2016 LLSA Review

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Objective

- Review 2016 LLSA articles so that you can pass the exam
- Review articles from the perspective of a practicing emergency physician in the community
- Highlight areas of particular importance (bolded and underlined)

Fever in the Postoperative Patient

- Narayan, et al
- Fever=>100.4 (38)
- Classic "Ws" of Postop Fever

W	Cause	Timeframe
Wind	Atelectasis	POD 1-2
Waters	UTI	POD 2-3
Wound	**Infection**	**POD 3-7 (most common cause of POF on POD #5)**
Walk	DVT/thrombophlebitis	POD 5-7
Wonder Drug	Drug Fever	POD >7

Fever in the Postoperative Patient

- Think of potential causes based on timing

Timing	POD	Potential Causes
Immediate	<1 (usually less than 12 hours)	Inflammation due to cytokines
Acute		NSTI, PE, alcohol withdrawal, anastomotic leak, adrenal insuff, malignant hyperthermia
Subacute		
Delayed		

Fever in the Postoperative Patient

- Atelectasis≠Fever
- Emergent Causes of Early Postop fever
  - NSTI
    - Dishwater drainage
    - Group A strep, enterococci, staph species, clostridial species
    - (Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) diagnostic aid
  - PE
    - Observed in 14% of PIOPED population
    - Usually low grade, short lived, peaking same day as PE occurs
  - Anastomotic leak
    - Fever+Abdominal Pain+Abdominal Surgery=Anastomotic leak
  - Alcohol Withdrawal
    - Fever may be an occult/only sign of withdrawal

Fever in the Postoperative Patient

- Emergent Causes of Early Postop fever
  - **Adrenal Insufficiency**
    - **Primary or secondary**
    - **Steroid withdrawal (secondary cause) most common**
      - **So think about adding hydrocortisone to other management**
  - Malignant Hypothermia
    - Inhalational anesthetics
    - Rapid, exponential increase in end-tidal CO2, muscle rigidity, tachy, hyperkalemic, fever
    - Dantrolene
- Other
  - UTI
    - Usually POD 3-5
    - Risks: prostate issues, anorectal surgery, spinal anesthesia, catheter
  - Pneumonia, C. Diff, CRBI, Infected Prosthesis

Hyperglycemic Crisis

- Van Ness-Otunnu, et al.
- Hyperglycemic Crisis=diabetic ketoacidosis (DKA) or hyperosmolar hyperglycemic state (HHS)
  - DKA=blood glucose >250mg/dL + moderate ketonuria/ketonemia + arterial pH<7.3 + bicarb<15mEq/L
  - HHS=altered sensorium+blood glucose>600mg/dL + minimal/no ketonuria/ketonemia + pH>7.3 + bicarb>15mEq/L
- Pathophysiology
  - counter-regulatory/stress hormones-->lipolytic pathways-->free fatty acids oxidized to ketones-->acetone, acetoacetate, beta-3-hydroxybutyrate (last contributes most to AG)
  - hyperglycemia-->osmotic load-->intravascular fluid shifts, osmotic diuresis, dehydration

Hyperglycemic Crisis

- Clinical Presentation
  - Infection--most common precipitant
    - Others to consider: MI, drug use, CVA, pancreatitis, eating disorder, pregnancy
      - See Table 1
  - Kussmaul breathing--hyperventilatory response to metabolic acidosis
- Differential Diagnosis
  - Hyperglycemia
    - Meds--calcium channel blocker overdose
  - Ketonemia
    - Ethanol, isopropyl alcohol
    - Salicylates

Hyperglycemic Crisis

- Diagnostic testing
  - Accucheck--da!
    - Euglycemic diabetic ketoacidosis (BS<250)--may be see in up to 10%
  - Urine ketones, BMP, lactate, venous or arterial pH, serum osmolality, serum ketones
  - Other tests based on suspected underlying cause--for example: ekg,
- Management
  - Goals--replace fluids, resolve ketonemia, correct acidosis, re-establish euglycemia, treat underlying cause
  - Replace fluids
    - Typical free water deficit
      - DKA: 6L
      - HHS: 9L

Hyperglycemic Crisis

Management

- **Replace fluids--First Priority**
  - **Start: NS at 15-20ml/kg/hr--goal to replace deficit over 24-48 hours**
    - **Consider K+ supplementation (slide to follow)**
  - Once hydration improved--base fluids on corrected Na level
    - Na<135mEq/L--NS at 250-500ml/hr
    - Na>135mEq/L--0.45% NaCl at 250-500ml/hr
    - Corrected Na level
      - Use medcalc (or if you want decrease measure Na by 1.6mEq/L for every 100mg/dL increase in glucose)
  - Cerebral edema?
    - Controversial
    - PECARN study in process

