Urgency vs. Emergency: Pearls for the Urgent Care Physician

Lindsay Saleski, DO, MBA, FACOEP
ACOFP FULL DISCLOSURE FOR CME ACTIVITIES

Please check where applicable and sign below. Provide additional pages as necessary.

Name of CME Activity: 2017 ACOFP Annual Convention & Scientific Seminars
Dates and Location of CME Activity: March 16 - 19, 2017, Gaylord Palms Resort and Convention Center, Kissimmee, FL, United States

Name of Faculty/Moderator: Lindsay Saleski, DO, MBA, FACOEP

DISCLOSURE OF FINANCIAL RELATIONSHIPS WITHIN 12 MONTHS OF DATE OF THIS FORM

A. Neither I nor any member of my immediate family has a financial relationship or interest with any proprietary entity producing health care goods or services.

B. I have, or an immediate family member has, a financial relationship or interest with a proprietary entity producing health care goods or services. Please check the relationship(s) that applies.

- Research Grants
- Stock/Bond Holdings (excluding mutual funds)
- Speakers' Bureau*
- Employment
- Ownership
- Others, please list:
- Consultant-for-

Please indicate the name(s) of the organization(s) with which you have a financial relationship or interest, and the specific clinical area(s) that correspond to the relationship(s). If more than four relationships, please list on separate piece of paper:

<table>
<thead>
<tr>
<th>Organization With Which Relationship Exists</th>
<th>Clinical Area Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
</tbody>
</table>

*If you checked “Speakers’ Bureau” in item B, please continue:
- Did you participate in company-provided speaker training related to your proposed topic? Yes: No:
- Did you travel to participate in this training? Yes: No:
- Did the company provide you with slides of the presentation in which you were trained as a speaker? Yes: No:
- Did the company pay the travel/lodging/other expenses? Yes: No:
- Did you receive an honorarium or consulting fee for participating in this training? Yes: No:
- Have you received any other type of compensation from the company? Please specify: Yes: No:
- When serving as faculty for ACOFP, will you use stock provided by a proprietary entity for your presentation and/or lecture handout materials? Yes: No:
- Will your topic involve information or data obtained from commercial speaker training? Yes: No:

DISCLOSURE OF UNLABELED/INVESTIGATIONAL USES OF PRODUCTS

A. The content of my material(s)/presentation(s) in this CME activity will not include discussion of unapproved or investigational uses of products or devices.

B. The content of my material(s)/presentation in this CME activity will include discussion of unapproved or investigational uses of products or devices as indicated below:

I have read the ACOFP policy on full disclosure. If I have indicated a financial relationship or interest, I understand that this information will be reviewed to determine whether a conflict of interest may exist, and I may be asked to provide additional information. I understand that failure or refusal to disclose, false disclosure, or inability to resolve conflicts will require the ACOFP to identify a replacement.

Signature: Lindsay Saleski, DO, MBA, FACOEP
Date: 1/10/17

Please email this form to joark@acofp.org as soon as possible
Deadline: Friday, January 20, 2017
Urgency vs. Emergency Pearls for the Urgent Care Physician

LINDSAY TJIATT-SALESKI DO, MBA, FACOEP
FAMILY PRACTICE/EMERGENCY MEDICINE
MIDLANDS EMERGENCY PHYSICIANS
PALMETTO HEALTH TUOMEY

Objectives

- To provide the urgent care physician with evidence based information regarding common outpatient presentations, initial treatment strategies and potential need for more emergent care.
Outline

- Head trauma evaluation – PECARN and Canadian Head CT Rules
- Human Bite
- Evaluation of Hypertension
- Supracondylar Fracture
- Pharyngitis
- Headache
- Scaphoid Fracture
- Allergy versus Anaphylaxis
- Cervical spine trauma
- Pulmonary Embolism Clinical Prediction Rules

Doc... my kid fell off the bed and hit their head!

