Baby, It's Cold Outside: Exploring Targeted Temperature Management

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Objectives

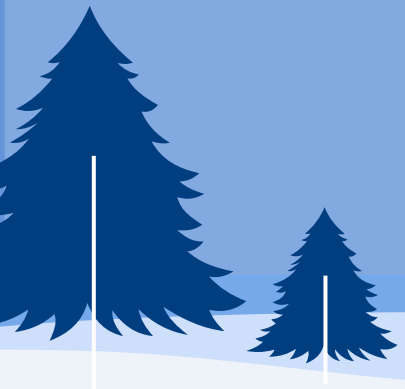
01 Understand the use of targeted temperature management after a cardiac arrest

02 Explain the role of antibiotics in aspiration pneumonia

03 Evaluate the efficacy of amantadine in non-traumatic brain injury

04 Apply these concepts to a patient case

01
Meet the Patient



31 Year Old Male

- Chief Complaint
  - Patient presented to Wilkes-Barre General Hospital with abdominal pain and nausea x 2 days
  - Took Aspirin at home with no relief
  - Pain: 10/10
- Past Medical History
  - Childhood asthma
- Allergies
  - No known drug allergies
- Social History
  - Drinks half a fifth of vodka daily for the past year
    - Denies symptoms of withdrawal
  - Marijuana use
  - Vapes

Medication List

Medication	Indication
Levalbuterol 45 mcg/inh	Asthma
Steel Alpha-AF	Testosterone Booster
Tongkat Ali	Muscle Strength
Steel ADA Bolic	Pre-Workout Supplement
Tadalafil	Pre-Workout Supplement

Labs Upon Admission

Weight: 87.1 kg Height: 175.3 cm CrCl: 107.5 mL/min eGFR: 103 mL/min/1.73²

CBC

Lab	Value
WBC	10.4
RBC	4.93
Hgb	17.7
Hct	51.1
Plt	282

CMP

Lab	Value
Na	132 (L)
K	4.7
Cl	92 (L)
BUN	10
Scr	1.0
Gluc	156 (H)

Liver

Lab	Value
AST	166 (H)
ALT	153 (H)
Bili Tot	2.81 (H)
Amylase	180 (H)
Lactic Acid	2.5 (HH)

Vitals

Lab	Value
Temp	97 F
HR	75 bpm
RR	16
BP	156/111
SpO2	99%

Initial Assessment

- CT of abdomen showed acute pancreatitis
  - Admitted to Med Surg floor

Inpatient Medications

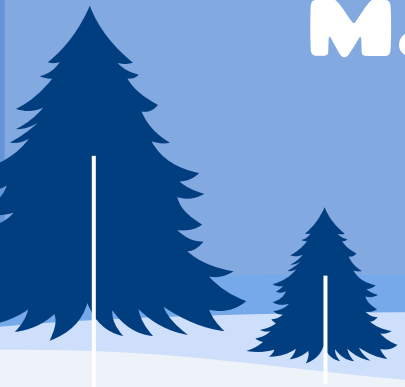
Medication	Indication
Morphine 4 mg IV push	Pain
Dilaudid 1 mg IV	Pain
Zofran 4 mg IV push q8h prn	Nausea
2 L NS	Fluid resuscitation
Folic acid 1 mg IV	Alcohol use
Thiamine 100 mg IV	Alcohol use
Multivitamin	Alcohol use
Lovenox 40 mg q24h	DVT prophylaxis

Hospital Day 2

- Code Blue
  - Patient felt lightheaded in the bathroom
  - Nurse helped patient to the floor
  - Developed bradycardia and lack of pulse
- CPR initiated
  - Given 3 doses of epinephrine and bicarbonate
- Intubated on mechanical ventilation
- Transferred to ICU
  - Plan for hypothermia protocol post cardiac arrest

02

Targeted Temperature Management Following Cardiac Arrest



Targeted Temperature Management

- Therapeutic hypothermia
  - Lowering the body temperature after a cardiac arrest to reduce brain injury
    - Lessens harmful effects of oxygen deprivation by decreasing the physiological demand for oxygen and glucose
    - Goal: reduce mortality and improve neurological outcomes
  - Start within 4 hours of return of spontaneous circulation (ROSC)
  - Target of 32 and 37.5 °C for 24 hours
- Cooling devices
  - Cold normal saline
  - Cooling surfaces
    - Ice packs
    - Cooling pads
    - Cooling blankets

Targeted Temperature Management

- Contraindications
  - Active bleeding and thrombocytopenia
    - Increase coagulopathy at colder temperatures
  - Cryoglobulinemia
    - Cryoglobulin clumps together at colder temperatures
    - Restricts blood flow
  - Severe sepsis
    - Hypothermia decreases the body's ability to fight infection
  - DNR code status

Targeted Temperature Management

- Monitoring Parameters
  - Potassium
    - Hypokalemia can occur at colder temperatures due to decreased activity of temperature dependent potassium exit channels
    - Replete potassium during cooling to prevent arrhythmias
    - Stop potassium repletion during warming due to increased shift of potassium out of cell at warmer temperatures
  - Blood glucose
    - Hypothermia can reduce insulin sensitivity leading to hyperglycemia
    - Goal: 140-180
  - Blood pressure
    - Rewarming can cause vasodilation, leading to hypotension
    - Use vasopressors and fluid to maintain perfusion
    - Goal: SBP >80, MAP >65

Targeted Temperature Management

- Adverse Events
  - Seizures
    - Monitor seizures using EEG
    - Recommended to treat seizures as they occur
      - Seizure prophylaxis is not recommended
  - Arrhythmias
    - Due to potassium shift
    - Higher risk at lower temperatures
  - Coagulopathy
    - Bleeding may occur during hypothermia protocol
    - Not considered clinically significant
  - Shivering

Targeted Temperature Management- Shivering

- Can worsen neurological damage
  - Increased blood flow, metabolic activity and oxygen demand
- Bedside Shiver Assessment Scale (BSAS)
  - 0: no shivering
  - 1: mild shivering - localized to neck or thorax
  - 2: moderate shivering - intermittent shivering of upper extremities
  - 3: severe shivering - sustained shivering of upper extremities
- Columbia Anti-Shivering Protocol
  - Goal: minimal shivering
    - BSAS $\leq$ 1

Jain A, Gray M, Slisz S, Haymore J, Badjatia N, Kulstad E. Shivering Treatments for Targeted Temperature Management: A Review. J Neurosci Nurs. 2018;50(2):63-67. doi:10.1097/JNN.0000000000000340

Targeted Temperature Management- Shivering

Columbia Anti-Shivering Protocol

Step	Sedation	Intervention
0	Baseline	Warming of extremities Acetaminophen 650-1000 mg q4-6h Buspirone 30 mg q8h Magnesium Sulfate 0.5-1 mg/h
1	Mild	Dexmedetomidine 0.2-0.5 mcg/kg/h OR Fentanyl 25 mcg/h OR Meperidine 50-100 mg IM or IV
2	Moderate	Dexmedetomidine AND Fentanyl or Meperidine
3	Deep	Propofol 50-75 mcg/kg/min
4	Neuromuscular blockade	Vecuronium 0.1 mg/kg IV