Hyperglycemic Crisis

- Correct ketonemia/acidosis, restore euglycemia
  - Bolus + infusion v. just infusion-->no difference in resolution
  - Expected rate of glucose decrease=50-75mg/dL/hr
  - Infusion
    - **Initial rate: 0.14units/kg/hr**
    - Adjust after 1st hour:
      - <10% decrease in glucose: bolus 0.14units/kg of insulin + reassess in 1 hour
      - >10% decrease in glucose: reassess hourly
    - Cut back on insulin when
      - DKA: BS<200-->decrease rate to 0.02-0.05units/kg/hr + initial D51/2NS at 250-500ml/hr
      - HHS: BS<300-->same
    - See Figure 1

Hyperglycemic Crisis

- Other management pointers
  - **Potassium:**
    - **< 3.3-->give 20-30mEq/h of potassium in fluids until level>3.3 before sta**
      - **So start fluids with potassium (see Figure 1)**
    - 3.2-5.2-->add 20-30mEq/L to each liter of IV fluids. Goal is level 4-5
    - >5.2-->reassess every 2 hours (hopefully they are gone before second check)
  - Bicarb
    - Give if pH<6.9
    - Method: 100mmol in 400mL of sterile water with 20mEq of K infused over 2 hours
  - Phosphate
    - Don't bother unless: muscle weakness, rhabdo
- Done when
  - DKA: BS<200 + 2 of the following: bicarb<15, pH>7.3, AG<12
  - HHS: normal serum osmolality + normal vitals + normal mentation

Theme for the next 2 articles

Streptococcus pneumoniae

Community-Acquired Pneumonia

- Wunderink, et al.
- Interesting facts
  - Pneumonia=most common infectious cause of death worldwide
  - Radiologist will miss 15% of cases on chest x-ray, they will disagree on same radiograph in 10% of cases.
- Diagnosis
  - Evidence of infection (fever, etc)
  - s/s of respiratory involvement
  - New or changed infiltrate on chest x-ray
- Treatment--3 considerations
  - Choice of antibiotic
  - Extent of testing to determine cause of pneumonia
  - Disposition

Community-Acquired Pneumonia

- Choice of Antibiotic
  - Need to cover--Strep pneumo and atypicals
  - Outpatients
    - Consider recent abx use and cost
    - Macrolides, doxycycline, fluoroquinolones
  - **Admitted patients**
    - **Respiratory quinolone (levaquin 750mg or moxifloxacin 400mg) OR**
    - **2nd/3rd generation cephalosporin + macrolide**
      - **Ceftriaxone + Azithromycin=excellent choice**
  - Timing of ABX
    - CMS-TJC: within 6 hours of presentation
      - Within 1 hour if hypotensive
  - Duration of ABX
    - 5-7 days

Community-Aquired Pneumonia

- Choice of Antibiotics
  - Resistant organisms
    - Risk Factors
      - Health Care Aquired--See Table 2
      - Structual lung disease
    - Need to cover Pseudomonas and MRSA
  - **CA-MRSA (Say What!?)**
    - Produces an exotoxin
    - Think about if:
      - Cavitary infiltrate or necrosis
      - Gross hemoptysis
      - **Erythematous rash**
      - Young, previously healthy
      - Rapidly increasing pleural effusion
      - Neutropenia
      - Skin papules
      - Severe pneumonia during summer months
    - **Treatment:**
      - **Vancomycin PLUS**
      - **Clindamycin OR**
      - **Linezolid**

Community-Acquired Pneumonia

- Additional Testing
  - Blood cultures-severe, HCAP, cirrhosis, asplenia, will cause change if positive
  - Sputum culture--severe, HCAP if cough, structural lung disease with cough, will change Tx
  - Influenza--when in season
  - See Table 4 for others (Urine for pneumo and legionella antigens)
- Disposition
  - Admit?-->PSI or Curb-65
    - PSI may be better but complex
    - https://www.mdcalc.com/psi-port-score-pneumonia-severity-index-cap
    - https://www.mdcalc.com/curb-65-score-pneumonia-severity
  - ICU?
    - IDSA-ATS: 3 or more of 9 minor criteria (see Table 5)
    - Minor Criteria: confusion, elevated BUN, Tachypnea, hypoxemia, multilobar infiltrate, thrombocytopenia, hypotension, hypothermia, leukopenia

Bacterial Meningitis post-PCV7: declining incidence and Treatment

- Kowalsky, et al.
- Interesting Facts:
  - 4% mortality rate
  - Epidemiology
    - Pre-1988: Haemophilus influenzae
    - Post-1988: Strep pneumo
      - PCV7 released in 2000
        - Increased in 19A and 22F serotypes not covered in vaccine
      - PCV13 released in 2010
        - Covers 19A as well as 5 other serotypes
  - Impact of PCV7-->decreasing rates of pneumococcal meningitis
  - Most common cause of meningitis-->aseptic
  - Neonates have not seen a decline in bacterial meningitis rates