- Pediatric Emergency Care Applied Research Network – PECARN
  - Federally-funded multi-institutional network for research in pediatric emergency medicine in the United States
  - Pediatric Head Injury Prediction provides factors to identify those at very low risk of clinically important traumatic brain injuries for whom CT might be unnecessary
- Prospective cohort study of 42,412 children
- Children (<18 years) presenting within 24 hours of head trauma, with Glasgow Coma Scale scores of 14 to 15
Pediatric Head Injury/Trauma Algorithm

Children younger than 2 years

- Normal mental status
- No scalp hematoma except frontal
- No loss of consciousness or loss of consciousness for <5 seconds
- Non-severe injury mechanism
- No palpable skull fracture
- Acting normally according to the parents

Children ages 2 years and older

- Normal mental status
- No loss of consciousness
- No vomiting
- Non-severe injury mechanism
- No signs of basilar skull fracture
- No severe headache

Doc...I fell and hit my head!

- Traumatic brain injury (TBI) = brain function impairment that results from external force
  - Mild: GCS \( \rightarrow \) 14-15 (Most Common)
  - Moderate: GCS \( \rightarrow \) 9-13
  - Severe: GCS \( \rightarrow \) 3-8
- History and Physical Exam
  - Pupillary response
  - Altered motor function
  - Age of patient
  - Comorbidities (anticoagulant use?)
- Decision rules attempt to limit unnecessary CT imaging & identify surgical emergencies
Canadian CT Head Injury/Trauma Rule

- Can clear a head injury without imaging
- Apply to patients with:
  - GCS 13-15 and LOC
  - Amnesia to the event
  - Confusion
- Excludes:
  - Age <16
  - Seizure after injury
  - Blood thinner use

Canadian Head CT Rule

- **High Risk Criteria:** Rules out need for neurosurgical intervention
  - GCS <15 at 2 hours post-injury
  - Suspected open or depressed skull fracture
  - Any sign of basilar skull fracture?
    - Hemotympanum, raccoon eyes, Battle’s Sign, CSF oto-/rhinorrhea
  - ≥ 2 episodes of vomiting
  - Age ≥ 65
- **Medium Risk Criteria:** In addition to above, rules out “clinically important” brain injury (positive CT’s that normally require admission)
  - Retrograde amnesia to the event ≥ 30 minutes
  - “Dangerous” mechanism?
    - Pedestrian struck by motor vehicle, occupant ejected from motor vehicle, or fall from > 3 feet or > 5 stairs.
Doc…I punched a door and now my hand hurts!

Human bite: the "Fight Bite"

- Clenched-fist injury: 3rd – 5th metacarpophalangeal joints of the dominant hand
- Complications: cellulitis, septic arthritis, osteomyelitis
  - Injury possible to the extensor tendon/bursa, the superficial/deep fascia, joint capsule
- Polymicrobial infection with normal human oral flora:
  - S. aureus (20-40%)
  - Eikenella corrodens (25%)
  - Streptococcus species
  - Anaerobic: Prevotella species, Fusobacterium nucleatum, Peptostreptococcus
Treatment

- Neurovascular evaluation of the hand & plain radiographs to rule out fracture
- Copious irrigation and debridement
- DO NOT close the wound (exceptions → cosmetic)
- Wound culture
- Antibiotics ISDA and Tintinalli
  - Amoxicillin/clavulanic acid 875/125 mg PO BID
  - Ampicillin-sulbactam 1.5-3 gm Q 6 hours or cefoxitin 2gm Q 8 hours or piperacillin-tazobactam 3.375 grams Q6 hours
  - PCN allergy – clindamycin plus moxifloxacin or TMP-SMX and metronidazole
    - Clindamycin 300 mg tid or 600 mg every 6-8 h plus Cipro 500-750 mg bid 400 mg every 12 h

Doc….My blood pressure is 210/115!