Choi HA, Ko SB, Presciutti M, et al. Prevention of shivering during therapeutic temperature modulation: the Columbia anti-shivering protocol. Neurocrit Care. 2011;14(3):389-394. doi:10.1007/s12028-010-9474-7

Targeted Temperature Management- Rewarming

- Rewarming too quickly dilates peripheral vasculature
  - Increases cytokines and intracranial pressure
  - Decreases cerebral perfusion pressure
  - Hypotension
- Rate: 0.25 - 0.5 °C per hour
  - Around 8 hours to rewarm
- Goal: normothermia (37 °C)

Targeted Temperature Management- Patient Management

- Starting esophageal temperature: 38.9 °C (102 °F) on Day 2
- Cooled using hypothermia machine

TTM Medications

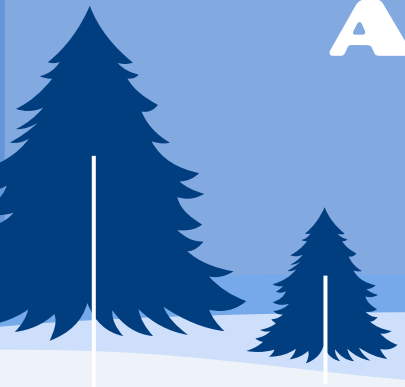
Medication	Indication
Potassium Chloride 20 mEq IV	Potassium management Starting K: 3.6
Insulin glargine 8 units IV	Glucose management Starting Glucose: 218
Propofol 1000 mg IV	Sedation
Cisatracurium 100 mg IV	Neuromuscular blockade- Shivering
Lovenox 40 mg q24h	Dose held due to coagulopathy

Targeted Temperature Management- Patient Management

- Achieved 33 °C (92 °F)
- Rewarming began on Day 4 at 10 am
  - Seizure like activity
    - Given Ativan 2 mg
    - Keppra 500 mg BID ordered
  - New onset AFib
    - HR: 160
    - Given Metoprolol Tartrate 5 mg IV push
      - HR slowed to 100
- Achieved 37 °C (98.6 °F) on Day 4 at 5 pm
  - Hypothermia protocol discontinued

03

Aspiration Pneumonia



Aspiration Pneumonia

- Hospital Day 3
  - CT of chest showed bilateral pleural effusions and left lower lobe infiltrate
  - Aspiration pneumonia process cannot be ruled out
  - Started empiric Vancomycin 750 mg q8h and Zosyn 3.375 g q8h
  - Sputum cultures collected to guide narrow therapy

Aspiration Pneumonia

- Pathogens
  - Typically multiple pathogens involved including those common in CAP and HAP
  - CAP
    - Streptococcus pneumoniae, Staphylococcus aureus, Haemophilus influenzae, Enterobacteriaceae
  - HAP
    - Risk for resistant organisms such as Pseudomonas and MRSA

Aspiration Pneumonia

- IDSA Guidelines
  - Recommend starting with empiric coverage based on suspected organisms
  - Hospital-acquired aspiration pneumonia
    - Single agent that will cover for MSSA, Pseudomonas, and gram negative bacilli
      - **Zosyn**
      - Cefepime
      - Levofloxacin
      - Carbapenems– Imipenem or Meropenem
    - Additional coverage for MRSA risk
      - **Vancomycin** or Linezolid
  - Recommend therapy for 7-10 days

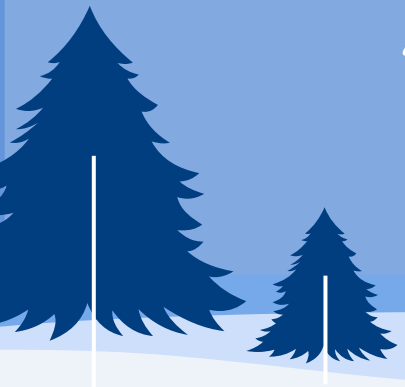
Aspiration Pneumonia

- Day 4
  - Cultures positive for MSSA
  - Vancomycin discontinued
    - No need for MRSA coverage
  - Zosyn discontinued
    - Narrow therapy for MSSA coverage
    - Started oxacillin 1000 mg IV q4h for 7 days
      - Day 5 - Day 11
  - WBC
    - Indicator that infection is being treated effectively
    - Peaked on half way through course on Day 11
    - Still slightly elevated but trending down

Day	WBC
5	14.1
6	16.9
7	19.4
8	21.8
9	27.0
10	21.3
11	15.8
12	12.1

04

Anoxic Brain Injury



Anoxic Brain Injury

- Patient unresponsive since cardiac arrest on hospital Day 2
  - Occasionally opens eyes, however not purposefully responding
- MRI done on Day 8
  - Showed moderate anoxic brain injury
  - Abnormal signaling
  - No signs of stroke or hemorrhage
- Anoxic brain injury
  - Oxygen deprivation in brain tissue due to lack of cerebral blood flow

Amantadine

- Started Amantadine 100 mg BID on Day 8 to improve consciousness

Mechanism	Indication	Considerations
Blocks dopamine reuptake Stimulates dopamine release	Parkinson's Disease dyskinesias	**Warnings:** Risk for seizure activity, do not abruptly discontinue (withdrawal and clinical decline) **ADR:** anticholinergic, orthostatic hypotension, dizziness, insomnia

- Glasgow Coma Score (GCS): asses level of consciousness after brain injury
  - ≥ 13: mild brain injury
  - 9-12: moderate brain injury
  - ≤ 8: severe brain injury

Amantadine Literature Review

Amantadine treatment is associated with improved consciousness in patients with non-traumatic brain injury

Design	Collected data from 5 single center studies of patients with non-traumatic brain injury, including stroke, hemorrhage, and bacterial meningitis admitted from 2012 to 2015 and ventilated for at least 7 days
Objective	To assess the efficacy of amantadine on consciousness in non-traumatic brain injury based on an improvement in the Glasgow Coma Score (GCS)
Results	Amantadine was received in 84 out of 294 participants. It was associated with consciousness improvement at day 5 with 86.9% in the amantadine group improving their GCS score by at least 3 points
Conclusion	Amantadine was associated with improved consciousness at day 5, however sample size was small. More studies need to be done in order to assess effects on mortality and functional outcomes. Safety wise, amantadine was associated with an increase risk in seizures

Rühl L, Kuramatsu JB, Sembill JA, et al. Amantadine treatment is associated with improved consciousness in patients with non-traumatic brain injury. J Neurol Neurosurg Psychiatry. 2022;93(6):582-587. doi:10.1136/jnnp-2021-327408

Amantadine for Anoxic Brain Injury

- Limited evidence for use of amantadine in anoxic brain injury
  - Case reports have shown improved consciousness with amantadine
  - Further research and studies need to be conducted
- Appropriate for patient due to unresponsiveness after hypothermia protocol
  - Potential for improvement in consciousness
  - Keppra 500 mg BID as seizure prophylaxis
- Day 7 of amantadine
  - Opening eyes more frequently and for longer periods of time

