lab Monitoring

- Beta-hydroxybutyrate vs. bicarbonate + AG + venous pH

- Affected by starvation, alcoholism, lactation, glycogen storage diseases, steroid/GH deficiency, salicylate poisoning, high fat diet

- Affected by separate acid-base disturbances
- Affected by degree of respiratory compensation
- Hyperchloremic metabolic acidosis common as patient recovers from DKA

Response to Treatment



Kitabchi AE, Fisher JN, Murphy MB, et al. Diabetic ketoacidosis and the hyperglycemic hyperosmolar nonketotic state. In: Joslin's Diabetes Mellitus, 13th edition, Kahn CR, Weir GC (Eds), Lea and Febiger, Philadelphia 1994. Copyright © 1994 Lippincott Williams & Wilkins. www.lww.com.

BACK TO ROUNDS... #2. MRS. JOHNSON

Mrs. Johnson

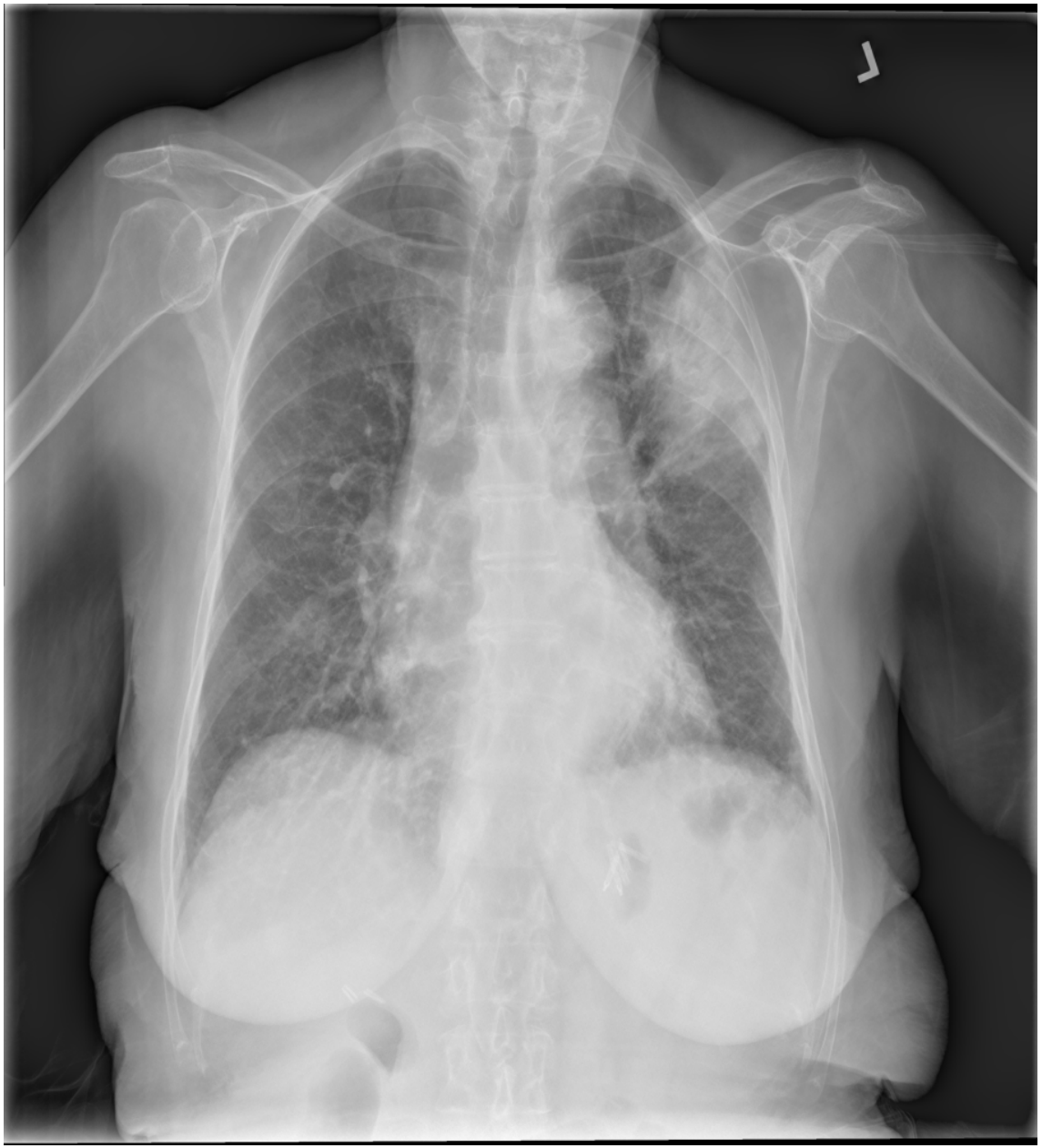
Sign out:

- HD # 2 for a 45-year-old female with history of HTN is admitted with CAP.

- She was started on IV ceftriaxone and azithromycin on admission and initially required 3L NC O2

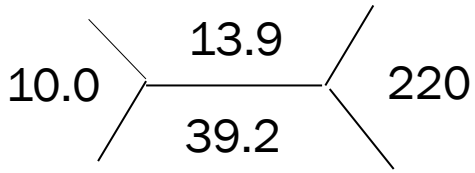
- Lab abnormalities included leukocytosis with left shift (WBC ct. 16.2K) and mild hyponatremia (Na 133) on admission. Her CXR showed LUL infiltrate. Procalcitonin was normal.

