<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 – 8:00 am</td>
<td>Breakfast Provided</td>
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</tr>
<tr>
<td>8:00 – 8:30 am</td>
<td>Acute CVA &amp; TIA – Robert Dachs, MD, FAAFP</td>
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<tr>
<td>8:30 – 9:00 am</td>
<td>Adult Pulmonary Disease – Dana King, MD, MS, FAAFP</td>
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<tr>
<td>9:00 – 9:30 am</td>
<td>The Surgical Abdomen – Robert Dachs, MD, FAAFP</td>
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<tr>
<td>9:30 – 10:00 am</td>
<td>Asthma: Pediatric and Adult – Dana King, MD, MS, FAAFP</td>
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<tr>
<td>10:00 – 10:15 am</td>
<td>Q&amp;A</td>
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<td>10:15 – 10:30 am</td>
<td>Break</td>
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<tr>
<td>10:30 – 11:15 am</td>
<td>Selected Issues in Women’s Health – David Weismiller, MD, ScM, FAAFP</td>
<td></td>
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<tr>
<td>11:15 – 11:45 am</td>
<td>Musculoskeletal Medicine – Joseph Garry, MD, FACSM, FAAFP</td>
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<tr>
<td>11:45 am – 12:30 pm</td>
<td>COPD, Lung Cancer, OSA, Sarcoidosis – Dana King, MD, MS, FAAFP</td>
<td></td>
</tr>
<tr>
<td>12:30 – 12:45 pm</td>
<td>Q&amp;A</td>
<td></td>
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<tr>
<td>12:45 – 1:45 pm</td>
<td>Lunch Provided</td>
<td></td>
</tr>
<tr>
<td>1:45 – 2:15 pm</td>
<td>Behavioral Medicine I: Major Depression – Stanley Oakley, MD, DLFAPA</td>
<td></td>
</tr>
<tr>
<td>2:15 – 2:45 pm</td>
<td>Fracture Care in Family Medicine – Joseph Garry, MD, FACSM, FAAFP</td>
<td></td>
</tr>
<tr>
<td>2:45 – 3:15 pm</td>
<td>Behavioral Medicine II: Bipolar &amp; Anxiety Disorders – Stanley Oakley, MD, DLFAPA</td>
<td></td>
</tr>
<tr>
<td>3:15 – 3:30 pm</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>3:30 – 3:45 pm</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:45 – 4:15 pm</td>
<td>Sports Medicine – Joseph Garry, MD, FACSM, FAAFP</td>
<td></td>
</tr>
<tr>
<td>4:15 – 4:45 pm</td>
<td>Behavioral Medicine III: ADHD, Autism, &amp; OCD – Stanley Oakley, MD, DLFAPA</td>
<td></td>
</tr>
<tr>
<td>4:45 – 5:15 pm</td>
<td>Pediatric Orthopedics – Joseph Garry, MD, FACSM, FAAFP</td>
<td></td>
</tr>
<tr>
<td>5:15 – 5:30 pm</td>
<td>Q&amp;A</td>
<td></td>
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</tbody>
</table>
Acute CVA and TIA

Robert Dachs, MD, FAAFP
Clinical Associate Professor
Ellis Hospital Family Medicine Residency Program
Albany Medical College, Albany, New York
Disclosure Statement

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Identify patients with underlying risk factors for stroke.
2. Employ cost-effective measures to decrease stroke in patients at risk.
3. State the 2009 AHA/ASA definition of TIA and describe the recommended evaluation.
4. Propose appropriate treatment options to improve outcomes in patients who suffer a stroke.
In 30 Minutes … The Plan

• CVA risk factors and 1° prevention
• Acute CVA care
• 2° prevention
• TIA – everything has changed
Stroke Pathogenesis

1. Acute stroke events are most often the result of which of the following pathological processes?

A. Acute thrombosis
B. Acute embolic event
C. Acute intracerebral hemorrhage
D. Acute subarachnoid hemorrhage
Stroke Type/Subtypes

Ischemic (80%-85%)
  - Thrombotic (50%)
    - Large-vessel (20-25%)
  - Embolic (30%)
    - Small-vessel (20-25%)

Hemorrhagic (15%-20%)
  - Intracerebral (10%)
  - Subarachnoid (6%)

What is a “cryptogenic stroke”?
Stroke Type/Subtypes

- **Ischemic (80-85%)**
  - Thrombotic (50%)
  - Embolic (30%)

- **Large-vessel**
  - (20-25%)

- **Small-vessel**
  - (20-25%)

But the underlying cause is undetermined

What is a “cryptogenic stroke”?
Stroke Risk Factors

• Modifiable vs. Non-modifiable
  – Age
  – Family Hx
  – Ethnicity
Modifiable Risk Factors and CVA

Accounts for 90% of all strokes

Add in: hyperlipidemia, excessive alcohol use

INTERSTROKE study, Lancet 2016
Stroke Type/Subtypes and Risk Factor: HTN

Ischemic (80-85%)
- Thrombotic (50%)
- Embolic (30%)