- First thing…Recheck it!
- HTN defined as SBP>140 mm Hg and DBP > 90 mm Hg
- Primary (essential) vs. Secondary
- ED Classification:
  - Asymptomatic elevated BP without hx HTN
  - Uncontrolled HTN
  - Hypertensive emergency
Hypertensive Emergency

- Hypertensive emergency = HTN with evidence of ACUTE end organ dysfunction
  - Heart: Chest pain, Acute MI, Pulmonary edema
  - Brain: Hypertensive encephalopathy/CVA/Hemorrhage
    - Cerebral autoregulation
  - Kidney: Ischemia and Renal impairment
  - Vascular: Aortic Dissection
  - Other: Eclampsia, Retinal Hemorrhage, drug abuse (cocaine, amphetamine)
- Sx: SOB, CP, HA, MS change, vision changes

Hypertensive Emergency Management

- Immediate treatment
  - Reduce MAP 10-20% in 30-60 minutes
  - Addition reduction 5-15% over next 23 hours
  - Reduction beyond this risks end organ ischemia due to relative hypotension
    - Exception: Aortic dissection \(\rightarrow\) acute goal = 100-120mm Hg
- Drugs of choice:
  - IV Meds \(\rightarrow\) Nicardipine, Labetalol, Esmolol
- Disposition \(\rightarrow\) admission
Asymptomatic Hypertension

- 2013 ACEP Clinical Policy on Asymptomatic Hypertension
  - Asymptomatic HTN → PCP f/u, no acute tx, labs may be helpful in select patients
- Should I screen for target-organ injury?
  - Routine lab screening not required
  - If patients have poor follow-up, screening may identify acute kidney injury
- Should I treat the blood pressure?
  - Medical intervention not required
  - If poor follow-up can treat in the ED and rx meds
  - "Hypertensive urgency is common, but the rate of MACE in asymptomatic patients is very low. Visits to the ED were associated with more hospitalizations, but not improved outcomes. Most patients still had uncontrolled hypertension 6 months later."

Asymptomatic Hypertension Management - Outpatient

- JNC 8 BP tx threshold of 150/90 mm Hg in the >60 age group and 140/90 mm Hg in <60 age group, DM and CKD
- JNC7: chemistry, EKG, chest xray, UA, prior to therapy initiation
- Medical treatment:
  - Non-black: thiazide type diuretics, ACEIs, ARBs, CCBs
  - Black: thiazide type diuretics, CCB
  - Chronic kidney disease: ACE or ARB (do they have a PCP)
- AHA/ACA/CDC 2014 Science Advisory:
  - Stage 1: lifestyle modifications and HCTZ
  - Stage 2: lifestyle modifications plus thiazide in combo with ACEI, ARB, CCB
Hypertension Conclusions...

- No evidence to suggest that patients with asymptomatic hypertension should be acutely treated
- Controversy as to whether or not to prescribe antihypertensive
- ED or Urgent care visit may be one of their few contacts with a healthcare professional
- Counsel
- Outpatient f/u within a month
- DC instructions: Return if severe headache, focal weakness or paresthesias, SOB

Supracondylar Fracture

Anterior humeral line

Posterior Fat Pad
Supracondylar Fracture

- Distal Humerus Fracture proximal to condyles
- Mostly in children due to strong collateral ligaments that prevent dislocation (Peak age 5-10 years)
- Mechanism \(\rightarrow\) FOOSH, elbow hyperextension
- X-ray \(\rightarrow\) Posterior fat pad sign, anterior displacement humerus
- Treatment:
  - Gartland I: non-displaced, immobilized in posterior splint and 48 hour ortho f/u
  - Gartland II: Some displaced, intact posterior cortex
  - Gartland III: Completely displaced, no cortical contact
    - Surgical: Closed Reduction with pin fixation
- Complications \(\rightarrow\) loss of carrying angle, nerve injury, compartment syndrome, Volkmann Ischemic contracture

Lateral Elbow: Normal Anterior Humeral Line

Middle 3\textsuperscript{rd} of Capitellum
Abnormal Joint Effusion

Rule out emergencies...
- Is the patient in respiratory distress?
- Drooling, trismus, Increased RR rate, hypoxia?