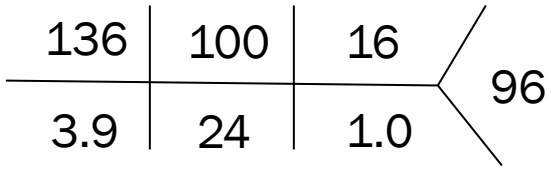
Mrs. Johnson



Mrs. Johnson

- Today's labs…





- She is coughing profusely when you enter the room, but says her shortness of breath is improving. She is down to 1L NC O2.

- She has scattered, coarse rhonchi in left upper and mid lung zones on exam.

Mrs. Johnson

Today's plan:

1. Continue IV ceftriaxone 1g daily and azithromycin 500mg daily x 5 days with possible transition to parenteral antibiotics tomorrow.
2. Wean O2 as tolerated; Aggressive pulmonary toilet with PEP therapy, incentive spirometry, and mucolytics
3. Monitor closely for fevers – acetaminophen prn
4. OOB as much as possible
5. Tolerating regular diet, Na normalized – d/c IVF

Community Acquired Pneumonia

- Bacterial pathogens:
  - *Streptococcus pneumoniae*
  - *Haemophilus influenzae*
  - *Mycoplasma pneumoniae*
  - *Staphylococcus aureus*
  - *Legionella species*
  - *Chlamydia pneumoniae*
  - *Moraxella catarrhalis*
- Viral pathogens
  - *Viral vs. secondary bacterial PNA?*
- Don’t forget risk factors for MRSA, *P. aeruginosa*, MDR infections!

Defining Severe Community Acquire Pneumonia

2007 Infectious Diseases Society of America/American Thoracic Society Criteria for Defining Severe Community-acquired Pneumonia
Validated definition includes either one major criterion or three or more minor criteria
Minor criteria
Respiratory rate ≥ 30 breaths/min
Pa_{02}/Fi_{02} ratio ≤ 250
Multilobar infiltrates
Confusion/disorientation
Uremia (blood urea nitrogen level ≥ 20 mg/dl)
Leukopenia* (white blood cell count < 4,000 cells/μl)
Thrombocytopenia (platelet count < 100,000/μl)
Hypothermia (core temperature < 36°C)
Hypotension requiring aggressive fluid resuscitation
Major criteria
Septic shock with need for vasopressors
Respiratory failure requiring mechanical ventilation

*Due to infection alone (i.e., not chemotherapy induced).

CAP Imaging

- **PA + lateral chest radiograph**
  - *Lobar consolidation*
  - *Interstitial infiltrates*
  - *Cavitation*
- **Chest CT**
  - *Indicated for immunocompromised, known exposure to epidemic pathogen, and other high-risk patients when CXR is negative but clinical suspicion remains high*
- **Lung ultrasound**
- Routine follow-up imaging **not** recommended

CAP Labs

- **Sputum culture** if severe disease OR treating presumptively for MRSA/pseudomonas.
- **Rapid influenza swab (NAAT)** during period of high activity.
  - *Treat with anti-virals even if >48 hrs from symptom presentation*
- **Blood cultures** if severe disease OR treating presumptively for MRSA/pseudomonas.
- **Urine antigens (pneumococcal, legionella)** if severe disease, recent travel, or association with legionella outbreak.
- **Procalcitonin** not recommended to determine initial need for antibiotic therapy.

CAP Treatment

- Treatment for inpatients:
  - ***Anti-pneumococcal beta-lactam + macrolide****
  - *Add anti-MRSA and/or anti-pseudomonal agent if RF present*
- Respiratory fluoroquinolones are accepted as 1st line tx but many institutions have restricted use
  - *FDA black box warning*
- Steroids not routinely recommended.
- Duration: 5 days (5-7 days)
  - *Consider longer course for more severe infections, chronic comorbidities, immunosuppressed*

*Doxycycline is an alternative if macrolides contraindicated, but there is a paucity of evidence to favor this recommendation

CAP Treatment

MRSA Risk Factors:

- **Prior respiratory isolation of MRSA**
- Recent hospitalization and parenteral antibiotics in last 90 days

Pseudomonas Risk Factors:

- **Prior respiratory isolation of *Pseudomonas aeruginosa***
- Recent hospitalization and parenteral antibiotics in last 90 days

Many studies have identified **other individual risk factors for MRSA or pseudomonas** but many of these associations are weak and vary across sites. Each patient should be assessed for additional risk factors on a case by case basis.

RN IS CALLING…

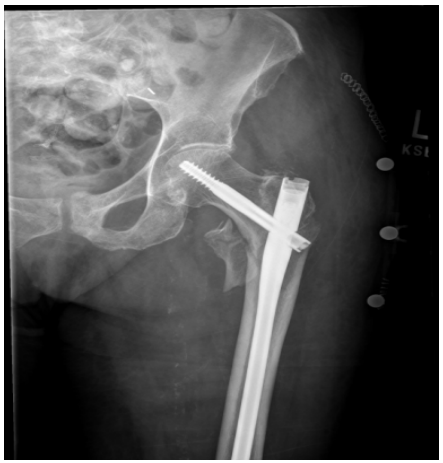
"Mr. Mitchell, an 89 YO gentleman who came in with a hip fracture yesterday is confused and pulling at his sheets. His daughter is very concerned. Can you come to the bedside?"

Mr. Mitchell

- 89-year-old male with Alzheimer's dementia. At baseline he is A&O to his name only but at times will recognize his family.

- He was admitted yesterday with an impacted L subtrochanteric fracture. He just returned from surgery and is more confused. He cannot tell you his name and does not recognize his daughter. He is pulling at his sheets.