Hemorrhagic (15-20%)
- Intracerebral (10%)
- Subarachnoid (6%)

Large-vessel (20-25%)
Small-vessel (20-25%)

If you can control BP, can you reduce CVAs?
Stroke Type/Subtypes and Risk Factor: HTN

Ischemic (80-85%)
- Thrombotic (50%)
- Embolic (30%)

Hemorrhagic (15-20%)
- Intracerebral (10%)
- Subarachnoid (6%)

If you can control BP, can you reduce CVAs? **YES!**
## Supporting Evidence: Control HTN (the Placebo-Controlled Trials)

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Treatment</th>
<th>NNT/years</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRC, 1985</td>
<td>17,354 pts</td>
<td>a) Bendrofluazide or b) Propranolol vs. placebo</td>
<td>90/5.5yrs 192/5.5yrs</td>
</tr>
<tr>
<td>SHEP, 1991</td>
<td>4,736 pts</td>
<td>Chlorthalidone vs placebo</td>
<td>43/4.5yrs</td>
</tr>
<tr>
<td>STOP, 1991</td>
<td>1,627 pts</td>
<td>a) B-Blocker, or b) HCTZ + amiloride, or c) ACE-I vs. placebo</td>
<td>34/4.0yrs</td>
</tr>
<tr>
<td>MRC-2, 1992</td>
<td>4,396 pts</td>
<td>a) HCTZ + amiloride, or b) Atenolol vs placebo</td>
<td>53/5.8yrs 103/5.8yrs</td>
</tr>
</tbody>
</table>
Stroke Type/Subtypes and Risk Factor: DM

Ischemic (80-85%)
- Thrombotic (50%)
- Embolic (30%)

Hemorrhagic (15-20%)
- Intracerebral (10%)
- Subarachnoid (6%)

Large-vessel (20-25%)
Small-vessel (20-25%)
Hemorrhagic (15-20%)
Stroke Type/Subtypes and Risk Factor: Afib

- Ischemic (80-85%)
  - Thrombotic (50%)
  - Embolic (30%)
  - Large-vessel (20-25%)
  - Small-vessel (20-25%)

- Hemorrhagic (15-20%)
  - Intracerebral (10%)
  - *if anticoagulated
  - Subarachnoid (6%)
Atrial Fibrillation and Stroke

- Anticoagulation decreases absolute annual risk from 4.5% -> 1.4%(NNT=30)
- The older the patient with atrial fibrillation, the higher the risk of cardioembolic stroke
- Strokes due to Afib have higher mortality and morbidity.
Afib and CVA risk stratification: CHA\(_2\)DS\(_2\)-VASc

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Score</th>
<th>CHA(_2)DS(_2)-VASc</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: Low-risk (ASA)</td>
<td>1</td>
<td>CHF</td>
</tr>
<tr>
<td>1: Women: (ASA or DOAC &gt; warfarin)</td>
<td>1</td>
<td>HTN</td>
</tr>
<tr>
<td>1: Men: (ASA or DOAC &gt; warfarin)*</td>
<td>2</td>
<td>Age &gt;75 yrs</td>
</tr>
<tr>
<td>2+: High-risk (DOAC &gt; warfarin)*</td>
<td>1</td>
<td>DM</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Prior Stroke or TIA</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Vascular disease</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Age 65-74 yrs</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Female sex</td>
</tr>
</tbody>
</table>

*2019 AHA/ACC guideline changes

Note: DOAC noninferior to warfarin, improved safety profile
Atrial Fibrillation: Anticoagulation
Potential Harms vs. Potential Benefits

- Decreases CVA – approx. 3% per yr
  - *Best calculator: www.afib.ca*

- Rate of ICH 0.1-0.6%
  - Increased with advanced age, HTN

- Major bleeding rates: 1.2% per yr
Which of the following new oral anticoagulants is approved for the management of non-valvular Afib?

1. Dabigatran (Pradaxa) – BID
2. Rivaroxaban (Xarelto) – qd
3. Apixaban (Eliquis) – BID
4. All of the above
Which of the following new oral anticoagulants is approved for the management of *non-valvular* Afib?

1. Dabigatran (Pradaxa) – BID
2. Rivaroxaban (Xarelto) – qd
3. Apixaban (Eliquis) – BID
4. All of the above
If you were asked…
Which of the following new oral anticoagulants is approved for the management of DVT/PE?

1. Dabigatran (Pradaxa)
2. Rivaroxaban (Xarelto)
3. Apixaban (Eliquis)
4. All of the above
If you were asked...

Which of the following new oral anticoagulants is approved for the management of DVT/PE?