Plan

- Neurological management
  - Neuro checks done every 1 - 2 hours
- Aspiration pneumonia
  - Oxacillin discontinued on Day 11 after 7 day course
  - WBC trending downwards
- Planning to transfer him to a rehab with a focus on brain injury

Takeaways

Targeted Temperature Management

Reduces metabolic demand after cardiac arrest to improve neurological outcomes

Amantadine

Potential for improvement in consciousness based on GCS. However, more studies need to be done due to limited evidence

Aspiration Pneumonia

Begin empiric antibiotics based on suspected pathogens and switch to narrow coverage once cultures come back

Resources

1. Hirsch KG, Abella BS, Amorim E, et al. Critical Care Management of Patients After Cardiac Arrest: A Scientific Statement From the American Heart Association and Neurocritical Care Society. Circulation. 2024;149(2):e168-e200. doi:10.1161/CIR.0000000000001163
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11. Symmetrel (amantadine) [package insert]. Chadds Ford, PA: Endo Pharmaceuticals Inc.; 2009.

THANK YOU!

What questions do you have?

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Blood, Guts, and Glory: A Patient Perspective

Ryan Stewart PharmD/MBA Candidate 2024

Objectives

- Assess proper antibiotic therapy based on the Surviving Sepsis guidelines
- Describe current treatment for warfarin reversal in the inpatient setting
- Understand pharmacologic cardioversion using amiodarone bolus and continuous infusion therapy
- Describe current thromboembolic prophylaxis recommendations for patients undergoing cardioversion according to the AHA/ACC/HRS guidelines

Lets meet our Patient

Meet our Patient - SAM

- 73 yo male
- 74.2kg
- Allergies: NKA
- CC
  - Bloody stools for two days prior to admission, weakness, SOB, Left lower extremity wound
- PMH
  - HTN, RA, osteoporosis, macrocytic anemia, Afib, chronic steroid use
- SH
  - Occasional use of cigars
  - Chronic alcohol use, denies use within one week of presentation
  - Denies NSAIDs/ iron replacement therapy
  - Increased consumption of dietary leafy greens
  - Lost 100 lbs over the last year
- FH
  - Father - prostate cancer
  - Mother -breast cancer

Home Medications

Warfarin 8 mg M-F, 10 mg Saturday and Sunday
Diltiazem 120 mg
Methotrexate 15 mg
Leflunomide 10 mg
Prednisone 5 mg
Alendronate 70 mg

Surviving Sepsis

ABX Recommendations[1]

- Start IV antibiotics within first hour of recognition
  - Reduce risk of mortality
- Obtain cultures
- Empiric coverage
  - MRSA if high risk
  - MDR
    - Use 2 meds with gram (-) coverage
- Narrow therapy once organism identified

- Potential antibiotics
  - Aminoglycosides
  - Beta-lactams
  - Colistin
  - Daptomycin
  - Vancomycin
  - Fluoroquinolones

Regional Hospital Sepsis Protocol

Cefepime 1g Q12H
Vancomycin 750 mg Q12H

Reversing Warfarin[2]

- Labs (Day 1)
  - HBG - 2.9
  - INR - 6.56
- Held PTA warfarin and diltiazem
- Received Vitamin K 20mg IV and PCC 3500 units
  - PCC contains:
    - Factors 2, 7, 9, 10
    - Protein C
    - Protein S
  - Dosed by units/kg based on factor 9
  - Pts <100kg use actual body weight, ≥100kg max dosing weight of 100kg

Inpatient Meds

CI

Norepinephrine
Octreotide
0.9% NS

PRN

Maalox
Acetaminophen 325 mg
Norco 5/325
Milk of Mg
Zofran 4mg inj

Methotrexate 15 mg
Leflunomide 10 mg
Prednisone 5 mg
Folic Acid 1 mg
Multivitamin
Vitamin D3
Cefepime 1 g
Vancomycin 750 mg

Treatment

Day 2
- Received 4 units since presentation
- BPs trending low - improving with levophed

Day 3
- Underwent endoscopy revealing gastric mass

Day 4
- Abdominal MRI showing mass from the spleen
- Placed order to IR for biopsy
- D/c octreotide bleeding resolve
- Surgery consult for left lower extremity wound
- WBC count stable and pt afebrile
    - Discussed discontinuing cefepime

	1	2	3	4
INR	6.56	1.17		
HBG	2.9	5.8	7.5	7.4
HCT			21.9	22.4
RBC			2.39	2.39
WBC			8.6	7.8

Treatment

Day 5

- Restart PTA diltiazem 120 mg

Day 6

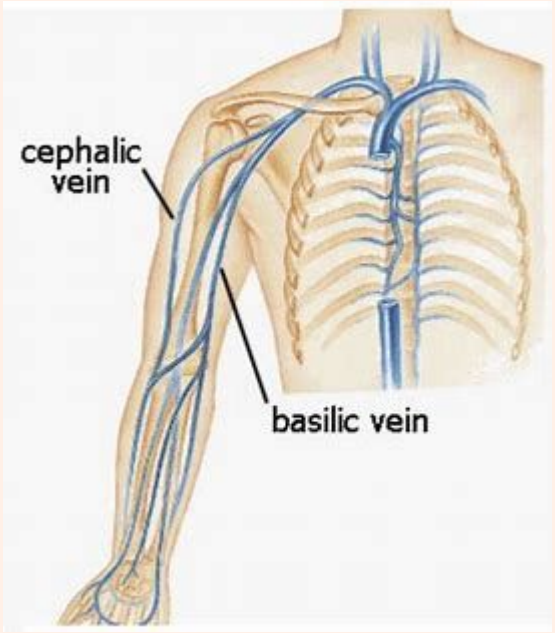
- Plan to be discharged to floor
- IR discovered mass was a hematoma
- Episode of paroxysmal Afib
- Initiated amiodarone drip
    - Pharmacologic cardioversion[3]
        - 150 mg over 10 minutes, then 1 mg/minute for 6 hours, then 0.5 mg/minute for 18 hours
- Discontinued antibiotics

Treatment

Day 7
- Pleural edema
  - Initiated lasix 20mg
- Right upper extremity swelling near PICC
  - Thrombus of cephalic and basilic veins
  - Keep PICC, can't anticoagulate
- Repeat abdominal CT showed cystic mass

Day 8
- Switched amiodarone to PO
  - 400 mg BID
- Still in Afib
  - Plan for cardioversion
- Increased lasix to 40mg

Day 9
- Now in sinus rhythm
  - Canceled cardioversion



Anticoagulation During Cardioversion[4]

- Patients CHADS-VASc Score - 2
  - **HTN, Age 65-74**
- Afib ≥ 48 hours or unknown duration

Start anticoag 3 weeks prior

Undergo Cardioversion

Continue for at least 4 weeks

Use warfarin, factor Xa inhibitors, direct thrombin inhibitors

Anticoagulation During Cardioversion[4]