Differential Diagnosis:
- Peri-tonsillar abscess → unilateral, trismus, deviation of the uvula
- Epiglottitis → sick appearing, leaning forward, drooling
- Ludwigs Angina → recent dental procedures
- Malignancy → smoking, weight loss
- Angioedema → swelling of tongue, lips, oral mucosa
- Thyroiditis → neck swelling

Doc...My Throat Hurts!
Bacterial Vs. Viral Pharyngitis

- **Viral**
  - Vesicular or petechial pattern on the soft palate and tonsils and is associated with rhinorrhea
  - 16% have tonsillar exudate
  - 55% have cervical adenopathy
  - 64% lack cough
  - Diagnostic testing not necessary except: influenza, mononucleosis, & acute retroviral syndrome

- **Bacterial**
  - Group A β-hemolytic Streptococcus: adults (15%), children (30%)
  - Incubation period of 2 to 5 days
  - Sudden onset of sore throat, painful swallowing, chills, and fever
  - Signs and symptoms:
    - Erythema of the tonsils (62%)
    - Exudate (32%)
    - Enlarged, tender cervical lymph nodes (76%)

Diagnostic Testing

- **Centor and Modified Centor Criteria**
  - Original article in 1981: exudates, anterior cervical adenopathy, no cough, fever
  - Modified in 1998: Age qualifier added
    - Age 3-14 years (+1)
    - Age 15-44 years (+0)
    - Age >45 years (-1)

- **Rapid Antigen Detection Testing (RADT) or Throat culture (gold standard)**

- **Guidelines:**
  - ISDA 2012 → 2+, perform RADT
  - AHA/AAP 2009 → 2+, perform RADT
  - CDC/AAFP/ACP → 2, perform RADT, 3+ RADT or treat empirically

- If viral sx (coryza, cough, diarrhea, ulcerative stomatitis) and score 0-1 → no testing/no treating
Treatment

- Decrease: symptom duration, infectivity
- Complications:
  - Suppurative → peritonsillar abscess, OM, sinusitis
  - Non-suppurative complications: acute rheumatic fever, PSGM
- Antibiotics
  - First Line (CDC recommendations):
    - Penicillin VK: Children: 250 mg twice daily or 3 times daily; adolescents and adults: 250 mg 4 times daily or 500 mg twice daily x 10 days
    - Amoxicillin: 50 mg/kg once daily (max = 1000 mg); alternate: 25 mg/kg (max = 500 mg) twice daily x 10 days
    - Penicillin G benzathine: <27 kg: 600,000 U; ≥27 kg: 1,200,000 U IM x 1
  - PCN Allergy (not severe): Cephalexin PO, Cefadroxil PO
  - Severe PCN Allergy: Clindamycin PO, Azithromycin PO, Clarithromycin PO
- Pain Relief
  - NSAIDS, Acetaminophen, throat lozenges

Steroids?

- Cochrane Review from 2012 of 8 trials involving 743 patients showed:
  - “Oral or intramuscular corticosteroids, in addition to antibiotics, increase the likelihood of both resolution and improvement of pain in participants with sore throat. Further trials assessing corticosteroids in the absence of antibiotics and in children are warranted.”
- ISDA 2012 Guidelines → recommends against use for symptoms
- Dosing:
  - Dexamethasone 0.6mg/kg, maximum 10mg
  - Prednisone 60mg PO for 1-2 days

https://www.cdc.gov/groupastrep/diseases-hcp/strep-throat.html
Doc…my head hurts!

- Typical of previous headaches?
- Worst headache of your life?
- How did it onset? (sudden versus gradual)
- Fevers and chills?
- Meningeal signs?
- Characterize the headache?
- Associated symptoms?
- Surrounding events? (trauma, pregnancy, recent infection)
- Hypercoagulable or on anticoagulants?
- Age?

Differential Diagnosis

- Migraine
- Meningitis
- Cluster headache
- Hypertension, hypertensive encephalopathy
- Temporal (giant cell) arteritis
- Tumor
- Caffeine, alcohol or drug withdrawal
- Carbon monoxide poisoning
- Venous sinus thrombosis
- Pseudotumor cerebri
- Post-Lumbar Puncture

- Tension Headache
- Sinusitis
- Cervical arthritis
- Acute angle closure glaucoma
- Dental Abscess
- Otitis Media
- TMJ
- Trigeminal neuralgia
- Depression
- Cerebral ischemia
- Post LP Headache
- Subarachnoid hemorrhage
Subarachnoid Hemorrhage