1. Dabigatran (Pradaxa)
2. Rivaroxaban (Xarelto)
3. Apixaban (Eliquis)
4. All of the above
Modifiable Risk Factors and CVA

Accounts for 90% of all strokes

Add in: hyperlipidemia, excessive alcohol use

INTERSTROKE study, Lancet 2016
• **Obesity:** recommend weight reduction
  
  *Class I, Level of evidence B*

• **Physical Activity:** recommend it

  *(moderate to vigorous aerobic activity 3-4 x/week)*

  *Class I, Level of evidence B*

• **Hypertension:** annual screen, treat if >140/90

  *Class I, Level of evidence A*

• **Diabetes:** control HTN,

  - start statin if > 1 risk factor

  *Class I, Level of evidence A*

• **Smoking:** Stop

  *Class I, Level of evidence A*
AHA/ASA Guideline for Primary Prevention of Ischemic Stroke (2014)

- **Alcohol**: for those who choose  
  - ≤2 drinks/day for men and ≤1 drink/day for women “might be reasonable”  
  *Class IIb, Level of evidence B*

- **A fib**: anticoagulate if CHA$_2$DS$_2$-Vasc ≥ 2  
  *Class I, Level of evidence A*

- **Lipids**: see 2018 lipid guideline in Cardiology lecture*  
  reproduced in Supplemental slides at end of lecture

*What about **aspirin** for primary prevention of CVA/CVD?
# USPSTF 2016 Recommendations

## Aspirin for 1° Prevention for CV/Stroke

### Recommendation Summary

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults aged 50 to 59 years with a ≥10% 10-year CVD risk</td>
<td>The USPSTF recommends initiating low-dose aspirin use for the primary prevention of cardiovascular disease (CVD) and colorectal cancer (CRC) in adults aged 50 to 59 years who have a 10% or greater 10-year CVD risk, are not at increased risk for bleeding, have a life expectancy of at least 10 years, and are willing to take low-dose aspirin daily for at least 10 years.</td>
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</tr>
<tr>
<td>Adults aged 60 to 69 years with a ≥10% 10-year CVD risk</td>
<td>The decision to initiate low-dose aspirin use for the primary prevention of CVD and CRC in adults aged 60 to 69 years who have a 10% or greater 10-year CVD risk should be an individual one. Persons who are not at increased risk for bleeding, have a life expectancy of at least 10 years, and are willing to take low-dose aspirin daily for at least 10 years are more likely to benefit. Persons who place a higher value on the potential benefits than the potential harms may choose to initiate low-dose aspirin.</td>
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<tr>
<td>Adults younger than 50 years</td>
<td>The current evidence is insufficient to assess the balance of benefits and harms of initiating aspirin use for the primary prevention of CVD and CRC in adults younger than 50 years.</td>
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</tr>
<tr>
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<td>The current evidence is insufficient to assess the balance of benefits and harms of initiating aspirin use for the primary prevention of CVD and CRC in adults aged 70 years or older.</td>
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</table>
Millions on Daily Aspirin for CV Prevention Probably Shouldn't Be: US Study

Megan Brooks
July 25, 2019

"It's Not You, It's Me" - Is it Time to Break Up With Aspirin?

Michael D. Miedema, MD; Thomas Knickelbine, MD, FACC

New Primary Prevention Guidelines Axe Aspirin, Pushing Routine Check-ins, Social Clues Instead

The ACC/AHA released new primary prevention guidelines this week, focusing on lifestyle, diet, and socioeconomic factors to lower the risk of CVD.
The Big 3 randomized trials...

• **ARRIVE trial** (*Lancet*, Sept 22, 2018)
  - 12,546 pts (55yrs+), Ave CV risk score (17% over 10yrs) – followed 5 yrs
  - **No difference** in Composite CV endpt, or mortality
  - 0.5% increase bleeding with ASA

• **ASPREE trial** (*NEJM*, Oct 18, 2018)
  - 19,114 pts (70yrs+), no hx of CV disease – followed for 5 yrs
  - **No difference** in death, dementia or disability, 1% increase in bleeding

• **ASCEND trial** (*NEJM*, Oct 18, 2018)
  - 15,480 pts with DM but no CV disease, Ave age 63, – followed 7.4 yrs
  - 1.1% **decrease in first vascular event**, 0.9% increase in bleeding
4.6. Aspirin Use

Recommendations for Aspirin Use

Referenced studies that support recommendations are summarized in Online Data Supplements 17 and 18.

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIb</td>
<td>A</td>
<td>1. Low-dose aspirin (75-100 mg orally daily) might be considered for the primary prevention of ASCVD among selected adults 40 to 70 years of age who are at higher ASCVD risk but not at increase bleeding risk (S4.6-1—S4.6-8)</td>
</tr>
<tr>
<td>III: Harm</td>
<td>B-R</td>
<td>2. Low-dose aspirin (75-100 mg orally daily) should not be administered on a routine basis for the primary prevention of ASCVD among adults &gt;70 years of age (S4.6-9).</td>
</tr>
<tr>
<td>III: Harm</td>
<td>C-LD</td>
<td>3. Low-dose aspirin (75-100 mg orally daily) should not be administered for the primary prevention of ASCVD among adults of any age who are at increased risk of bleeding (S4.6-10).</td>
</tr>
</tbody>
</table>
## Aspirin for 1° prevention for CV/Stroke

### USPSTF 2016 vs. AHA/ACC 2019

### Recommendation Summary

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</table>
Stroke Risk Factors

• Traditional vs. novel

• Modifiable vs. Non-modifiable
  – Age
  – Family Hx
  – Ethnicity
The Last “Traditional” Risk Factor: What About Family History?