- Afib < 48 hours

Start anticoag ASAP

Undergo Cardioversion

Continue for at least 4 weeks

Use heparin, factor Xa inhibitors, direct thrombin inhibitors

Future Plans

- Transfer to telemetry for monitoring
- Restart anticoagulation
  - Diagnosis of his mass
  - Consider in 5-7 days if HbG remains stable
    - Trending upward (Day 9 - 10.2)
- Maintenance dose of amiodarone
  - 100 mg QD
    - Low dose recommended for elderly

References

1. Evans L, et al. Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021. Crit Care Med. 2021 Nov 1;49(11):e1063-e1143. doi: 10.1097/CCM.0000000000005337. PMID: 34605781.
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Sips and Slips

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Learning Objectives

01 Examine the Patient Background

02 Evaluate Disease State Assessments and Plans

03 Understand Case Takeaways

01

Examine the Patient Background

Meet the Patient

Demographics

- 55 year old male

Past medical history

- Hypertension
- Alcohol abuse
- Oral squamous cell carcinoma - in remission
- Traumatic subarachnoid hemorrhage after a fall

Chief complaint

- Reporting multiple falls and dizziness, complaints of left forehead pain

Meet the Patient

- Home medications
  - ipratropium - albuterol 20 mcg / 100 mcg 1 puff qid prn wheezing
  - Pentoxifylline 400 mg 1bid
  - Multivitamin 1qd
- Family history
  - Mother: COPD
- Social history
  - 6 to 12 beers daily
  - 10 to 15 cigarettes per day

History of Present Illness

- Passed out several times leading up to admission
- Epigastric comfort and poor appetite
- Stools have been black and red for weeks
- Syncope in past had no etiology besides alcohol
    - Pt surprised that alcohol is causing the issue
- Scans
    - CT Head: no pathology
    - CT abdomen and pelvis: no pathology
    - Chest X-ray: no pathology

Pertinent Labs

Hematology

RBC	2.33 ↓
Hgb	6.7 ↓
HCT	20.9 ↓
RDW	20.0 ↑

Chemistry

Albumin	3.5
Alkaline Phosphatase	98
ALT	14
AST	26
Bilirubin Total	3.4
Protein Total	6 ↓

Ethanol	0.271 ↑
Iron	< 10 ↓
IBC Total	< 366
Iron Saturation	< 3 ↓
IBC Unbound	356 ↑

02 Evaluate Disease State Assessments and Plans

1. Acute Upper GI Bleed
2. Acute Respiratory Failure
3. Alcohol Withdrawal

Acute Upper GI Bleed

Which diagnostic test should be done in patients with a suspected upper GI bleed?

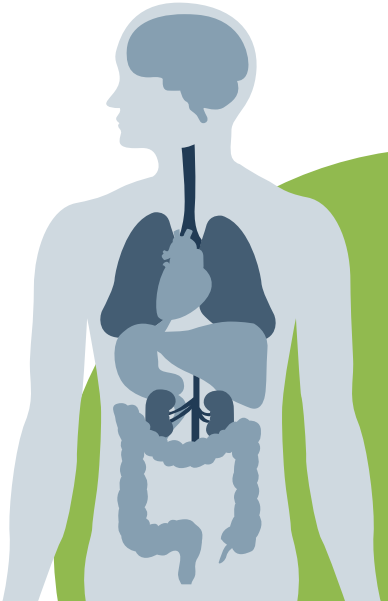
a. Colonoscopy
b. EGD: Esophagogastroduodenoscopy
c. CT Scan of Abdomen and Pelvis
d. GI Ultrasound

Which diagnostic test should be done in patients with a suspected upper GI bleed?

a. Colonoscopy
b. **EGD: Esophagogastroduodenoscopy**
c. CT Scan of Abdomen and Pelvis
d. GI Ultrasound

Diagnosis

- Black and red stools for several weeks
- Low hemoglobin
- GI consult at admission stated no active bleeding
- EGD (day after admission)
    - No evidence of varices
    - Duodenitis in the bulb with a 1 cm clean-based ulcer
    - Recommend PPI twice daily and stop octreotide
- GI consult (4 days after admission)
    - Pathology negative for H. pylori
    - Recommended PPI twice daily for at least 2 months



Inpatient Treatment

- Started on IV octreotide, IV pantoprazole, and given PRBC on admission
- Discontinued pantoprazole and octreotide the next day and started famotidine
    - Against GI consult recommendation
- Later discontinued famotidine and initiated lansoprazole per pharmacy recommendation

Acute Nonvariceal Upper GI Bleed

- Common sources: peptic ulcers, mucosal erosions, or Mallory-Weiss tears
- Acute bleed may be due to NSAID or aspirin use and the presence of H. pylori
- Common findings
    - Lightheadedness, weakness, hypertension
        - Could have contributed to falls
    - Hematemesis, coffee ground emesis, melena, or hematochezia
        - Blood in stools present

DynaMed. Acute Nonvariceal Upper Gastrointestinal Bleeding. EBSCO Information Services. Accessed June 14, 2023.

Management

- pre-EGD: high dose PPIs recommended at presentation
- Perform EGD within 24 hours after hemodynamically stabilized
- If bleeding is severe, endoscopic therapy often used
- Test all patients for H. pylori infection
- American College of Gastroenterology: suggests patients with low-risk ulcers on endoscopy receive standard PPI therapy
- International Consensus Upper GI Bleeding Conference Group recommend discharge with single daily dose PPI

DynaMed. Acute Nonvariceal Upper Gastrointestinal Bleeding. EBSCO Information Services. Accessed June 14, 2023.

Assessment of Actions

- Successfully gave PPI upon presentation
  - But it should not have been discontinued
  - Famotidine is not a treatment recommendation
  - Should have followed GI consult recommendation of PPI treatment
- EGD done in timely manner
  - Received PRBC evening of admission then EGD next afternoon

DynaMed. Acute Nonvariceal Upper Gastrointestinal Bleeding. EBSCO Information Services. Accessed June 14, 2023.

Assessment of Actions

- European Society of Gastrointestinal Endoscopy: Octreotide should not be used in patients with acute nonvariceal upper GI bleed
  - Only used if variceal bleed suspected
  - Perhaps initiated because liver damage and alcoholism is a risk factor for variceal bleeding
- GI consult said to discharge on twice daily PPI
  - ESGE guidelines say once daily

DynaMed. Acute Nonvariceal Upper Gastrointestinal Bleeding. EBSCO Information Services. Accessed June 14, 2023.