Bacterial Meningitis

- Common ***Bacterial*** Pathogens
  - Strep pneumo--most common
  - By Age
    - Neonate: Strep agalactiae, E. coli, Listeria
    - 1-3 months: Strep agalactiae>>gram negative rods>>Strep pneumo
    - 3 months-3 years: Strep pneumo>>N. meningitidis>>Strep agalactiae
    - 3-10 years: Strep pneumo>>N. meningitidis
    - 10-19 years: N. meningitidis>>Strep pneumo
  - By condition
    - Basilar skull fx: Strep pneumo, H. influenzae, Strep pyogenes
    - Penetrating trauma/recent NUS: Staph aureus, Staph epidermidis, Pseudomonas
    - Ventricular shunt: Staph epidermidis, Pseudomonas, Propionobacterium acnes
    - HIV: Cryptococcus, Strep pneumo, Listeria
    - Others (lack of opsnizing antibiodies or complement deficiency)

Bacterial Meningitis

- H/P
  - Neck stiffness/meningeal signs not reliable in kids<2 y/o
  - Check immunization status
- Labs
  - CSF culture + Blood cultures
    - Effects of Pretreatment on CSF Cultures
      - Definitely causes decrease in positive culture rates--From 84% to as low as 55%
        - Decrease magnified by time--only decrease to 72% if within 4 hours
        - CSF WBC counts not affected
      - True for both oral and IV antibiotics
      - Most rapid sterilization seen in meningococcal meningitis
        - Can have within 1 hour

Bacterial Meningitis

- Labs
  - CSF analysis
    - Cell count w/ diff
      - Bacterial meningitis--typical range 1000-5000 WBCs/microL
      - Newborns: may have 3 WBCs/microL
      - WBCs can be seen in aspetic meningitis
      - Traumatic tap--no set formula (maybe 500:1 or 1000:1)
        - When in doubt treat!
    - Glucose
      - <40mg/dL (with depressed CSF:blood ratio of 0.4 or less, 0.6 or less in neonates)
    - Protein
      - typically elevated

Bacterial Meningitis

- Labs
  - CSF Gram Stain
    - False positive: 40%
  - CSF antigen tests--NOT recommended for routine use
- CT Scan
  - Consider before LP if
    - Immune compromise
    - Ventricular shunts
    - hydrocephalus
    - CNS trauma
    - Recent neurosurgery
    - Known space occupying lesion
    - Papilledema
    - Focal neuro deficit except CN6 or 7 palsy

Bacterial Meningitis

- Other Diagnostic aides
  - Bacterial Meningitis Score
  - Enterovirus PCR
- Treatment
  - Abx--next slide
  - Steroids?
    - Bottom line: unlikely proven benefit unless you think meningitis is due to Hib
      - Given with or before ABX
      - Weigh risks and benefits in cases of suspect S. pneumo
      - Yes decreases risk of hearing loss in Hib meningitis but otherwise no consistent benefit

Bacterial Meningitis

Age	Empiric Treatment	Notes
Neonate	Ampicillin + cefotaxime or aminoglycoside +/- acyclovir	Add acyclovir if: rash, seizure, maternal history, ill appearance
Older than 1 month	**Vanco + 3rd generation cephalosporin**	**Increasing N. meningitidis resistance to penicillins**
Basilar Skull Fx	Vanco + 3rd generation cephalosporin	
Trauma/recent NUS	Vanco + cefepime or ceftazidime or meropenem	
Ventricular shunt	Vanco + other based on gram stain	If gram + bacilli on stain add cefepime, ceftazidime, or meropenem

Bleeding and Coagulopathies in Critical Care

- Hunt, Beverly
- Ugh!--Damn it Jim, I am an emergency physician.
- Coagulopathy: a condition in which the bodies ability to clot is impaired
- Figure 1--differential diagnosis schematic
- Table 1 describes lab findings with different conditions
  - **End Stage Liver Disease has same findings as DIC**
  - **ABEM REALLY LIKES ANSWERS BURIED in TABLES!!!! WHY?????**
- Treatment Principles
  - Do not correct coagulopathy unless:
    - Clinical bleeding problem
    - Surgical procedure needed
    - Both

Bleeding and Coagulopathies in Critical Care

- Management of major bleeding
  - Blood components
    - No RCTs
    - FFP to PRBC
      - 1:1 or 1:2 ratio
      - risk--transfusion related acute lung injury
  - Fibrinogen
    - Consider for fibrinogen levels 1.5-2.0g/L
  - Tranexamic Acid
    - CRASH-2 study
      - **"TXA should be administered to all patients with major bleeding af**
    - Give within 3 hours after injury for death reduction
    - Dose: 1g