- Acute bleed into the subarachnoid space
- Non-traumatic → Ruptured berry aneurysm 85%
- Symptoms
  - Sudden onset severe headache
  - Activities that increase ICP
    - intercourse, coughing, weight lifting, defecation
  - Nausea and vomiting
  - Seizures, neck stiffness, photophobia
  - "Sentinel bleed"

Subarachnoid Hemorrhage Diagnosis

- CT without contrast → the longer since onset headache, less sensitive the CT
  - CT within 6 hours...
- Lumbar puncture → If clinical suspicion and negative CT
  - Persistent RBC in tubes 1-4 (usually in thousands) indicates SAH
  - Zero RBCs in the 4th tube = traumatic tap
- CTA/MRI – has not replaced current diagnostic approach
- Treatment
  - Neurosurgery evaluation
  - BP control
  - Antiemetics
Meningitis

- 1.38 out of 100,000 people with fatality rate 14.3%
- Inflammation of membranes covering spinal cord or brain due to bacterial, viral or fungal infection
- Causes
  - Recent otitis, sinusitis, pneumonia or immunocompromised, trauma, neurosurgery, indwelling medical devices
  - Bacterial → S. pneumoniae (MC), N. meningitides, L. monocytogenes
  - Viral → Enteroviruses (MC, summer), Herpes simplex
  - Fungal → Cryptococcus, Toxoplasma
  - Non-infectious → Lupus, Vasculitis, Sarcoidosis etc.

Meningitis Diagnosis

- Symptoms & Exam
  - Fever, headache, neck stiffness, altered MS, photophobia, vomiting, seizures, petechial/purpuric rash, Kernig/Brudzinski
- CT head without contrast
  - Before LP IDSA recommends for patients who meet any criteria:
    - Immunocompromised state
    - History of CNS disease (mass lesion, stroke, or focal infection)
    - New-onset seizure within 1 week of presentation
    - Papilledema
    - Abnormal level of consciousness
    - Focal neurologic deficit
- LP
  - Contraindications → coagulopathy
  - Disposition → Admission and monitoring
Chemoprophylaxis

- Exposure increases risk by 500-800x normal population
- Close contacts:
  - Housemates
  - Secretion exposure (kissing, shared utensils or toothbrush, person who intubated without a facemask)
- Can decrease transmission by 89% in N. menengitidis
- Initiate within 24 hours, but no later than 2 weeks
  - Rifampin 10 mg/kg (max 600mg) Q 12 hours x 4 doses
  - Cipro 500mg PO once
  - Ceftriaxone 250mg IM once

Scaphoid Fracture

Mid-distal scaphoid fracture without displacement
Scaphoid Fracture

- Most common carpal fracture
- Must suspect with “snuff box” tenderness
- Imaging – wrist and scaphoid x-rays
  - Sometimes negative with acute injury “occult”
  - Can CT or MRI
- Treatment of identified fractures and suspected ...
- Thumb spica splint and ortho follow-up
- Complications → Avascular necrosis (AVN)
  - Distal scaphoid supplied by radial artery
  - AVN of proximal fragment

- Fracture of the proximal portion of the scaphoid bone with displacement of the fracture fragments
Doc, I’m itchy and my tongue is swollen…

- What is “just” an Allergic Reaction vs. Anaphylaxis?
- Vital signs?
- Causes: medications, foods, insect stings, environmental allergens, latex, exercise, and other unknown factors
- Differential Diagnosis:
  - MI, arrhythmia, PE, Asthma, COPD
  - Vasovagal response, anxiety, septic shock
  - Scromboid poisoning, monosodium glutamate syndrome
  - Ace inhibitor or hereditary induced angioedema

Definition of Anaphylaxis from NIAID/FAAN

1. “Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both” AND one of the following:
   - Respiratory compromise or reduced BP
2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient
   - Involvement of skin-mucosal tissue, respiratory compromise, hypotension, GI symptoms
3. Reduced BP after exposure to known allergen for that patient
   - 30% decrease in systolic BP in children or adults

Treatment of Anaphylaxis →
Prehospital

- Evaluate VS and ABCs/monitor
- Supplemental O2
- Large bore IV access
- IV fluids, supine position with elevation of legs
- Remove hymoneptera stinger
- B-agonists – 2.5mg via nebulizer
- Steroids