• Documented parental stroke by 65 yrs of age is associated with a 3-fold increase in stroke in offspring.

Based on 8-year follow-up of 3,443 stroke-free Framingham offspring

Risk Factors: Intracerebral Hemorrhage

- Hypertension
- Amyloid angiopathy
- AVMs
- Brain tumors
- Bleeding disorders
- Vasculitis
- CNS infection
- Septic embolism

- High-risk groups
  - Older age
  - Ethnicity
    (African American, Asian)

- Drugs
  - Anticoagulants, antiplatelets
  - Cocaine
  - Amphetamines
  - SSRIs
Subarachnoid Hemorrhage

- 80% due to saccular aneurysms
- Who is at risk?
  - Hypertension
  - Smoking
  - Vasculitis, SLE
  - Genetic
- Peak age 50

Sudden “thunderclap” headache, “worst HA of my life”
Neck pain/nuchal rigidity, vomiting, onset with exertion
In 30 Minutes … The Plan

• CVA risk factors and prevention
• Acute CVA care
• Secondary prevention
• TIA – everything has changed
2. An 82 yo male developed sudden dysarthria and RUE weakness. Onset at 8am. He arrives at the ED at 11 am. IV is inserted, labs sent.

Which of the following imaging studies should be ordered STAT?

A. Non-contrast head CT
B. Contrast head CT
C. CT-A (angiogram) of the head
D. Non-contrast MRI of head
Stroke Type/Subtypes

- Ischemic (80-85%)
  - Thrombotic (50%)
  - Embolic (30%)
  - Large-vessel (20-25%)
  - Small-vessel (20-25%)

- Hemorrhagic (15-20%)
  - Intracerebral (10%)
  - Subarachnoid (6%)
Stroke Type/Subtypes

Ischemic (80-85%)

Hemorrhagic (15-20%)
3. An 82 yo male developed sudden dysarthria and RUE weakness. Onset at 8 a.m. He arrives at the ED at 11 a.m. BP= 200/100 At noon, the labs and head CT are reported as “normal.” Your management will include…?

**A.** Initiate IV thrombolytic (tPA), **initiate** IV nicardipine (for BP control), **initiate** aspirin 325 mg po.

**B.** Initiate IV tPA, **initiate** IV nicardipine, do **NOT** initiate ASA 325 mg

**C.** Do **NOT** start IV tPA, **initiate** IV nicardipine, **initiate** ASA 325 mg

**D.** Do **NOT** start IV tPA, do **NOT** IV nicardipine, **initiate** ASA 325 mg
3. An 82 yo male developed sudden dysarthria and RUE weakness. Onset at 8 a.m. He arrives at the ED at 11 a.m. BP= 200/100 At noon, the labs and head CT are reported as “normal.” Your management will include…?

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B. Initiate IV tPA, initiate IV nicardipine, do NOT initiate ASA 325 mg
C. Do NOT start IV tPA, initiate IV nicardipine, initiate ASA 325 mg
D. Do NOT start IV tPA, do NOT IV nicardipine, initiate ASA 325 mg
The NINDS Trial: tPA within 3 hrs of Onset of Symptoms

**Positive Results**

- 39% of pts with minimal/no disability at 3 months (with tPA) vs.
- 26% of pts with minimal/no disability at 3 months (with placebo)

*Number needed to treat (to experience benefit): 1 in 8*

**Absolute risk reduction (ARR) = 13% (NNT = 8)**

**Number needed to treat (NNT) = 1/ARR**

**Example: 1/.12 = 8.3**
The NINDS Trial

Positive Results

• 39% of pts with minimal/no disability at 3 months (with tPA) vs.
• 26% of pts with minimal/no disability at 3 months (with placebo)

Number needed to treat (to experience benefit): 1 in 8

Negative Results

• 6.4% of pts develop intracranial hemorrhage (with tPA) vs.
• 0.6% of pts develop intracranial hemorrhage (with placebo)

Number needed to harm: 1 in 16
I Heard That tPA Can Now Be Given Up to 4.5 Hrs After Onset of Stroke?