Bleeding and Coagulopathies in Critical Care

- Support of Invasive Procedures
  - No evidence to support use of FFP to correct abnormal lab results
    - No standards on trigger
  - Author's opinion
    - INR<1.5: ok to insert central line or arterial catheter if
      - Can compress area
  - Critical Care Patients at risk
    - Give Vitamin K--daily or weekly (hopefully they are not in the ED that long)

Bleeding and Coagulopathies in Critical Care

- Disseminated Intravascular Coagulation
  - "An acquired syndrome characterized by intravascular activation of coagulation with loss of localization arising from different causes"
  - Sepsis most common cause (Staph, E. Coli)
  - May present as bleeding or thrombosis
  - Diagnosis-->Diagnostic Scoring System
    - See Table 2
  - Treatment
    - Treat underlying cause
    - Bleeding-->replace coagulation proteins and platelets
      - Keep platelets above 50,000
      - FFP to maintain PT and aPTT <1.5x normal
      - Fibrinogen if level>1.5g/L
    - Do not use antifibrinolytic agents

Bleeding and Coagulopathies in Critical Care

- Thrombocytopenia
  - Common: 20% of medical patients and 33% of surgical patients in ICU
  - Cause: usually multifactorial (thanks)
  - Causes
    - immunologic --especially if abrupt after recent surgery
      - Heparin induced is uncommon
    - Post-transfusion purpura
    - Thrombotic microangiopathies
  - Treatment thresholds
    - stable patient--10,000
    - Actively bleeding--50,000
    - CNS bleeding risk or NUS--100,000
  - Use HLA-matched if possible

Bleeding and Coagulopathies in Critical Care

- Other issues
  - Liver disease
    - Decreased production of coagulation factors AND anticoagulation factors
    - Net result: no need to treat prolonged coagulation times if no bleeding
    - **Remember lab findings like DIC**
  - Renal Disease
    - Uremic bleeding due to platelet dysfunction (multifactorial)
    - May see prolonged bleeding time if tested
    - Dialysis helps
  - Fibrinolytic Bleeding
    - Excessive fibrinolysis-->threatens clot integrity-->more bleeding
    - TXA may help
  - Antithrombotic Therapy
    - PCC may help with reversal of novel anticoagulants

Rapid Reversal of Warfarin-Associated Hemorrhage in the ED by PCC

- Frumkim, Kenneth
- Problem
  - Anticoagulation can increase the risk of ICH x 7-10
  - Bleeding continues for 12-24 hours in ½ of anticoagulated ICH patients
    - This expansion is independent predictor of death/poor outcome
- Traditional Options for Warfarin reversal
  - Vitamin K
    - Dose: 5-10mg IV for life threatening bleeds (IV works faster than oral)
    - Risk: anaphylaxis (seen in 3 of 10,000 doses)
      - Minimize by diluting and infusing no faster than 1mg/min

Rapid Reversal of Warfarin

- Traditional options for reversal-continued
  - Fresh Frozen Plasma
    - You cannot give QUICKLY
      - Requires ABO testing
      - Takes time to thaw--30-60 minutes
        - Special microwave?
    - Dose: 15mL/kg (4 units for 70kg person)
    - Takes 13-48 hours for correction
    - Every 30 minute delay in 1st dose=20% decreased odds of INR reversal within 24 hours
- Rapid Reversal Options
  - Keep in mind: normalization of INR may not mean successful reversal of anticoagulation
  - Options
    - Recombinant Factor 7
    - Prothrombin Complex Concentrates

Rapid Reversal of Warfarin

- Recombinant Factor 7
  - Dose: ?
    - 90mcg/kg OR
    - 1.0-1.2mg vial
  - How fast: 10 minutes when used with traditional options
  - Risk: thrombosis
    - 10-20%
- Prothrombin Complex Concentrates
  - Contents: Factors 2, 9, 10, some 7 in varying amounts, and proteins C/S
  - Recommended in 2008 and 2012 by ACCPs
  - Formulations
    - 3 Complex--no factor 7
    - 4 Complex--contain factor 7
      - Kcentra approved in 2013 by FDA for rapid reversal

Rapid Reversal of Warfarin

- Prothrombin Complex Concentrates
  - How fast: 3-15 minutes to normalize INR and resolution of bleeding
  - Risks: thrombosis
  - Dose: 25-50 IU/kg
  - Which one: 3 or 4 Factor
    - Both available in US
      - Profilnine (3 factor)
        - Some recommend adding FFP to give the factor 7
        - Some say if INR less than 4.5--enough intrinsic factor 7 is present
      - Kcentra (4 factor)--favored because of factor 7