Acute Respiratory Failure

Episode 4 Days After Admission

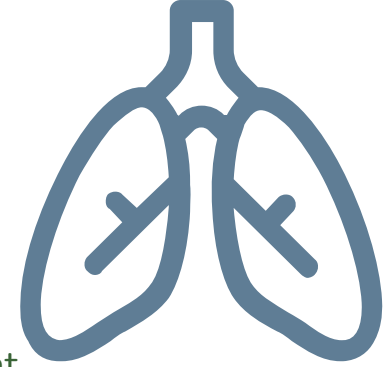
- Became apneic and unresponsive in the early morning
- Was sedated on propofol and intubated
- Chest X-ray showed right middle and lower lobe infiltrate
- IV vancomycin and Zosyn given for hospital acquired aspiration pneumonia
- Extubated two days later
- Sputum culture
    - Staph aureus, gram negative rods, rothia mucilaginosa, alpha-hemolytic streptococcus, and it was oxacillin susceptible
- Therapy changed to IV Unasyn

Sedation Choice

- American College of Critical Care Medicine 2018 Guidelines
  - Propofol or dexmedetomidine were recommended over benzodiazepines for critically ill adults on mechanical ventilation
- Treatment choice of propofol appropriate
  - Dexmedetomidine made patient agitated earlier in stay

Devlin JW, Skrobik Y, Gélinas C, et al. Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU. Crit Care Med. 2018 Sep;46(9):e825-e873

Aspiration Pneumonia



- An infection of the lung following the inhalation of a large amount of colonized oropharyngeal material
- Risk factors the patient had:
  - Altered mental status
  - Enteral tube feeding
- Pathogens
  - Strep pneumoniae, staph aureus, haemophilus influenzae, and enterobacteriaceae
  - Multidrug resistant organisms like pseudomonas may be most important in hospital
- Complications
  - Respiratory failure seen here

DynaMed. Aspiration Pneumonia. EBSCO Information Services. Accessed June 14, 2023. https://www.dynamed.com/condition/aspiration-pneumonia

Which medication regimen is not a first-line option for inpatient aspiration pneumonia?

a. Zosyn
b. Unasyn
c. Levofloxacin + Clindamycin / Metronidazole
d. Augmentin

Which medication regimen is not a first-line option for inpatient aspiration pneumonia?

a. Zosyn
b. Unasyn
c. Levofloxacin + Clindamycin / Metronidazole
d. **Augmentin**

Antibiotic Treatment

- IDSA Primary inpatient treatment options include:
  - Levofloxacin + clindamycin / metronidazole
  - **Zosyn**
  - Unasyn
  - + **Vancomycin** for MRSA coverage
    - Indicated in patients with a history of loss of consciousness due to alcohol / drug overdose
- Appropriately switched to Unasyn after cultures MRSA negative
  - Zosyn to Unasyn likely due to no pseudomonas
- Total 9 day duration ordered
  - Generally 7-10 days recommended
- Overall, appropriate treatment

Odeti S, Caldwell-McMillan M, Sarikonda K. Pneumonia (aspiration). Essential Evidence Plus. June 11, 2020. Accessed June 14, 2023. https://www-essentialevidenceplus-com.wilkes.idm.oclc.org/content/eee/682?section=5.

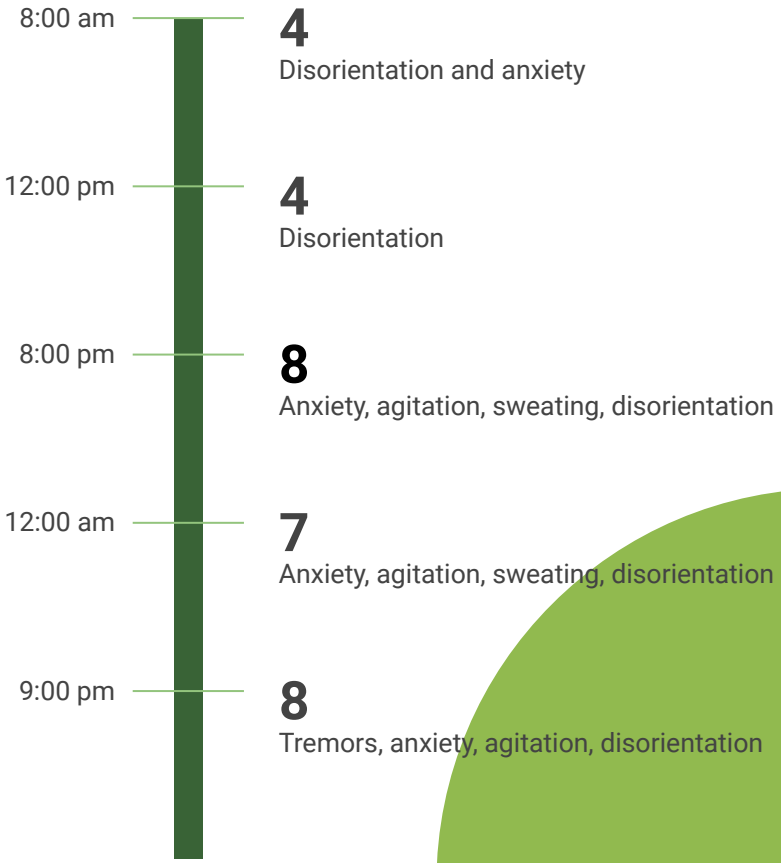
Alcohol Withdrawal

Episode One Day After Admission

- History of heavy alcohol usage
  - Started on librium and prn lorazepam
  - Thiamine and folic acid
- During the night one day after admission:
  - Pt extremely confused and uncooperative
  - Got out of bed and urinated around the room
  - Started on dexmedetomidine and ordered CIWA protocol
- Librium was discontinued at this point
- Dexmedetomidine caused agitation, so pt weaned off and started on phenobarbital TID and prn lorazepam
- Patient strongly advised to stop alcohol abuse

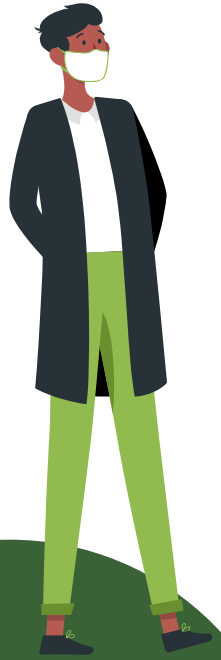
CIWA Scores

- Measures 10 symptoms of alcohol withdrawal
  - Higher the score = greater the risk
  - Scores less than 10 usually do not require additional medication
- Tool is considered a gold standard
  - Validity in ICU patients has been questioned given lack of communication and other variables at play
- Scores: started next day after episode
- Stopped scoring after respiratory failure



Sullivan, J.T.; Sykora, K.; Schneiderman, J.; Naranjo, C.A.; and Sellers, E.M. Assessment of alcohol withdrawal: The revised Clinical Institute Withdrawal Assessment for Alcohol scale (CIWA-Ar). British Journal of Addiction 84:1353-1357, 1989.