**ECASS 3, NEJM, 9/25/08:** tPA 3 - 4.5 hours

Results: (+) tPA (n=418) Placebo (n=403)

<table>
<thead>
<tr>
<th>mRankin score (0-1)</th>
<th>52.4%</th>
<th>45.2%</th>
</tr>
</thead>
</table>

**Absolute difference = 7%, NNT = 14**

<table>
<thead>
<tr>
<th>Symptomatic ICH</th>
<th>2.4%</th>
<th>0.2%</th>
</tr>
</thead>
</table>

**Absolute difference = 2.2%, NNH = 45**

But only in patients < age 80 yrs!!!
tPA (Thrombolytic for Stroke)

Recommended for ischemic stroke when:

1) CT reveals no evidence of hemorrhage
2) No hx of intracerebral hemorrhage
3) No seizure at onset of stroke
4) BP <185/110

Age <80 yrs
- Onset of symptoms <4.5 hrs
- INR <1.7

Age >80 yrs
- Onset of symptoms <3 hrs
- No anticoagulants
3. An 82 yo male developed sudden dysarthria and RUE weakness. Onset at 8 a.m. He arrives at the ED at 11 a.m. **BP= 200/100** At noon, the labs and head CT are reported as “normal.”

Your management will include…?

A. **Initiate** IV thrombolytic (tPA), **Initiate** IV nicardipine (for BP control), **initiate** Aspirin 325 mg po.

B. **Initiate** IV tPA, **initiate** IV nicardipine, do NOT initiate ASA 325 mg

C. Do **NOT** start IV tPA, **initiate** IV nicardipine, **initiate** ASA 325 mg

D. Do **NOT** start IV tPA, do NOT IV nicardipine, **initiate** ASA 325 mg
Blood Pressure Control:

**CAUTION in Acute (ischemic) CVA!!!**

- Elevated BP is body’s desire to maintain cerebral perfusion

- AHA guidelines: 
  - Treat BP systolic >220
  - Treat BP diastolic >120

- Recommended meds:
  1. Labetalol: 10 mg q 10-20 min
  2. Nicardipine: 5 mg/hr, titrate q 5 min

  *Goal: 15% decrease in BP*

Blood Pressure Control:

A. *For Acute (Hemorrhagic) CVA!!!*

- If systolic BP 150-220 – lower BP sys to <140

  *Class I, Level of Evidence A, AHA guideline, 5/2015*

Blood Pressure Control:

B. *For Subarachnoid Hemorrhage!!!*

- Decrease systolic BP < 160

  *Class IIa, Level of Evidence C, AHA guideline, 2012*
Acute Ischemic Stroke

• What about aspirin?
  – Just say, “YES!”
• What about antipyretics (in fever)?
  – Just say, “YES!”
• What about treating hyperglycemia (>180 mg/dL)?
  – Just say, “YES!”
• Assessment of swallowing before feeding?
  – Just say, “YES!”

Acute Ischemic Stroke

• What about prophylactic antiseizure meds?
  – Just say, “NO!”
• What about heparin?
  – Just say, “NO!”
• What about warfarin?
  – Just say, “NO!”
• What about clopidogrel (Plavix)?
  – Just say, “NO!” (**maybe in TIA/minor stroke**)

Stroke Units

• CVA accounts for 4% of all hospital admissions
• Cochrane Review (2013): 28 trials reviewed ==> decreases odds of death or dependency at 1 year!!!

• Why? It’s not the high-tech stuff!!!!

1. Aspiration prevention, use of oxygen, and use of acetaminophen (for fever) were more commonly used in stroke units than general wards.
2. Less use of urinary catheters were noted in stroke units.
3. Stroke units experienced less stroke progression or recurrence, chest infections, other infections, falls, and pressure sores.
4. A review of death certificates suggests that stroke units do not prevent neurologic deaths, but deaths from stroke complications such as infections.
The post-CVA patient now returns to your care (office/rehab). Note the following recommendations for secondary prevention of ischemic stroke or TIA:

- **Hypertension:** start or resume BP meds “beyond the first several days”  
  - Goal: <140/90 (Class IIA), ? <130 systolic for lacunar CVA (Class IIb)  
  
- **Lipids:** (+) statins  
  - for LDL-C >100mg/dl  
  - for LDL-C <100mg/dl  
  
- **Glucose/DM:** Screen for DM  

AHA/ASA guideline 2014
The post-CVA patient now returns to your care (office/rehab). Note the following recommendations for secondary prevention of ischemic stroke or TIA:

- ASA: 50-325mg qd monotherapy
  - OR
  - ASA 25mg + dipyridamole 200mg
  - OR
  - Clopidogrel 75mg qd monotherapy

  “Selection of an antiplatelet agent should be individualized”

AHA/ASA guideline 2014
4. TIA (Transient Ischemic Attack) is Defined as:

A. Sudden focal neurologic deficit caused by focal brain ischemia of vascular origin that completely resolves in 24 hours.

B. A brief episode of neurologic dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting <1 hour, and without evidence of acute infarction.

C. A brief episode of neurologic dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting <1 hour, and with hyperacute changes on MRI.

D. A transient episode of neurologic dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction.
TIA: The Definition Has Changed!!!!

• **Classic definition:** sudden focal neurologic deficit caused by focal brain ischemia of vascular origin that completely resolves in 24 hours

• **2002 TIA Working Group**
  “A brief episode of neurologic dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than 1 hour, and without evidence of acute infarction”
TIA: The Definition Has Changed!!!!