Rapid Reversal of Warfarin

Comparisons

- PCC v. FFP
  - Speed: PCC
  - Safety:
    - FFP--more volume
    - Same thrombotic risk
- Factor 7 v. FFP
  - Speed: Factor 7
  - Safety: same as above
- PCC v. Factor 7
  - Speed: ?
  - Safety: Thrombosis more common with Factor 7
  - Duration: PCCs last longer (6-8 hours v. 60 minutes)--so may need to redose Factor 7

Rapid Reversal of Warfarin

- Who is using Kcentra?
- Does anyone have a rapid reversal protocol in place?
  - Figure--gives a good starting point if need to develop one (see below)
- **PCC are the preferred/recommended reversal agent for warfarin associated bleeding**
  - **After you give PCC-->next most appropriate step is to recheck INR in 15 minutes!**

Acute Liver Failure

- Bernal, et al.
- Clinical Problem
  - Fulminant hepatic failure--a severe liver injury, potentially reversible in nature and with onset of hepatic encephalopathy within 8 weeks of the first symptoms in the absence of pre-existing liver disease
    - Can be further defined by interval between onset of symptoms and development of encephalopathy
      - Hyperacute--one week or less
        - Tylenol or virus
      - Subacute--somewhere between hyperacute and chronic
        - Drug induced or indeterminate cause

Acute Liver Failure

- Causes
  - Viruses
    - Most common cause worldwide
    - Hepatitis A and E--majority of cases with 50% mortality worldwide in developing countries
    - Hepatitis B--more common in asia and mediterranean
    - Other--herpes simplex, cytomegalovirus, epstein-barr, parvovirus
  - Drugs
    - 50% of cases in the US
    - Both dose dependent and independent cases
    - Tylenol most common
      - Malnourished and alcoholics are greater risk
    - Recreational drugs--MDMA, Cocaine (both cause ischemia); mushrooms
  - Other
    - Ischemia--due to shock, cardiac or respiratory failure
    - Neoplasm, acute Budd-Chiari syndrome, heatstroke, metabolic disorders (Wilson's)

Acute Liver Failure

- Initial Care
  - Supportive--fluids, etc
    - Early intubation for worsening encephalopathy in hyperacute cases
  - **Acetylcysteine**
    - **May benefit non-tylenol related acute liver failure**
      - **Good to give as treatment in undifferentiated cause**
  - Antibiotics?
    - No evidence to support BUT
    - Authors recommend "preemptive" antibiotics if coagulopathy + organ failure/encephalopahty present, or likelihood of progression
  - Bleeding not common--even though clotting factors less, so are hepatically derived anticoagulants
    - Avoid use of coagulation factors unless bleeding or invasive procedure
  - See Table 1

Acute Liver Failure

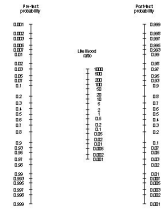
- Other Treatment Considerations
  - Overall Goal=metabolic and hemodynamic stability
  - Hypoglycemia
  - Avoid large volume hypotonic fluid infusion--may cause hyponatremia and cerebral edema
  - Nutritional support
  - Transplantation
    - Evaluate early
- Complications
  - Cardiorespiratory dysfunction
    - Hypotension common--multifactorial etiology
      - Norepi--preferred vasopressor
      - Vasopressin--can be added
    - Myocardial function should be evaluated

Acute Liver Failure

- Complications
  - Neurologic Conditions
    - Encephalopathy
      - Speed at which develops=huge prognostic value
        - Faster is bad
      - Goal--prevent onset
        - Onset is poorly understood, but ammonia (neurotoxin) plays role
          - Direct correlation between ammonia level and encephalopathy
        - Common therapies (lactulose) used in Chronic Dz may be **"deleterious"**
    - Intracranial Hypertension
      - Results from cerebral edema
        - Risk greatest with ammonia level > 150-200micromol/L (255-340 mcg/dl)
      - Leading cause of death worldwide
    - If encephalopathy is present, consider
      - Sedation, temperature management, and osmotherapy (mannitol, hypertonic saline)
  - Renal Dysfunction
    - May see in 50% of cases

Adult Small Bowel Obstruction

- Taylor, et al.
- Disclaimer: We will not be plotting stuff using the Fagan Nomogram
  - Say what, Fagan What? Bayesian analysis?
  - Likelihood Ratios?
  - Pre-test and Post-Test probability?
  - *"An Effective way to make the diagnosis of SBO in the ED as quickly as possible is with the use of likelihood ratios (LRs)...Diagnosis is made from determining the pre-test probability based on the history and physical examination and from a LR of the specific diagnostic test used. Historically, this information could have been plotted on a Fagan nomogram to determine a post-test probability..."*



Adult SBO

- Background info
  - 2% of patients with abdominal pain
  - Most common cause=adhesions
  - Complications
    - strangulation--30%
    - Bowel necrosis--15%
- Objectives of article
  - Provide reliability and diagnostic accuracy estimates for history, physical, and imaging so can develop pre and post test probabilities
  - Help determine a test-treatment threshold
    - When to treat and forego further testing to confirm the diagnosis
      - Treatment=fluids and NG tube