Medications to Initiate

- Epinephrine 0.3 to 0.5mL (0.01mg/kg in children max 0.3 dosage) of epinephrine in a 1:1000 dilution
  - IM, lateral aspect of the thigh
  - Every 5-10 minutes as necessary
- Antihistamines:
  - Diphenhydramine 25-50mg
  - H1 and H2: Ranitidine 50mg (adult) 1mg/kg (children)
- Corticosteroids
  - Prednisone 1mg/kg PO
  - Methylprednisolone 125mg IV
Disposition

- Admission
  - Limited access to phone or emergency services
  - Prior history of anaphylaxis
  - Underlying asthma, renal disease, CHF, B-blocker usage
- Discharge after Observation
- AAAI and AI Joint Task force – observation time based on individual patients
- NIAID & FARE – observation time of 4-6 hours
- Biphasic reaction in 5-20%

Doc…my neck hurts after an MVA

- Low risk trauma patients: Alert, stable, adult trauma patient w/o neurologic deficits
- National Emergency X-Radiography Utilization Study (NEXUS) - 1998
  - Plain cervical spine injury unnecessary if patients lack 5 criteria
  - 99.6% sensitive, 12.9% specific, negative predictive value 99.9%
  - Limitations: Age >60
- Canadian Cervical Spine Rule for Radiography (CCR)
  - 3 assessments asked in sequential order
  - If any answer is positive → imaging
  - 100% sensitive, 42.5% specific
  - Limitations: Complexity compared to NEXUS
NEXUS Criteria

1. Absence of midline cervical tenderness
2. Normal level of alertness
3. No evidence of intoxication
4. Absence of focal neurologic deficit
5. Absence of painful distracting injury

- If any of the above criteria are present, the C-Spine cannot be cleared clinically by these criteria, consider imaging

Canadian C-Spine Rule

Assessments

1. There are no high risk factors that mandate radiography
2. There are low risk factors that allow for a safe assessment of range of motion
3. The patient is able to actively rotate the neck

Definitions

- Age 65 or older
- A dangerous mechanism of injury
- Paresthesias in extremities
- Simple rear-end MVA
- Patient able to sit up
- Ambulatory
- Delayed onset of pain
- Absence of midline TTP
- Can rotate neck 45 degrees bilaterally
Cervical Spine Imaging

- Plain radiography
  - 3 views: Lateral, anterior-posterior, odontoid
  - Clinically acceptable study: all 7 vertebrae and superior border first thoracic
  - Benefits: Cost-effective, bedside, small amount of radiation
  - Disadvantages: C1 & C2, Visualizing spine due to body habitus

- Cervical Spine CT
  - More sensitive and specific than plain X-rays
  - Consider for moderate & high risk patients

Thoracic and Lumbar Spine Imaging

Doc…it hurts when I take a deep breath!

- History
  - Duration?
  - Location?
  - Associated symptoms?
  - Constant or intermittent?
  - Aggravating or alleviating factors?

- Differential:
  - Pneumonia
  - Bronchitis
  - Pulmonary embolism
  - Pneumothorax
  - Pericarditis
  - Rib fracture
  - Esophageal spasm/rupture
  - Atypical CP/MI
Pulmonary Embolism

- 650,000 - 900,000 PEs each year in the US → 200,000 deaths
- **Pulmonary Embolism:**
  - Thrombus forms in the venous system (MC LE DVT) and embolizes to the lung
  - Causes acute obstruction of the pulmonary arterial system and pulmonary ischemia/infarction
  - Large emboli → obstruction of right ventricular outflow and circulatory collapse
- **Risk Factors: THROMBOSIS**
  - Trauma, travel
  - Hypercoagulable, hormone replacement
  - Relatives, recreational drugs
  - Old (age >60)
  - Malignancy
  - Birth control
  - Obesity, obstetrics
  - Surgery, smoking
  - Immobilization
  - Sickness