Treatment Assessment



- American Society of Addiction Medicine 2020 Guidelines for Inpatient Treatment
- Monitoring
  - In patients with moderate to severe withdrawal or those requiring pharmacotherapy, reassess every 1 to 4 hours for 24 hours
  - Once stabilized (CIWA < 10 for 24 hrs) monitoring can be extended to every 4 to 8 hours for 24 hours
- Assessment
  - Could have been started upon admission
  - Could have been assessed more frequently
  - Discontinuation appropriate
    - Oral communication not possible after respiratory failure

The ASAM Clinical Practice Guideline on Alcohol Withdrawal Management. Journal of Addiction Medicine 14(3S):p 1-72, May/June 2020. | DOI: 10.1097/ADM.0000000000000668

Treatment Assessment

- Supportive care
  - Thiamine should be provided to prevent Wernicke encephalopathy
  - In patients who are critically ill, folate supplementation should be considered
    - Chronic alcohol use associated with hyperhomocysteinemia
- Pt received both treatments = appropriate therapy

The ASAM Clinical Practice Guideline on Alcohol Withdrawal Management. Journal of Addiction Medicine 14(3S):p 1-72, May/June 2020. | DOI: 10.1097/ADM.0000000000000668

Treatment Assessment

- Prophylaxis
  - In patients at risk of developing severe or complicated withdrawal or complications of withdrawal, preventative pharmacotherapy should be given
  - Providing at least a single dose of preventative medication is appropriate for patients at lower levels of risk not experiencing symptoms but have acute, medical, psychiatric, or surgical illness
  - Benzodiazepines are first line
- Patient received librium every four hours = therapy appropriate

The ASAM Clinical Practice Guideline on Alcohol Withdrawal Management. Journal of Addiction Medicine 14(3S):p 1-72, May/June 2020. | DOI: 10.1097/ADM.0000000000000668

Treatment Assessment

- Treatment
  - For patients experiencing mild withdrawal (CIWA < 10) who are at a minimal risk of developing severe or complicated withdrawal or complications of withdrawal, pharmacotherapy or supportive care alone may be provided
  - Appropriate options: BZDs, carbamazepine, or gabapentin
  - Librium treatment was appropriate
  - Patient transitioned to phenobarbital after episode
    - Phenobarbital appropriate if BZDs contraindicated or it can be used in some inpatient settings when closely monitored
    - Appropriate use because librium was possibly not effective
    - Also used to wean off sedation
  - Guidelines say phenobarbital and BZDs may be used together with close monitoring
    - PRN lorazepam appropriate
  - Overall - all treatment appropriate

The ASAM Clinical Practice Guideline on Alcohol Withdrawal Management. Journal of Addiction Medicine 14(3S):p 1-72, May/June 2020. | DOI: 10.1097/ADM.0000000000000668

Which two supportive care medications should be given for alcohol withdrawal?

Which two supportive care medications should be given for alcohol withdrawal?

Thiamine and Folic Acid

03

Understand Case Takeaways

Case Takeaways

- Upper GI bleed
  - Perform EGD when possible
  - PPIs are mainstay of treatment
  - Follow GI consult
- Respiratory Failure and Aspiration Pneumonia
  - Start with empiric antibiotics to cover for staph. Aureus and anaerobes along with possible MRSA coverage
  - Narrow therapy after cultures
- Alcohol withdrawal
  - Four key parts to treatment:
    i. Assessment and monitoring
    ii. Prophylaxis
    iii. Supportive care
    iv. Withdrawal treatment

Resources

- DynaMed. Acute Nonvariceal Upper Gastrointestinal Bleeding. EBSCO Information Services. Accessed June 14, 2023.
- DynaMed. Aspiration Pneumonia. EBSCO Information Services. Accessed June 14, 2023. https://www.dynamed.com/condition/aspiration-pneumonia
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- The ASAM Clinical Practice Guideline on Alcohol Withdrawal Management. Journal of Addiction Medicine 14(3S):p 1-72, May/June 2020. | DOI: 10.1097/ADM.0000000000000668

Thank You

What questions do you have?

The Bruise Cruise: A Patient's Journey Through A Subdural Hematoma

By: Andrew Dean
PharmD Candidate 2024
Wilkes University
June 22, 2023

Formal Patient Case Presentation
Internal Medicine APPE Rotation

Learning Objectives

01

Understand the patient's acute problems

02

Understand the patient's chronic problems

03

Assess patients current medical regimen

04

Identify both patient and disease centered goals

Table of Contents

01
THE PATIENT

Patient Background

- **Demographics:**
  - Age: 43
  - Sex: Male
  - Weight: 63.6 kg / 139.92 lbs
- **Past Medical History:**
  - Chronic Alcohol Abuse
    - Withdrawal seizures
  - Essential Hypertension
  - Systemic Lupus Erythematosus
  - Generalized Anxiety Disorder

Patient Background cont.

- **Chief Complaint:**
  - Patient presented to the ED by ambulance after striking the back of his head on his kitchen tile floor. Reports legs seemingly gave out on him due to lupus. Reported no syncope
- **History of Present Illness:**
  - Patient states that he has fallen in the past due to lupus but has not struck his head before

Patient Background cont.

- **Social History:**
  - Smokes an average of 9 cigarettes a day
    - Started at 16
    - Willing to stop? No
  - History of alcohol abuse
    - Has been sober since last discharge
    - Has withdrawal seizures
- **Family History:**
  - Alcohol Abuse;
    - Mom, Dad, Brother

Patient Background cont

- **Review of Systems:**
  - Generally felt well
  - Complained of headache that had subsided shortly after his arrival
  - Denied the following:
    - Changes in vision
    - Dizziness
    - Numbness/Tingling
    - Syncope
    - Fatigue

Patient Background cont.

Home Medications:

Name (Generic)	Dose	Frequency
Tamsulosin	0.4 mg	One Once Daily at Bedtime
Folic Acid	1 mg	One Once Daily
Magnesium Oxide	400 mg	One Twice Daily
Metoprolol Tartrate	25 mg	One Twice Daily
Vitamin B1	100 mg	One Once Daily
Vitamin B12	500 mcg	Two Once Daily

Patient Background cont.

- **Pertinent Labs**
  - Chemistry
    - BUN: 6
    - SCr: 0.46
    - Protein: 5.9
  - Hematology
    - RBC: 3.72
    - Hgb: 12.0
  - Vital Signs
    - BP: 149/96, 171/95, 133/87

02 Disease States

Subdural Hematoma

Background

- **What is it?**
  - Can be caused by many different sources
    - In this case it was head trauma
  - A collection of blood within the inner dural cellular layer bordering the arachnoid mater
    - Mainly from the trauma inducing damage to blood vessels including damage to bridging veins

Bevers M. Subdural Hematoma. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/condition/subdural-hematoma#GUID-5D9E5E39-3A02-4EE6-9894-AFD377A8FF44.

Question #1

What drug class should be stopped immediately when someone is suspected of having a subdural hematoma?

A. Blood thinners/Anticoagulants

B. SGLT2is

C. CCBs

D. Alpha 1 agonists

Question #1

What drug class should be stopped immediately when someone is suspected of having a subdural hematoma?