Adult SBO

- Diagnostic Accuracy Estimates
  - History
    - No elements could predict SBO reliably and accurately
      - Previous abdominal surgery best
      - ? constipation
  - Physical
    - **Few elements helped**
      - **Abdominal distention best**
      - **Again look at the tables (ABEM Why!)**
  - Diagnostic Studies
    - Plain X-ray
      - SBO=2+ air fluid levels in dilated loops of bowel > 2.5cm
      - Not good, included studies only provided a +LR of 1.64, -LR 0.43

Adult SBO

- Diagnostic Accuracy Estimates
  - CT
    - **SBO=continuous dilated loops of bowel >2.5cm present proximal to coll bowel**
      - **So Dx made by seeing a transition point**
    - Diagnostic accuracy improved as CT slices got thinner
      - 5-10mm slices--Sensitivity 63-100%/Specificity 57-100%
        - +LR 2.3-5.4 (pooled 3.6), -LR 0.09-0.35 (pooled 0.18)
      - 0.75mm slices (64 slice multidetector)--Sensitivity 93-96%/Specificity 93-100%
        - +LR infinite, -LR 0.04
  - MRI
    - Pretty good
    - Sensitivity 90-95%/Specificity 86-100%
    - Pooled +LR 6.77, -LR 0.12

Adult SBO

- Diagnostic Accuracy Estimates
  - US
    - **The big winner**
      - **Overall demonstrated the highest + LR**
    - SBO=dilated loops of bowel >2.5cm proximal to collapsed loops + absent/decreased peristalsis activity
    - Formal US Group
      - Sensitivity 86-93%/Specificity 91-99%
      - +LR 14.1, -LR 0.13
    - Emergency US Group
      - Sensitivity 92-99%/Specificity 84-95%
      - +LR 9.5, -LR 0.04
    - We can learn this!
      - ED US studies--each with some prior coursework. In one study they then had a 10 minute teaching session then 5 proctored exams.
      - ? put in link to US video of US for SBO

Adult SBO

- Test-Treatment Threshold Estimates
  - Suggested Treatment=3-5 days of conservative management (fluids, bowel rest, NG) if no signs/symptoms of peritonitis or sepsis
    - NG carries largest risk
      - 3% risk of pneumonia (authors used this number to determine thresholds)
  - Risk of testing
    - CT with contrast--0.1% risk of serious allergic reaction
  - Test-Treatment Threshold
    - Pre-test <1.5%--more testing may be riskier
    - Pre-test >20.7%--more benefit from starting treatment as opposed to getting more investigations
- How to use this?
  - Bayesian approach--"...plotting, on a hypothetical continuum of 0% to 100%, the clinical certainty that a patient has a given diagnosis based on both pre- and post-test probabilities."

A Randomized Trial of Colchicine for Acute Pericarditis

- Imazio, et al.
- Study design--you can read
  - Basis--colchicine recommended for recurrent pericarditis already (Europeans)
- Diagnosis of Pericarditis
  - 2 of the following:
    - Typical chest pain
      - Sharp
      - Pleuritic
      - Improved by sitting up and leaning forward
    - Pericardial friction rub
    - ECG changes
      - **Widespread ST elevation or PR depression**
    - New or worsening pericardial effusion

Colchicine for Pericarditis

- Conventional Treatment
  - 800mg of aspirin Q 8 hours x 7-10 days, then tapered over 3-4 weeks
  - 600mg of Ibuprofen Q 8 hours x 7-10 days, then tapered over 3-4 weeks
  - Prednisone 0.2-0.5mg/kg/day x 14 days, the tapered
  - **PPI given as prophylaxis
- **Study Treatment (added to conventional treatment)**
  - **>70kg: colchicine 0.5mg BID x 3 months**
  - **<70kg: colchicine 0.5mg QD x 3 months**
- Results
  - **It worked**
    - Less incessant or recurrent pericarditis at 18 months
    - Less symptoms at 72 hours
  - Results similar regardless of whether ibuprofen or aspirin was used.