- His daughter asks why he is like this and when he will be back to normal.



Features of Delirium

- DSM-5 definition requires all criteria to be met:
  1. *Disturbance in attention and awareness*
  2. *Disturbance develops acutely and tends to fluctuate in severity*
  3. *At least one additional disturbance in cognition*
  4. *Disturbances are not better explained by a preexisting dementia*
  5. *Disturbances do not occur in the context of a severely reduced level of awareness/coma*
  6. *Evidence of underlying organic cause*

Hospital Delirium

- Most common surgical complication among older adults
  - *50% after high-risk surgery*
- Hyperactive delirium only represents 25%
  - *Hypoactive delirium = worse prognosis*

Delirium Risk Factors

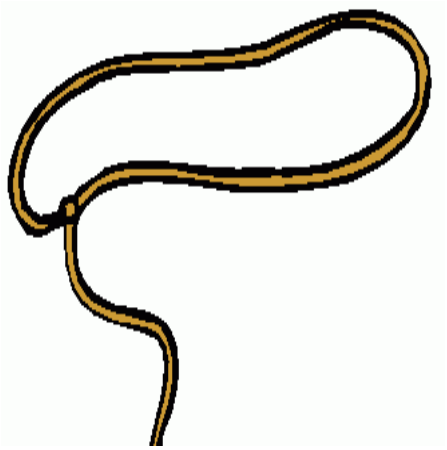
Predisposing

- Dementia, stroke, Parkinson disease or other underlying brain disease
- Old age
- Functional disabilities
- Multiple medical problems

Precipitating

- Drugs/polypharmacy
- Surgery
- Anesthesia
- High pain levels
- Infection
- Dehydration
- Acute illness
- Immobility/restraints
- Malnutrition
- Bladder catheters
- Alcohol use

“Round up the Usual Suspects”



- Post-operative
- Infections
- Medications (22-39%) or lack of
- Cardiopulmonary events
- Metabolic abnormalities
- Neurologic events
- Urinary and fecal disorders (retention, impaction)
- Substance intoxication or withdrawal
- Reduced sensory input

Evaluation of Delirium

- Complete history and physical exam
- Gather details: when did it start, was there a medication change or a coinciding recent symptom (ie. cough)
- Review medications
- CBC w/diff, CMP, Ca^{2+}, Mg^{2+}, UA/urine culture
- ECG and CXR
- ABG
- If the cause is not clear after the initial work-up, consider:
  - *Urine/blood toxicology screens*
  - *TSH, folate, vitamin B12, CSF analysis*
  - *Head CT/MRI, LP, EEG*
  - *Blood cultures*
  - *Bladder scan*

Confusion Assessment Method (CAM)

1. Acute change in mental status with fluctuating course (usually answered by RN or family)
2. Inattention
3. Disorganized thinking
4. Altered level of consciousness

(+) CAM requires 1 & 2 AND either 3 OR 4

Treatment of Delirium

- Prevention is the primary goal!
- Identify and treat the underlying cause.
- Consider environmental factors.
  - *Re-establish sleep-wake cycle*
  - *Day/night observation*
  - *Reorienting devices/memory cues*
  - *Family to bedside*
  - *Encourage use of hearing aids/glasses*
  - *RN – de-escalating techniques*
  - *Patient sitter if needed for safety*
- Reassure patient/family/staff.

Pharmacologic Treatment

- There are NO FDA approved medications.
- Avoid benzodiazepines (unless in ETOH withdrawal) and “sleepers”!
  - *Melatonin*
- Anti-psychotics are often used off-label.
  - ***Black box warning***

    “….conventional and atypical antipsychotics are associated with an increased risk of mortality in elderly patients treated for dementia-related psychosis….”

Pharmacologic Treatment

- Stop and ask yourself……
  - *Do the symptoms need drug treatment?*
  - *Is this medication really going to help the symptoms?*
  - *What are the potential side effects?*
  - *How long will I have to continue it?*

#3. MR. DANIELS

Mr. Williams

Sign out:

- 74-year-old male with history of lung CA, on chemotherapy and tobacco abuse presented with 12 hours of shortness of breath and chest pain. He was found to have an acute PE along with RLE DVT, was admitted and started on IV unfractionated heparin.