- Classic definition: sudden focal neurologic deficit caused by focal brain ischemia of vascular origin that completely resolves in 24 hours
- 2002 TIA Working Group
  “A brief episode of neurologic dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than 1 hour, and without evidence of acute infarction”
TIA: Definition
AHA/ASA Statement: June 2009

“A transient episode of neurologic dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction”

Note 1: No time limitation
Note 2: A tissue-based definition (no evidence of acute infarction)
Why No Time Limits?

<table>
<thead>
<tr>
<th>Duration of symptoms: hrs</th>
<th>(+) MRI - DWI (ie. +CVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>33.6%</td>
</tr>
<tr>
<td>1-2</td>
<td>29.5%</td>
</tr>
<tr>
<td>2-3</td>
<td>39.5%</td>
</tr>
<tr>
<td>3-6</td>
<td>30.0%</td>
</tr>
<tr>
<td>6-12</td>
<td>51.1%</td>
</tr>
<tr>
<td>12-18</td>
<td>50.0%</td>
</tr>
<tr>
<td>18-24</td>
<td>49.5%</td>
</tr>
</tbody>
</table>

MRI - DWI image

- Bright white signal
- Associated with cytotoxic edema (i.e., cell death)
- Occurs within minute of stroke

Source: VirtualMedStudent.com
Why is this (the MRI) important?
(in the patient that has returned to baseline)

Patients with minor CVA (+ DWI - MRI) have a worse prognosis than those with true TIA (- DWI - MRI)
Transient Neurologic Changes
and has returned to baseline

MRI

TIA
(-)MRI

CVA
(+ )MRI
Acute Neurovascular Syndrome

- TIA
  - (-)MRI
- CVA
  - (+)MRI

MRI
TIA/Stroke Mimics
(The Differential Diagnosis of TIA/CVA)

- Structural brain lesion (tumor, hemorrhage, AVM, aneurysm)
- Infection (focal abscess, septic emboli)
- Seizure/Todd’s paralysis
- Complicated migraine
- Hypoglycemia
- Syncope from any cause (especially arrhythmia)
- Labyrinthine disorders
- Temporal arteritis
- Multiple sclerosis (flare)
So My Patient Has a Neg (-) MRI
Was It a TIA?

**TIA: Anterior Circulation**
- Hemiparesis
- Unilateral sensory loss
- Visual field deficit
- Gaze preference
- Aphasia
- Left-sided spatial neglect

“negative” or “lost”

**Not Associated With TIA: Nonfocal Symptoms**
- Loss of consciousness**
- Dizziness
- Generalized weakness
- Mental confusion
- Vision: wavy lines, flashing lights (retina)
- Limb shaking or “tingling”
- Incontinence
TIA Management: Risk Assessment

Who is going on to acute CVA? Who is such high-risk they need hospitalization?

The AHA/ASA recommends the ABCD2 score to calculate a patient’s short-term risk of developing a CVA.
ABCD² Score

• **Age:** greater than or equal to 60 (1 pt)
• **Blood pressure:** SBP ≥ 140 or DBP ≥ 90 (1 pt)
• **Clinical Features**
  – Focal weakness (2 pt) or
  – Speech impairment without focal weakness (1 pt)
• **Duration of symptoms**
  – ≥ 60 minutes (2 pt) or
  – ≤ 59 minutes (1 pt)
• **Diabetes** (1 pt)


**Risk of CVA at 2 days**
- 0-3 points = 1% risk
- 4-5 points = 4.1% risk
- 6-7 points = 8.1% risk
What Do You Do With the ABCD² Score?

In 2009, the AHA/ASA Recommended:

“**It is reasonable to hospitalize patients with TIA if they present within 72 hours of the event and any of the following criteria are present:**

- ABCD² score of \( > 3 \)
- ABCD² score of 0-2 and uncertainty that diagnostic workup can be completed within 2 days as an outpatient
- ABCD² score of 0-2 and other evidence that indicates the patient’s event was caused by focal ischemia”

**All Class IIa recommendations, Level of Evidence C**
In patients presenting with **minor stroke**, treatment for 21 days with dual antiplatelet therapy (aspirin and clopidogrel) begun within 24 hours can be beneficial for early secondary stroke prevention for a period of up to 90 days from symptom onset.