A. **Blood thinners/Anticoagulants**

B. SGLT2is

C. CCBs

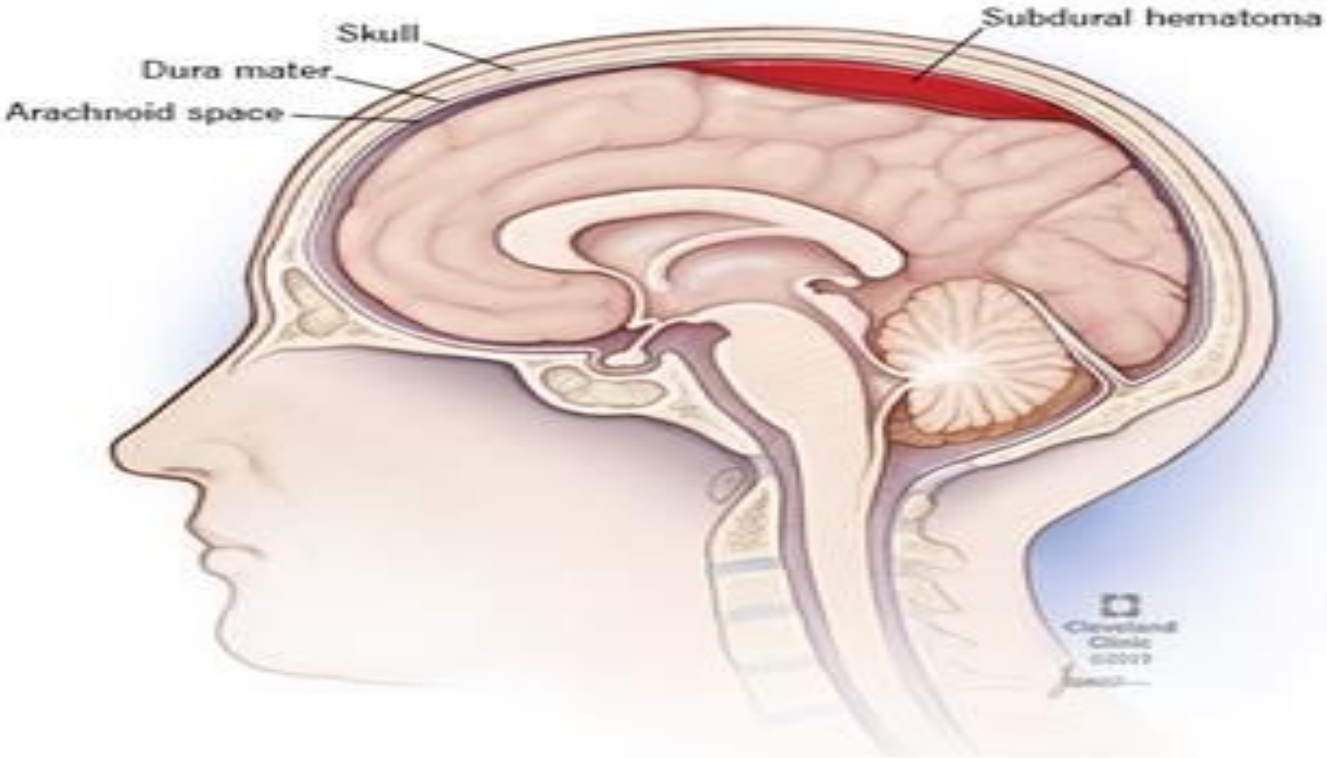
D. Alpha 1 agonists

Background cont.

- **How is it treated?**
  - Patients usually arrive at ED requiring urgent supportive care
    - Implement life support protocols
    - Treat elevated BP
    - Manage elevated intracranial pressure
    - If on any, stop all blood thinners/anticoagulants
    - Treat seizure, if experiencing one, with anti-seizure medication
  - If the size is above 10 mm consider surgical intervention
  - If the size is below 10 mm consider medical management as necessary and serial exam

Bevers M. Subdural Hematoma. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/condition/subdural-hematoma#GUID-5D9E5E39-3A02-4EE6-9894-AFD377A8FF44.

Background cont.



Professional CC medical. Subdural hematoma: Types, symptoms treatments, prevention. Cleveland Clinic. Accessed June 18, 2023. https://my.clevelandclinic.org/health/diseases/21183-subdural-hematoma.

Patient's Treatment

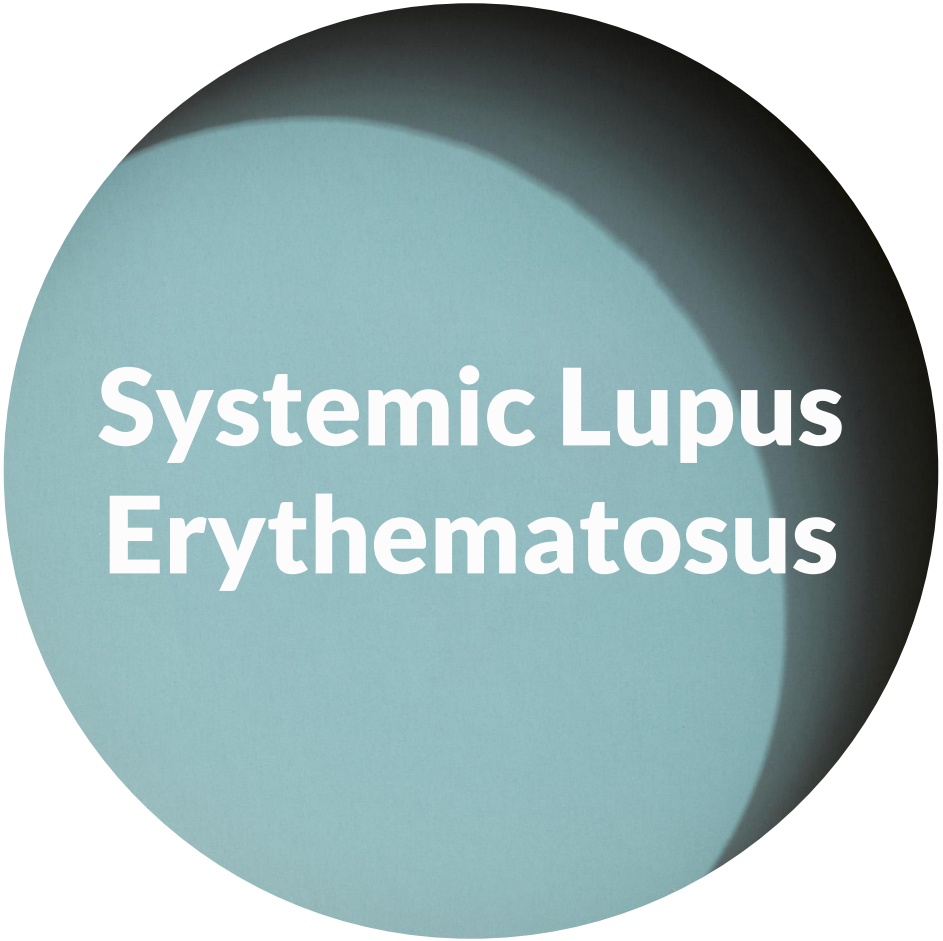
- **What did they do?**
  - Arrived at ED and received the following;
    - Supportive care as mentioned by guidelines
    - Initiated on clevidipine 50 mg IV
      - DHP-CCB, Fast Acting, Lipid Emulsion
      - Set monitoring parameters of 110-140 mmHg per protocol
    - Initiated on Keppra 500 mg IV
      - Seizure precaution and PMH of seizures
    - CT scans
      - Run everyday to monitor size
      - Initial scan revealed that the size was about 7-8 mm big
  - Admitted to ICU for medical management and observation