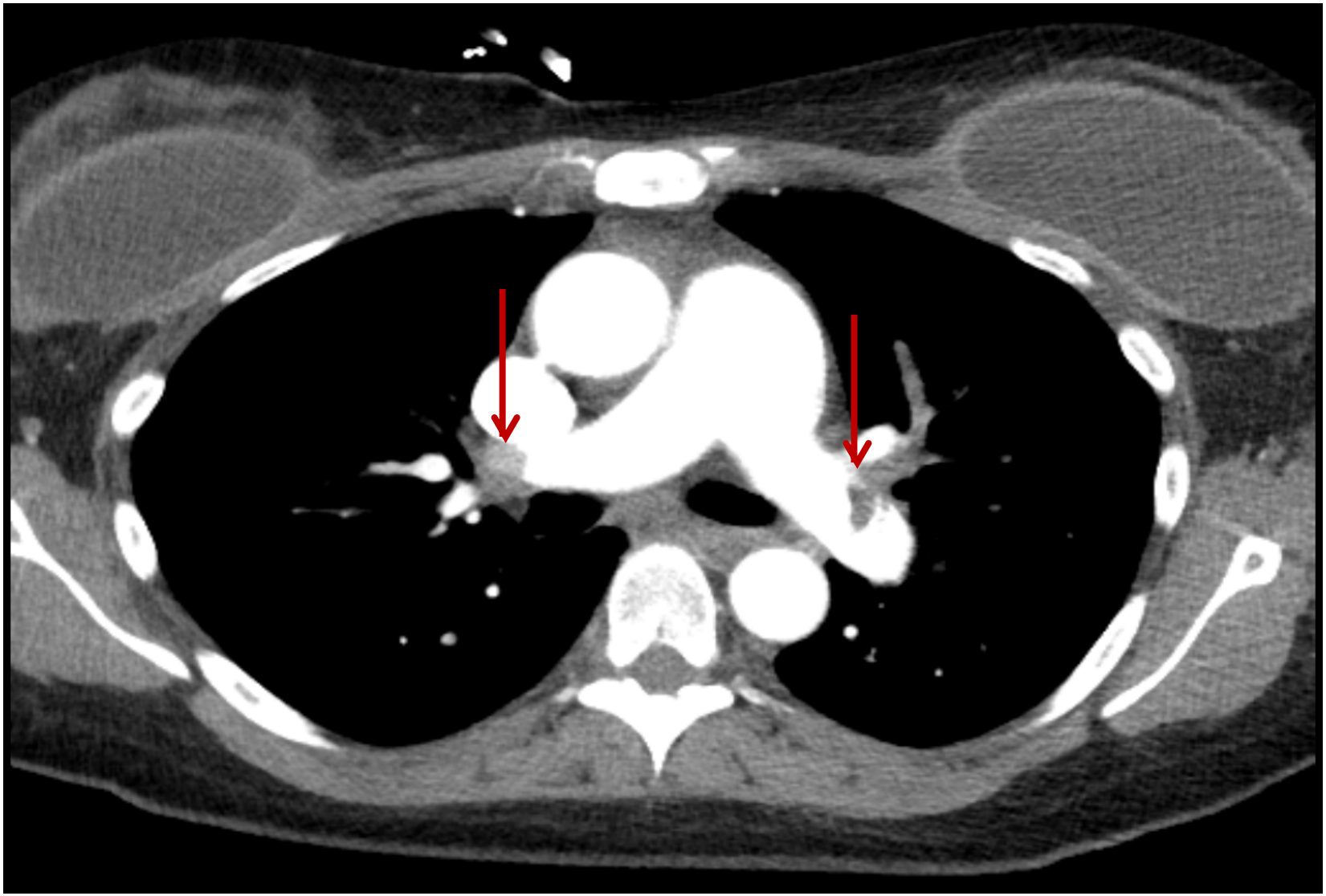
- HD #3, symptoms had improved some yesterday, but he was still on 2L NC O2.

Mr. Williams

- When you enter the room, he appears well and immediately asks if today is the day he can go home. He reports that his symptoms have improved significantly from yesterday, and he was even able to ambulate the halls last night without oxygen.

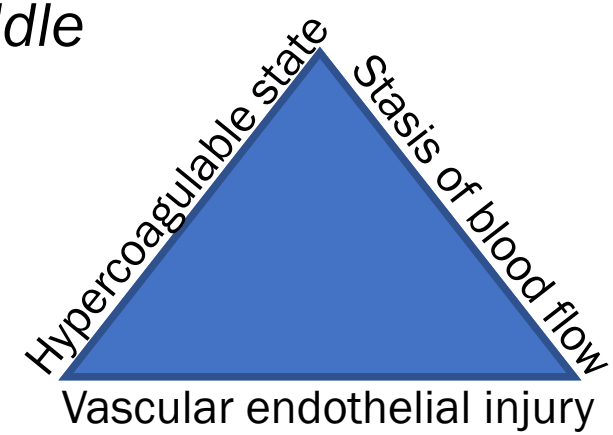
- His VS are stable, and he came off supplemental O2 late last night, has been stable on RA through the morning.

Mr. Williams



Pulmonary Embolism

- Common, fatal (est. 100,000 deaths in US each year)
- Increased incidence with age; Males > females
- Characterized by:
  - ***Chronicity:*** *Acute, subacute, chronic*
  - ***Hemodynamics:*** *Massive (unstable), submassive, low-risk*
  - ***Anatomic location:*** *Segmental, subsegmental, lobar, saddle*



(Modified) Wells Score for PE

Criteria	Scoring
Clinical symptoms of DVT	3.0
Other diagnosis less likely than PE	3.0
HR > 100	1.5
Immobilization ≥ 3 days or surgery in the previous 4 weeks	1.5
Previous DVT/PE	1.5
Hemoptysis	1.0
Malignancy	1.0

Pretest Probability	Score
High	> 6.0
Moderate	2.0 to 6.0
Low	< 2.0

Modified Wells Criteria	Score
PE likely	> 4.0
PE unlikely	≤ 4.0

(Modified) Wells Score for PE

Wells Category	Recommendation
Low risk (< 2 points) 1.3% incidence of PE	Consider d-dimer testing or applying PERC rule
Intermediate risk (2-6 points) 16.2% incidence of PE	Consider high sensitivity d-dimer or CTA
High risk (> 6 points) 37.5% incidence of PE	D-dimer NOT recommended, consider CTA

Modified Wells Category	Recommendation
PE unlikely (0-4 points) 12.1% incidence of PE	Consider high-sensitivity d-dimer testing
PE likely (> 4 points) 37.1% incidence of PE	Consider CTA

- If d-dimer is + in any scenario, proceed to CTA; d-dimer alone is not enough to make diagnosis.
- Use age adjusted d-dimer if appropriate.
- Before ordering, consider that d-dimer may be elevated for a variety of other reasons.