*New IIA recommendation (AHA/ASA, 2018)*

**A. Minor CVA**

**B. TIA**

Dual antiplatelet therapy (ASA + clopidogrel) are recommended for 10-21 days in patients with high-risk TIA (ABCD2 ≥ 4)

BMJ clinical practice guideline, published 12/18/18
In patients presenting with minor stroke, treatment for 21 days with dual antiplatelet therapy (aspirin and clopidogrel) begun within 24 hours can be beneficial for early secondary stroke prevention for a period of up to 90 days from symptom onset. *New IIA recommendation (AHA/ASA, 2018)

*CHANCE Study: Patients with minor ischemic stroke or TIA in China

Methods: Double-blind, randomized (within 24 hrs) to:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CVA at 90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA (75-300mg) + placebo</td>
<td>11.7%</td>
</tr>
<tr>
<td>ASA 75mg + Clopidogrel 300mg Day1, then 75mg qd</td>
<td>8.6%</td>
</tr>
</tbody>
</table>

Note: dual therapy for 21 days, then clopidogrel 75mg qd.
In patients presenting with minor stroke, treatment for 21 days with dual antiplatelet therapy (aspirin and clopidogrel) begun within 24 hours can be beneficial for early secondary stroke prevention for a period of up to 90 days from symptom onset.

*New IIA recommendation (AHA/ASA, 2018)*

**POINT** Study: Patients with minor ischemic stroke or TIA

Methods: Double-blind, randomized (within 12 hrs) to:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CVA at 90 days</th>
<th>NNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA (50-325mg)</td>
<td>6.3%</td>
<td></td>
</tr>
<tr>
<td>+ placebo</td>
<td></td>
<td>59</td>
</tr>
<tr>
<td>ASA (50-325mg)</td>
<td>4.6%</td>
<td></td>
</tr>
<tr>
<td>+ Clopidogrel 600mg Day1, then 75mg qd</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: dual therapy for 90 days

*NEJM, 2018*
Summary: 2° Prevention for TIA and CVA

TIA ($\text{ABCD2} \geq 4$) or minor CVA (NIHSS score 3 or less)

- ASA + clopidogrel x 21 days
- Then…ASA qd (monotherapy)

CVA (NIHSS > 3)

- ASA qd (monotherapy)

--------------------- if fails (i.e., recurrence)---------------------

Consider increasing dose or adding second agent

BUT THERE IS NO EVIDENCE TO SUPPORT THIS
What happens when patient with CVA/TIA on ASA has another event?

“for patients who have a noncardioembolic AIS while taking aspirin, increasing the dose of aspirin or switching to an alternative antiplatelet agent for additional benefit in secondary stroke prevention is not well established”.

AHA/ASA guideline update 2018
The TIA Diagnostic Evaluation
Step 1: MRI – done … next ➔
Step 2: Duplex US of carotids

• “Duplex US is recommended to detect carotid stenosis in patients who develop focal neurological symptoms corresponding to the territory supplied by the L or R internal carotid artery”

• “…MRA or CTA is indicated to detect carotid stenosis when US either cannot be obtained or yields equivocal or …nondiagnostic results”

Class I recommendation, Level of Evidence C

AHA/ASA 2011 Guideline on Carotid and Vertebral Disease
Released 1/31/11
Symptomatic Carotid Artery Disease: When Do You Recommend Endarterectomy?

- **Indicated** in symptomatic patients with 70-99% stenosis
- **Consider** in symptomatic patients with 50-70% stenosis

  - 3 trials (NASCET, ECST, VA) benefits of CEA best in:
    - Men > women
    - Age > 75
    - Recent minor stroke (vs TIA)
    - Presence of hemispheric symptoms (not *amaurosis fugax*)
    - Early surgery (within 2 weeks of TIA)

- Note: These studies done prior to era of widespread aggressive medical therapy

  AHA, American Stroke Association, 2006
5. Screening for Carotid artery disease…

in 2007 and 2014, the USPSTF stated:

A. All adults $\geq 65$ years of age should have ultrasound screening for carotid artery disease.

B. Adults $>65$ years of age with diabetes should have ultrasound screening for carotid artery disease.

C. Adults $>65$ years of age with any of the common risk factors for atherosclerosis (DM, HTN, smoking, family history, or hypercholesterolemia) should have ultrasound screening for carotid artery disease.

D. Adults should not be screened for carotid artery disease with ultrasound or other tests.
One last plea...

DO NOT SCREEN for Carotid Artery Disease in ASYMPTOMATIC PATIENTS

USPSTF guideline 2007 and 2014
Carotid Artery Screening… (Asymptomatic Population): D recommendation

• **The bottom line:**
  Prevalence of disease in age >65 = 1%

• 4,348 persons would need screening to prevent 1 CVA in 5 years.

• 8,696 persons would need screening to prevent 1 *disabling* CVA in 5 years.
Carotid Artery Screening …
(Asymptomatic Population): D recommendation

• **Put another way:** (the harms of screening)
  Prevalence of disease in age >65 = 1%

• If you screen 100,000 adults…
  - 940 true positives
  - 7920 false positives*

  - Confirmatory angiography => 1.2% CVA rate
  - **MRA = 90% specificity ==> 792 needless surgeries***
Thank you!
Answers

1. A
2. A
3. D
4. D
5. D
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Supplemental Slides
1) Patients ages 20-75 years and LDL-C ≥190 mg/dl, use high-intensity statin without risk assessment.