Treatment Comparison

- **Was there treatment approach appropriate?**
  - Provided supportive and emergency care when arrived in ED
  - Controlled BP with clevidipine due to hypertensive emergency parameters
  - Initiated seizure prophylaxis with keppra
  - Had constant CT scans going daily to ensure SDH was not worsening

Continuity of Care

- **What's next?**
  - Not much literature to reduce the risk of subdural hematomas
    - Reduce fall risk
    - Drink responsibly
    - Have vision checked regularly
    - Protect your head
  - This incident related to patient's SLE
    - Brings a big fall risk into play
    - Needs to get medications in order for his comorbidities
    - Needs to be counseled on importance of adherence
  - Will see PCP in a few weeks


Systemic Lupus
Erythematosus

Question #2

Can SLE affect multiple organs?

True

False

Question #2

Can SLE affect multiple organs?

True

False

Background

- **What is it?**
  - In the basic terms it is when an individual has a loss of self-tolerance
    - Leads to autoimmunity and tissue damage
  - Immune system problems
    - T-cell defects
    - B-cell lymphopenia
    - Production of autoantibodies
  - Characterized by a butterfly rash

Roberts J. Systemic Lupus Erythematosus (SLE) in Adults. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/condition/systemic-lupus-erythematosus-sle-in-adults#GUID-12B55D38-B51C-4B7A-927F-2EA3DA9B69AE.

Background cont.

- **How is it treated?**
  - When a patient is diagnosed with SLE they usually are trying to do three things;
    - Minimize organ damage
    - Prevent flare ups
    - Optimize health related quality of life
  - Mainstay of therapy is giving an antimalarial drug or NSAID depending on severity
    - Hydroxychloroquine 300-400 mg daily
  - Can use glucocorticoids in combination with hydroxychloroquine depending on organ involvement
    - Start with prednisone ≤0.5 mg/kg/day

Roberts J. Systemic Lupus Erythematosus (SLE) in Adults. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/condition/systemic-lupus-erythematosus-sle-in-adults#GUID-12B55D38-B51C-4B7A-927F-2EA3DA9B69AE.

Patient's Treatment

- **What did they do?**
  - Due to the patient being a very poor historian, he was not initiated on any medication to treat his SLE
  - Patient claimed he had just gotten medications prescribed to him within the last few weeks for this disease state
    - He told a nurse on admission that he has stopped taking medications for it several years ago
- **At home**
  - Medication history was not fully given by patient
  - No known drugs being taken

Continuity of Care

- **What's next?**
  - Give proper counseling on medications and why it is important to be adherent
  - Ensure the patient understands the risks that come with SLE and what to be on the lookout for
  - Have him follow up with PCP or his pharmacy to confirm his medications regarding SLE


Essential
Hypertension

Background

- **What is it?**
  - High blood pressure coming from an unknown cause
    - Can be related to;
      - Changes in lifestyle such as diet and exercise
      - Family history of hypertension
      - Alcohol abuse disorder
      - Age

Nambi V. Hypertension Medication Selection and Management. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/management/hypertension-medication-selection-and-management#GUID-25E1DBD7-B4A2-403B-B852-A6C1BCDD3945.

Background cont.

Blood Pressure Categories

American Heart Association.

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

Carey R. High blood pressure redefined for first time in 14 years: 130 is the new high. American Heart Association. 2017. Accessed June 18, 2023. https://newsroom.heart.org/news/high-blood-pressure-redefined-for-first-time-in-14-years-130-is-the-new-high.

Background cont.

- **How is it treated?**
  - According to both the ACC and AHA guidelines. A patient should be on a combination of the first line therapies
  - First line therapies include:
    - ACEis
    - ARBs
    - CCBs
    - Thiazide Diuretics
  - Do not use ACEis and ARBs together
  - Depending on which guideline you look at you may see different target goals
    - ACC/AHA - 130/80 mmHg
    - ESC/ESH - 140/90 mmHg
  - Institutions can set their own goals per patient

Whelton P. Harmonization of the American College of Cardiology/American Heart ... AHA Journal. Accessed June 18, 2023. https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.121.054602.

Patient's Treatment

- **What did they do?**
  - After ED arrival, patient was given clevidipine which is a DHP-CCB
    - First line agent
  - This was before PMH was obtained
  - Kept him on this agent along with metoprolol tartrate 25 mg BID from home medications
  - Target range was set at 110-140 mmHg
    - Stayed within goal with current regimen

Question #3

Based on this patient's current regimen for essential hypertension, what would be an appropriate recommendation to optimize his therapy (Drug and Dose)?

Question #3

Based on this patient's current regimen for essential hypertension, what would be an appropriate recommendation to optimize his therapy (Drug and Dose)?

Any of the first line agents with their smallest dose to start.

- ACEi
- ARB
- CCB
- Thiazide Diuretics

Treatment Comparison

- **Was there treatment approach appropriate?**
  - They provided clevidipine per protocol for SDH
  - Kept it on his regime due to HTN
    - Is a first line agent and is appropriate
  - They had him on metoprolol due to it being an at home medication
  - Around day 3 or 4 we could've switched off the IV clevidipine to an ACEi like Lisinopril 5-10 mg once daily
  - SBP parameters of 110-140 mmHg were appropriate based on guideline literature and protocol

Continuity of Care

- **What's next?**
  - Give proper counseling on medications and why it is important to be adherent
  - Contact PCP and see what medications he was on before for HTN
  - Discharge with new first line antihypertensive medication prescription
  - Depending on his BP should be reevaluated every 6 months to one full year on his HTN

Nambi V. Hypertension Medication Selection and Management. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/management/hypertension-medication-selection-and-management#GUID-25E1DBD7-B4A2-403B-B852-A6C1BCDD3945.

03
Discussion

Key Points

- **Subdural Hematoma**
  - Timing is everything
  - Stat CT scans
  - Ensure proper protocol in ED
- **Systemic Lupus Erythematosus**
  - Combo therapy is better than singular agent
    - Antimalarial + glucocorticoid
- **Essential Hypertension**
  - Get a monitoring parameter set
  - First line therapy options

Other Recommendations

- Make sure you get the full story
  - Not as effective treatment
- Get your patient to fully understand what their disease states are
  - May boost moral to want to make themselves better
  - May also boost adherence levels

REFERENCES

- Nambi V. Hypertension Medication Selection and Management. Dynamed. Accessed June 18, 2023. https://www.dynamed.com/management/hypertension-medication-selection-and-management#GUID-25E1DBD7-B4A2-403B-B852-A6C1BCDD3945.
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