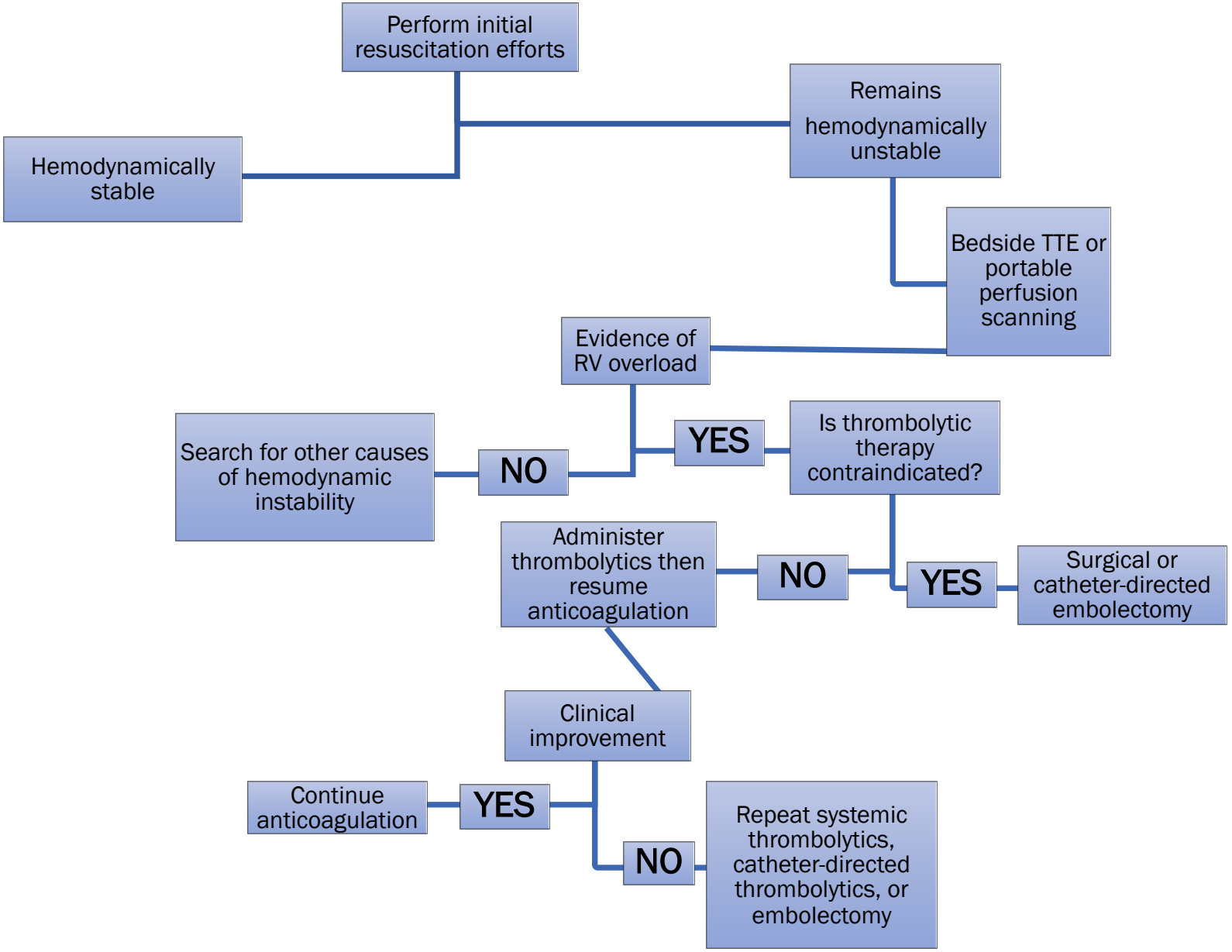
PE Treatment

- **Step 1:** If PE suspected, stabilize the patient while definitive diagnostic test is ongoing.

- **Step 2:** Risk stratification
  - *High-risk/massive*
  - *Intermediate-risk/sub-massive*
  - *Low-risk/small*

- **Hemodynamic instability ("massive PE"):** SBP<90 mmHg for >15 minutes, hypotension requiring vasopressors, or clear evidence of shock

Massive PE Treatment



Hemodynamically Stable PE Treatment

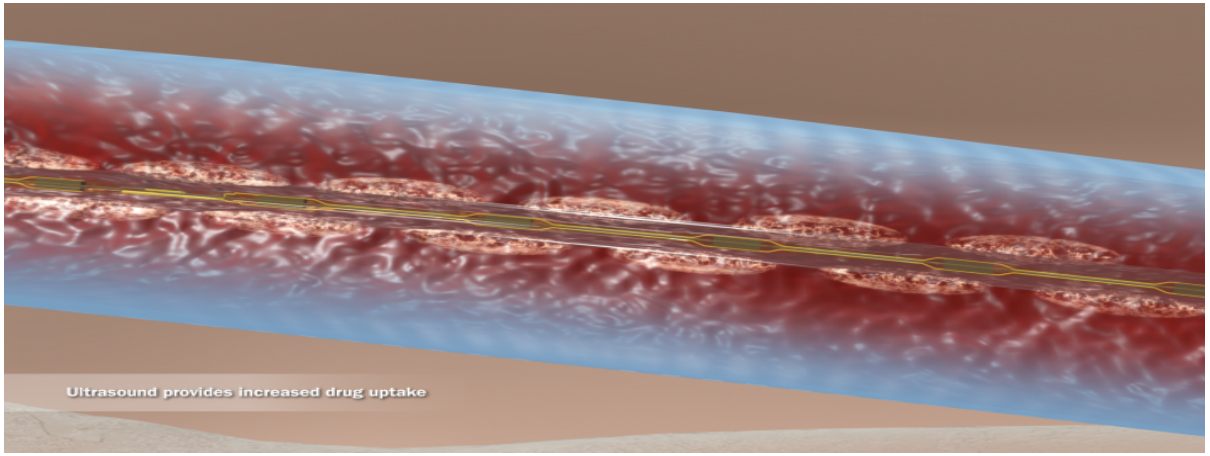
- Treat with anticoagulation unless contraindicated