Pulmonary Embolism

- **Symptoms**
  - Hemoptysis
  - Shortness of breath
  - Pleuritic chest pain
- **Exam:** SOB, tachy, clear lungs, hypoxia, unilateral leg swelling, +/- unstable VS
- **Diagnosis**
  - EKG → ST, S1Q3T3, new RBBB
  - CXR → Hampton Hump, Westermark sign
  - D-dimer
  - CTA/VQ Scan
PERC Rule for Pulmonary Embolism

- Rules out PE if no criteria are present and pre-test probability is ≤15%
- If all are negative, no need for further workup, <2% chance of PE
- ACEP 2011 Clinical Policy: “Level B recommendations. In patients with a low pretest probability for suspected pulmonary embolism, consider using the PERC to exclude the diagnosis based on historical and physical examination data alone.”
- D-dimer:
  - D-dimer if low-risk, but not PERC negative
  - D-dimer → negative and pre-test probability is <15% then no further testing
  - D-dimer → positive then CT-angiography or V/Q

Criteria for PERC Rule

- Clinical low probability (<15% probability of PE based on gestalt assessment)
- Age < 50
- HR < 100
- O2 sat on room air > 94% at near sea level
- No prior hx DVT or PE
- Recent trauma or surgery
- No Hemoptysis
- No estrogen use
- No unilateral leg swelling (asymmetrical calves on visual inspection)
Wells Clinical Prediction Rule for PE

- Risk stratifies patients for PE & provides an estimated pre-test probability
- Based on risk, physician chooses next diagnostic study
  - D-dimer
  - CTA
- 3 tiers: low, moderate, high
- 2 tiers: unlikely, likely \(\Rightarrow\) (supported by ACEP’s 2011 clinical policy on PE)
- Main criticism: has a “subjective” criterion in it “PE #1 diagnosis or equally likely”

Wells Clinical Prediction Rule for PE

**Point Score**
- Suspected DVT \(\Rightarrow\) 3
- Alt dx less likely than PE \(\Rightarrow\) 3 points
- Heart rate > 100 bpm \(\Rightarrow\) 1.5
- Prior venous thrombus \(\Rightarrow\) 1.5
- Immobilization w/in 4 wks \(\Rightarrow\) 1.5
- Active malignancy \(\Rightarrow\) 1
- Hemoptysis \(\Rightarrow\) 1

**Risk Score Interpretation**
- 3-Tier model
  - Low risk (<2 points): 1.3%
  - Mod risk (2-6 points): 16.2%
  - High risk (>6 points): 37.5%
- 2-Tier model
  - PE unlikely (0-4 points): 12.1%
  - PE likely (>4 points): 37.1%
D-dimer

- Clots contain fibrin, degraded by plasmin → yields D-dimer
- Half-life of approximately 8 hours, can be elevated for at least 3 days
  - Sensitivity: 94-98%, Specificity: 50-60%
- Factors known to give false positive D-dimer level
  - Age > 70
  - Pregnancy
  - Malignancy
  - Recent surgical procedure
  - Liver disease
  - RA
  - Trauma
- Potential false negatives: Lipemia, symptoms > 5 days, warfarin, small pulmonary infarction, isolated calf vein thrombosis

Closing Points...
References Pediatric Head Trauma


Canadian Head CT References

References Fight Bite


Hypertension References

Supracondylar Fracture References


References for PERC/PE

Pharyngitis References


Headache References

- Based Approach to Diagnosis and Management of Subarachnoid Hemorrhage in the ED. Emergency Medicine Practice: October 2014, Vol. 16, Number 10
- Perry J. Use of sensitivity of computed tomography performed within six hours of onset of headache for diagnosis of subarachnoid hemorrhage: prospective cohort study. BMJ; 2011;343:d4277
Scaphoid References


Allergic Reaction References

- Campbell, Ronna L. et al. Evaluation of National Institute of Allergy and Infectious Diseases/Food Allergy and Anaphylaxis Network criteria for the diagnosis of anaphylaxis in emergency department patients. Journal of Allergy and Clinical Immunology. Volume 129, Issue 3, 748 - 752
Neck Pain References


- Current Guidelines For Assessment Of Cervical Spine And Vertebral Artery Injuries In Adults Following Blunt Trauma. July 2014. EB Medicine.