Colchicine for Pericarditis

- Side Effects
  - Gastrointestinal
    - Diarrhea--major limiting side effect
  - Less common--hepatotoxicity
- Mechanism of Action
  - Who knows

A Randomized Trial of Protocol-Based Care for Early Sepsis

- The ProCESS Investigators (Yealy, et al.)
- Who here remembers the original Rivers article in 2001?
  - Did anyone every do all the elements of EGDT?
- Ok, so is this article relevant to my practice?
  - YES
  - Eligibility for site inclusion
    - Measured serum lactates
    - Adhere to Surviving Sepsis Campaign guidelines for non-resuscitation aspects of care
    - No routine protocols for septic shock
    - Do not routinely use continuous ScvO2 catheters
- **Remember Cornerstones of effective treatment regardless of study design:**
  - **Early Antibiotics**
  - **IV crystalloids**

Protocol-Based care for early Sepsis

- Study Design
  - Protocol based EGDT
    - The Rivers protocol
      - Team approach
    - ScvO2 and CVP measurements to guide fluids and vasopressor use
      - Required central line placement
    - Packed RBCs
  - Protocol based standard therapy
    - Team approach
    - Good peripheral lines (Central line only if needed)
    - Fluids and vasoactive agents to reach BP and shock index [HR:BP] goals, and to address fluid status
      - Fluids stopped when felt to be hydrated
    - Blood only for Hgb<7.5
  - Usual care--anything goes

Protocol-Based care for early Sepsis

- Results
  - Volume of fluids (usually crystalloids) during first 6 hours
    - EGDT--2.8L
    - PBSC--3.3L
    - Usual--2.3L
  - Other interventions between 6-72 hours really did not differ
  - Outcomes-Died in the Hospital
    - EGDT--21%
    - PBSC--18.2%
    - Usual--18.9%
  - New renal failure
    - Higher in PBSC
  - **Overall--"There were no significant differences [between protocol based gro**
    mortality, either overall or in a number of pre-specified and post hoc subgroups."
    - **No differences in mortality or morbidity between protocol based resusc**
      usual bedside care based on physician discretion

Clinical Policy: Procedural Sedation and Analgesia in the Emergency Department

- ACEP subcommittee on Procedural Sedation and Analgesia
  - Godwin, et al.
- Definitions
  - **Procedural sedation/analgesia:** "technique of administering sedatives or dissociative agents with or without analgesics to induce an altered state of consciousness that allows the patient to tolerate painful or unpleasant procedures while preserving cardiorespiratory function."
  - **Minimal sedation:** near baseline level of alertness, respond normally to verbal commands
  - **Moderate sedation:** depressed consciousness but patient responds purposefully to verbal commands, +/- tactile stimulation. Able to maintain airway and spontaneous ventilation
  - **Dissociative sedation:** a trance-like cataleptic state with profound analgesia and amnesia. Able to maintain airway and spontaneous ventilation
  - **Deep sedation:** depressed consciousness, cannot be easily aroused but respond purposefully after repeated or painful stimuli, impairment of ventilatory function
  - **General anesthesia:** unresponsive to all stimuli and unable to maintain airway

Procedural Sedation

Q1: In patients undergoing procedural sedation and analgesia in the ED, does procedural fasting demonstrate a reduction in the risk of emesis or aspiration?

- Other professional society guidelines for elective procedure
  - 2 hours clear liquids
  - 4 hours breast milk
  - 6 hours solid food
- **Recommendation: do not delay procedural sedation based on fasting times**
  - **Studies cited did not demonstrate significant difference in rates when c fasting times**

Procedural Sedation

Q2: In patients undergoing procedural sedation and analgesia in the ED, does the routine use of capnography reduce the incidence of adverse respiratory events?

- Recommendation: Addition tool in the toolbox--along with pulse oximetry and clinical assessment to detect hypoventilation
  - Better than using solitary means of detection
- Capnography detects hypoventilation earlier than pulse ox or pulse rate alone

Procedural Sedation

Q3: In patients undergoing procedural sedation and analgesia in the ED, what is the minimum number of personnel necessary to manage complications?

- **Recommendation: A nurse or other qualified individual should be present for continuous monitoring with you**
- More important than number of people is the "quality" of those involved
  - Individuals should be able to
    - Choose appropriate pharmacological agents
    - Monitor patients to detect complications
    - Manage potential complications
- Nothing in literature "specifically identifies" those cases in which 2 physicians are needed to prevent adverse outcomes
- TJC: "...individuals administering moderate or deep sedation and anesthesia are qualified and have credentials to manage and rescue patients..."

Procedural Sedation

Q4: ..., can ketamine, propofol, etomidate, dexmedetomidine, alfentanil and remifentanil be safely administered?

- Recommendation: Yes (see article for various levels of recommendations)
- Propofol: "...multiple studies have demonstrated findings that support and strengthen the use of propofol for both adult and pediatric patients."
- Ketofol
  - Dose: 0.5mg/kg-0.75mg/kg for each agent
  - Proposed advantage: reduction of adverse events associated with either drug alone
- Ketamine
  - Try zofran with it to reduce vomiting
- Etomidate
  - Myoclonus, mild to severe in 20-40% of patients