- Consider **thrombolysis** or **catheter-directed thrombolysis** on a case-by-case basis:
  - *Severe RV dysfunction*
  - *Persistent tachycardia*
  - *Extensive DVT*
  - *Presence of severe hypoxemia*
  - *Patients who appear to be decompensating but not yet hypotensive*
  - *Clot in transit (RA or RV clot)*

Ultrasound Assisted Catheter-Directed Thrombolysis

- *Ultrasound waves are delivered into the blood clots and help to separate fibrin strands…this facilitates the delivery of the thrombolytic into the clots*

- *Multiple studies have demonstrated* ***superiority*** *to heparin alone,* ***effectiveness in reducing RV dysfunction in 24 hours without increased bleeding risk, effectiveness in reducing clot burden***



PE in Malignancy

- PE is the second leading cause of death in cancer patients, aside from the cancer itself.

- Higher rates of recurrence despite anticoagulation **AND** higher rates of bleeding with anticoagulation than the general population.
  - *These risks vary amongst different cancers.*

Treating PE in Malignancy

- **Low-molecular-weight heparin (LMWH)** is the current endorsed guideline treatment.

- HOKUSAI VTE Cancer Trial: **edoxaban** demonstrated noninferiority to LMWH in respect to recurrent VTE, but higher rates of bleeding (observed in GI cancers).

- ADAM-VTE Trial: **apixaban** resulted in lower rates of major bleeding and recurrent VTE when compared with LMWH.
  - *Study limitations*

Back to Mr. Williams

Today's Plan:

1. Discharge home with close follow-up.
2. R/B/SE of various strategies for anticoagulation discussed, patient wishes for long term treatment with edoxaban.
3. Enoxaparin (1 mg/kg q 12 hours) to be used for 2.5 days before starting edoxaban.
4. Reviewed transition times of AC, completed AC teaching and bleeding precautions given.
5. SMOKING CESSATION !

#4. MRS. SULLIVAN

Mrs. Sullivan

Sign out:

- 62-year-old female admitted last night for back pain after a fall.
- Plain films are negative, MRI of the T + L-spine ordered for today.
- Reported improvement in her pain with scheduled acetaminophen and lidocaine patch.

Mrs. Sullivan

- As you are walking to the room, you run into her RN, who was just about to call to let you know that she is now anxious, diaphoretic, and tremoring.

- Her BP is 190/95 with a HR of 129. She denies uncontrolled pain or any new symptoms.

- You quickly peer through her medical record and note that she has been admitted for alcohol withdrawal 4 times in the past year.

Alcohol Withdrawal

Syndrome	Onset	Findings
Minor withdrawal	6 – 36 hours	Tremulousness, mild anxiety, headache, diaphoresis, palpitations, anorexia, GI upset
Seizures	6 – 48 hours	Single or brief flurry of generalized tonic-clonic seizures
Hallucinosis	12 – 48 hours	Visual, auditory, and/or tactile hallucinations
Delirium Tremens	48 – 96 hours	Delirium, agitation, tachycardia, hypertension, fever, diaphoresis

Keep in mind that patients can still be withdrawing even with an elevated ethanol level!

CIWA-Ar

- Clinical Institutes Withdrawal Assessment Scale for Alcohol, revised
  - *Scored based on n/v, HA, sweats, tremor, agitation, anxiety, visual/auditory/tactile disturbances, orientation and clouding of sensorium*
  - *Score > 15 or lower score with a history of withdrawal seizures/DT, begin treatment*

Alcohol Withdrawal Treatment

- **IV Benzodiazepines** → control autonomic hyperactivity, prevents seizures
  - *Symptom-triggered treatment*
- Prophylaxis for high-risk patients or history of seizures or DTs
  - *Chlordiazepoxide*
- Multivitamin, folic acid, thiamine, IVF
  - *Glucose, potassium, magnesium, phosphorus*

Your shift is *almost* over!

BUT BEFORE YOU GO…ANOTHER RN IS CALLING.

"I am taking care of Mr. Flowers who was admitted for HTN urgency, and he currently has a blood pressure of 158/82. What should I do?"

Mr. Flowers

- Mr. Flowers is a 68-year-old male with history of HTN, HLD, CAD, and HFpEF. He was admitted about 24 hours ago with hypertensive urgency. At presentation, his BP was 200/128 and he did not have any signs of end-organ damage.

- He was given a dose of clonidine in addition to his usual anti-hypertensive regimen, and his BP lowered to 160/98. He was admitted last night for further workup and monitoring.

Hypertensive Crises

- Severe HTN, **SBP ≥180 and/or DBP ≥120 mmHg**
- **Hypertensive Urgency:** no signs of target-organ damage
- **Hypertensive Emergency:** signs of acute target-organ damage

Hypertensive Crises

- Thorough H&P to help r/o signs/symptoms of target organ damage:
  - *Chest pain/pressure*
  - *Acute severe back pain*
  - *Dyspnea*
  - *N/V*
  - *Focal or generalized neurologic symptoms*
  - *Papilledema or new hemorrhage/exudate on fundoscopy*
  - *Pregnancy*
  - *Acute head injury/trauma*
  - *Illicit drug use*
  - *Discontinuation or addition of medications*

Hypertensive Crises

- Complete workup:
  - *ECG*
  - *CXR*
  - *UA*
  - *BMP*
  - *+/- Cardiac biomarkers*
  - *+/- TTE, BNP*
  - *+/- Brain imaging (CT, MRI)*
  - *+/- TEE or contrast-enhanced chest imaging*

Hypertensive Urgency Treatment

- Resume oral anti-hypertensive therapy and intensify if needed.
- Treat pain or anxiety as indicated.
- Usually no indication for hospitalization.

Hypertensive Emergency Treatment

- Admit to ICU
- Treat BP in step-wise fashion, generally not recommended to lower too quickly d/t *autoregulation*
  1. *Reduce SBP by no more than 25% in 1st hour*
  2. *Then, if stable, to 160/100 mmHg over hours 2-6*
  3. *Then, cautiously to normal during the following 24-48 hours*
- Exceptions:
  - *Aortic dissection: goal SBP < 120 mmHg in 1st hour*
  - *Acute ischemic stroke: treat BP ≥185/110 mmHg if reperfusion, ≥220/120 mmHg if not*
  - *Acute hemorrhagic stroke: varies; general goal SBP < 140 mmHg*
  - *Severe preeclampsia, eclampsia, or pheochromocytoma crisis: goal SBP < 140 mmHg in 1st hour*

Hypertensive Emergency Treatment

Comorbidity	Recommended IV antihypertensive
Acute aortic dissection	Labetalol, esmolol
Acute pulmonary edema	Nitroglycerin, nitroprusside, clevidipine
ACS	Esmolol, nitroglycerin
Acute Renal Failure	Nicardipine, fenoldopam, clevidipine
Preeclampsia/Eclampsia	Hydralazine, labetalol, nicardipine

Back to Mr. Flowers

- His workup has been negative thus far. He remains asymptomatic. He admitted to stopping his pills a few days ago.
- Home anti-hypertensive regimen:
  - *Lisinopril 10 mg daily*
  - *Metoprolol 25 mg BID*
  - *Lasix 20 mg daily*
- Plan:

Turn that thing off!

References

1. McDonald LC, Gerding DN, Johnson S, Bakken JS, Carroll KC, Coffin SE. Clinical Practice Guidelines for Clostridium Difficile Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA). Clin Infect Dis. 2018 Mar. 66(7), e1-e48. DOI: 10.1093/cid/cix1085

2. Howell MD, Novak V, Grgurich P, Soulliard D, Novak L, Pencina M, et al. Iatrogenic Gastric Acid Suppression and the Risk of Nosocomial Clostridium difficile Infection. Arch Intern Med. 2010 May;170(9):784-790. DOI: 10.1001/archinternmed.2010.89

3. Kwok CS, Arthur AK, Anibueze CI, Singh S, Cavallazzi R, Loke YK. Risk of Clostridium difficile infection with acid suppressing drugs and antibiotics: meta-analysis. *Am J Gastroenterol.* 2012 Jul;107(7):1011. DOI: 10.1038/ajg.2012.108

4. Kitabchi AE, Umpierrez GE, Miles JM, Fisher JN. Hyperglycemic crises in adult patients with diabetes. Diabetes Care. 2009;32(7):1335-1343. https://doi.org/10.2337/dc09-9032

5. Fayfman M, Pasquel FJ, Umpierrez GE. Management of Hyperglycemic Crises: Diabetic ketoacidosis and hyperglycemic hyperosmolar state. Med Clin North Am. 2017 May; 101(3): 587–606. doi: 10.1016/j.mcna.2016.12.011

6. Savage MW, Dhatariya KK, Kilvert A, Rayman G, Rees JA, Courtney CH, Hilton L, Dyer PH, Hamersley MS, Joint British Diabetes Societies. Joint British Diabetes Societies guideline for the management of diabetic ketoacidosis. Diabet Med. 2011;28(5):508. DOI: 10.1111/j.1464-5491.2011.03246.x

7. Gosmanov AR, Gosmanova EO, Kitabchi AE. Hyperglycemic Crises: Diabetic Ketoacidosis (DKA), And Hyperglycemic Hyperosmolar State (HHS) [Updated 2018 May 17]. In: Feingold KR, Anawalt B, Boyce A, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK279052/

8. Nyenwe EA, Kitabchi AE. Evidence-based management of hyperglycemic emergencies in diabetes mellitus. Diabetes Res Clin Pract. 2011 Dec;94(3):340-51. DOI: 10.1016/j.diabres.2011.09.012

9. Sheikh-Ali M, Karon BS, Basu A, Kudva YC, Muller LA, Xu J, et al. Can Serum β-Hydroxybutyrate Be Used to Diagnose Diabetic Ketoacidosis? Diabetes Care 2008 Apr; 31(4): 643-647. https://doi.org/10.2337/dc07-1683

10. Kitabchi AE, Fisher JN, Murphy MB, et al. Diabetic ketoacidosis and the hyperglycemic hyperosmolar nonketotic state. In: Joslin's Diabetes Mellitus, 13th edition, Kahn CR, Weir GC (Eds), Lea and Febiger, Philadelphia 1994. Copyright © 1994 Lippincott Williams & Wilkins. www.lww.com.