Conjunctivitis

- Azari, et al.
- Causes of conjunctivitis
  - Infectious
    - Viral
      - Most common--80% of all cases
      - Adenovirus--65-90%
        - 2 common clinical entities
          - Epidemic conjunctivitis
          - Pharyngoconjunctival fever--high fever+pharyngitis+bilateral conjunctivitis
      - Lymphadenopathy--seen in up to 50% of cases (more than in bacterial)
      - **Treatment (see table 2)**
        - Hand hygiene, isolation
        - **Artificial tears,** topical antihistamines, cool compresses

Conjunctivitis

- Causes
  - Infectious
    - Herpes
      - 1.3-4.8% of cases
      - Treatment: topical and oral antivirals
        - AVOID topical steroids
    - Bacterial
      - Most common causes: staph, strep pneumoniae, H. influenzae
        - Can have M. catarrhalis in kids also
      - Hyperacute
        - Severe purulent discharge and decreased vision
        - Think gonorrhea
        - Complication: corneal perforation
      - Chronic
        - >4 weeks
        - Think S. aureus, Moraxella lacunata

Conjunctivitis

- Infectious
  - Bacterial
    - Treatment
      - **Benefits of antibiotics (despite no observed differences in outcomes overall)**
        - **Quicker recovery/decreased duration of symptoms**
        - Decreased transmissibility
        - Early return to school
      - Antibiotic choice
        - Any broad spectrum antibiotic
    - "Special Topics"
      - MRSA--3-64% of staph infections
      - Chlamydia
        - majority are unilateral and have concurrent genital infections
        - Treatment: systemic abx--zithromax or doxycycline
        - Chlamydia Trachomatis subtypes A-C=leading cause of blindness worldwide
          - Treatment: Zithromax 20 mg/kg single dose

Conjunctivitis

- Causes
  - Allergic
    - Most common
    - Itching and redness common
    - **Treatment**
      - Saline solution, **artificial tears**
      - Topical decongestants, antihistamines, mast cell stabilizers, NSAIDs, steroids
        - Long term use of antazoline and naphazoline can cause rebound hyperemia
        - Long term topical steroids can cause cataract and increase eye pressure
  - Chemical, Drug, Toxin-Induced
  - Systemic Disease
    - Mucous membrane pemphigoid, Sjogren Syndrome, Kawasaki disease, Stevens-Johnson syndrome, carotid cavernous fistula

Conjunctivitis

- How to differentiate
  - History/Physical
    - **Often nonspecific**
    - Discharge
      - Purulent-bacterial
      - Watery-viral
    - Bacterial--bilateral mattering of eyelids, lack of itching, no history of conjunctivitis
    - Itching-->allergic
- Labs
  - Reserved for
    - Neonatal
    - Recurrent
    - Recalcitrant
    - Severe purulent discharge
    - Suspicious for gonorrhea or chlamydia

Conjunctivitis

- When to refer to an ophthalmologist
  - Visual loss
  - Moderate-severe pain
  - Severe purulent discharge
  - Corneal involvement
  - Conjunctival scarring
  - Lack of response to therapy
  - Recurrent episodes
  - History of Herpes simplex of the eye
- Final caution
  - Steroid drops should not be used routinely

Physician Orders for Life-Sustaining Treatment and Emergency Medicine: Ethical Considerations, Legal Issues, and Emerging Trends

- Jesus, et al.
- Suggested reading: Critical Decisions in Emergency Medicine. Vol. 26, issue 15. November, 2012
- Estimated only 18% of adult population have an advance directive
- What is POLST?
  - Basically, portable physician written medical orders for patients with progressive, chronic illnesses in regard to life-sustaining medical treatment.
- Advantages
  - Developed to foster communication between physician and patients regarding advance care planning (key is collaborative nature)

POLST

- Initial Approach to any patient with an advance directive
  - **Determine if patient has decision making capacity**
    - **If yes, no advance directive is relevant**
    - **Remember: Capacity is the key**
  - Determine if the document still reflects the patient's wishes
    - Only possible if patient still has decision making capacity
    - Key point: if competent--patient's wishes trump any advance directive
  - Determine if the document is legal and recognized in your State
    - Difficult in the heat of the moment
    - Key point: POLST NOT a valid instrument in the state of Wisconsin.
      - Valid and recognized instruments
        - Declaration to Physicians ("living will")
        - Health Care Power of Attorney
        - Out-of-Hospital DNR

POLST

- Common challenges in the use of any advance directive (including POLST)
  - Insufficient completion of form or not valid due to lack of statutory requirement (ex. signature)
  - Failure to transport the form with the patient
  - Inadequate education regarding authorizing statute and legal protections for following POLST within the patient's respective state
  - Failure to read the contents of the form, and assuming to know its contents and how they apply to patient's end of life care
  - Following the document without confirming contents with patient or surrogate decision maker if applicable
  - Surrogate decision makers who report changes to a patient's advance directive that contradict the actual tangible document
- **In general (according to the article) POLST is the preferred method for communication of end-of-life care.**

Question?

Alright, go take the test!!