References

11. Metlay JP, Waterer GW, Long AC, Anzueto A, Brozek J, Crothers K, et al. Diagnosis and Treatment of Adults with Community-acquired Pneumonia. An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America. Am J Respir Crit Care Med. 2019 Oct; 200 (7): e45–e67. https://doi.org/10.1164/rccm.201908-1581ST

12. Marcantonio ER. Delirium in hospitalized older adults. N Engl J Med 2017; 377:1456-1466
DOI: 10.1056/NEJMcp1605501

13. Inouye SK, van Dyck CH, Alessi CA, Balkin S, Siegal AP, Horwitz RI. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. Ann Intern Med. 1990;113(12):941. DOI: 10.7326/0003-4819-113-12-941

14. American Psychiatric Association DSM-5 Task Force. Diagnostic and statistical manual of mental disorders, 5th ed.: DSM-5. Washington, DC: American Psychiatric Association, 2013.

15. Inouye SK, Charpentier PA. Precipitating factors for delirium in hospitalized elderly persons: predictive model and interrelationship with baseline vulnerability. JAMA. 1996;275:852-857. PMID: 8596223

16. Neufeld KJ, Yue J, Robinson TN, Inouye SK, Needham DM. Antipsychotic medication for prevention and treatment of delirium in hospitalized adults: a systematic review and meta-analysis. J Am Geriatr Soc 2016;64:705-714. DOI: 10.1111/jgs.14076

17. Horlander KT, Mannino DM, Leeper KV. Pulmonary embolism mortality in the United States, 1979-1998: an analysis using multiple-cause mortality data. Arch Intern Med. 2003;163(14):1711. DOI: 10.1001/archinte.163.14.1711

18. Freund Y, Cachanado M, Aubry A, Orsini C, Raynal PA, Feral-Pierssens AL, et al. Effect of the Pulmonary Embolism Rule-Out Criteria on Subsequent Thromboembolic Events Among Low-Risk Emergency Department Patients: The PROPER Randomized Clinical Trial. JAMA. 2018;319(6):559. DOI: 10.1001/jama.2017.21904

19. Kucher N, Boekstegers P, Müller OJ, Kupatt C, Beyer-Westendorf J, Heitzer T, et al. Randomized, controlled trial of ultrasound-assisted catheter-directed thrombolysis for acute intermediate-risk pulmonary embolism. Circulation. 2014;129:479–486.
DOI: 10.1161/CIRCULATIONAHA.113.005544

20. Piazza G, Hohlfelder B, Jaff MR, Ouriel K, Engelhardt TC, Sterling KM, et al. A prospective, single-arm, multicenter trial of ultrasound-facilitated, catheter-directed, low-dose fibrinolysis for acute massive and submassive pulmonary embolism: The SEATTLE II study. JACC Cardiovasc Interv. 2015;8:1382–1392. DOI: 10.1016/j.jcin.2015.04.020

References

21. Mangi MA, Rehman H, Bansal V., Zuberi O. Ultrasound Assisted Catheter-Directed Thrombolysis of Acute Pulmonary Embolism: A Review of Current Literature. Cureus. 2017 Jul; 9(7): e1492. DOI: 10.7759/cureus.1492

22. Kearon C, de Wit K, Parpia S, Schulman S, Afilalo M, Hirsch A, PEGeD Study Investigators, et al. Diagnosis of Pulmonary Embolism with d-Dimer Adjusted to Clinical Probability. N Engl J Med. 2019;381(22):2125. DOI: 10.1056/NEJMoa1909159

23. McBane RD 2nd, Wysokinski WE, Le-Rademacher JG, Zemla T, Ashrani A, Tafur A, et al. Apixaban and dalteparin in active malignancy-associated venous thromboembolism: The ADAM VTE trial. J Thromb Haemost. 2020;18(2):411. DOI: 10.1111/jth.14662

24. Raskob GE, van Es N, Verhamme P, Carrier M, Di Nisio M, Garcia D, et al. Edoxaban for the treatment of cancer-associated venous thromboembolism. *N Engl J Med.* 2018;378(7):615. DOI: 10.1056/NEJMoa1711948

25. Mayo-Smith MF, Beecher LH, Fischer TL, Gorelick DA, Guillaume JL, Hill A, Working Group on the Management of Alcohol Withdrawal Delirium, Practice Guidelines Committee, American Society of Addiction Medicine, et al. Management of alcohol withdrawal delirium. An evidence-based practice guideline. Arch Intern Med. 2004;164(13):1405. DOI: 10.1001/archinte.164.13.1405

26. Amato L, Minozzi S, Vecchi S, Davoli M. Benzodiazepines for alcohol withdrawal. Cochrane Database Syst Rev. 2010;

27. Perry EC. Inpatient Management of Acute Alcohol Withdrawal Syndrome. CNS Drugs. 2014; 28 (5), 401-10. DOI: 10.1007/s40263-014-0163-5

28. Levine AR, Carrasquillo L, Mueller J, Nounou MI, Naut ER, Ibrahim D. High-Dose Gabapentin for the Treatment of Severe Alcohol Withdrawal Syndrome: A Retrospective Cohort Analysis. Pharmacotherapy. 2019; 39 (9), 881-888. DOI: 10.1002/phar.2309

29. Whelton P, Carey RM, Aronow WS, Casey Jr. DE, Collins KJ, Himmelfarb CD. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018;71:e13–e115. DOI: 10.1161/HYP.0000000000000065

30. Jauch EC, Saver JL, Adams HP Jr, et al. Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2013; 44:870.

31. Hiratzka LF, Bakris GL, Beckman JA, Bersin RM, Carr VF, Casey DE Jr, American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, Society for Vascular Medicine, et al.
TI2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. Circulation.
2010;121(13):e266. DOI: 10.1213/ANE.0b013e3181dd869b

QUESTIONS ?

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