2) T2DM and age 40-75 years, use moderate-intensity statin and risk estimate to consider high-intensity statins.
   * Risk-enhancers in diabetics include: ≥10 years for T2DM and 20 years for type 1 DM, ≥30 mcg albumin/mg creatinine, eGFR <60 ml/min/1.73 m², retinopathy, neuropathy, ABI <0.9. In those with multiple ASCVD risk factors, consider high-intensity statin -- with aim of lowering LDL-C by 50% or more.

3) Age >75 years, clinical assessment and risk discussion.
2019 ACC/AHA guideline on primary prevention of CV disease

4) **Age 40-75 years and LDL-C ≥70 mg/dl and <190 mg/dl without diabetes**, 
-- use the risk estimator

**A. Risk 5% to <7.5% (borderline risk).** Risk discussion: if risk-enhancing factors are present, discuss moderate-intensity statin and consider coronary CACs in select cases.

**B. Risk ≥7.5-20% (intermediate risk).** Risk discussion: use moderate-intensity statins and increase to high-intensity with risk enhancers

**C. Risk ≥20% (high risk).** Risk discussion to initiate high-intensity statin to reduce LDL-C by ≥50%.

---

**Option of CACs to risk stratify if there is uncertainty about risk.**

**A.** If CAC = 0, can avoid statins and repeat CAC in the future (5-10 years), *the exceptions being high-risk conditions such as diabetes, family history of premature CHD, and smoking.*

**B.** If CACs 1-100, it is reasonable to initiate moderate-intensity statin for persons ≥55 years.

**C.** If CAC >100 or 75th percentile or higher, use statin at any age.
Physical Activity: Just Do It!

• **Methods:** Women’s Health Study
  - 39,315 women, reported physical activity at baseline, followed 11.9 yrs

• **Results:** compared to sedentary (nonwalkers)
  - Walk > 2 hrs/week ==> lowered CVA risk 30%
  - **… and speed (ie, vigorous) did not matter!!**

What Is the Data Supporting tPA for Stroke?

• 12 randomized trials of thrombolytics vs placebo for acute ischemic CVA
  • 2 were positive
  • 10 were negative or neutral

The NNT.com
The NINDS Trial (1995)

<table>
<thead>
<tr>
<th>Location</th>
<th># of Pts</th>
<th>Time of CVA</th>
<th>Drug and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>624</td>
<td>3 hours</td>
<td>1) tPA 0.9 mg/kg vs. 2) Placebo</td>
</tr>
</tbody>
</table>

RESULTS

A. Mortality: No difference!!!

B. Part 1: At 24-hour neurologic assessment (291 pts)  
No difference!!!

C. Part 2: At 3-month neurologic assessment (333 pts)  
(+) Significant difference***
Heparin (UFH) and Low-Molecular-Weight Heparin (LMWH) for acute CVA?

Just say “NO.”

• AHA/ASA 2003, 2007 recommend “against”
  - IST (Lancet, 1997): 19,435 pts, UFH => no benefit
  - LMH - initial trials promising, subsequent disappoint
  - TOAST trial (JAMA, 1998) LMH ==> no benefit

• Cochrane Review: 24 trials (23,748 pts) ==>  
  - 9 fewer ischemic strokes (per 1,000) with heparin
  - 9 more intracerebral hemorrhages (per 1,000)
What about Aspirin and ischemic stroke?  

Just say “YES”


- 12 trials (43,041 pts)
- 13 pts; alive and independent (per 1,000) with ASA
- 10 more pts: made complete recovery (per 1,000)
- 2 more pts: intracerebral hemorrhage (per 1,000)
Endovascular Treatment: What are the outcomes?

B. Stent retrievers (vs. standard therapy= IV tPA)

<table>
<thead>
<tr>
<th>Trial</th>
<th># of pts</th>
<th>Hrs to treat</th>
<th>mRS 0-2 @ 90 days</th>
<th>NNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR CLEAN</td>
<td>500</td>
<td>6hrs</td>
<td>19.1% vs. 32.6%</td>
<td>8</td>
</tr>
<tr>
<td>ESCAPE trial</td>
<td>316</td>
<td>12hrs</td>
<td>29.3% vs. 53.0%</td>
<td>4</td>
</tr>
<tr>
<td>EXTEND-IA trial</td>
<td>70</td>
<td>6hrs</td>
<td>40.0% vs. 71.4%</td>
<td>3</td>
</tr>
<tr>
<td>SWIFT PRIME</td>
<td>196</td>
<td>6hrs</td>
<td>35.5% vs. 60.2%</td>
<td>4</td>
</tr>
<tr>
<td>REVASCAT</td>
<td>206</td>
<td>8hrs</td>
<td>28.2% vs. 43.7%</td>
<td>7</td>
</tr>
</tbody>
</table>
## Endovascular Treatment: What are the outcomes?

**Stent retrievers + IV tPA (vs. standard therapy= IV tPA)**

<table>
<thead>
<tr>
<th>Study</th>
<th># of pts</th>
<th>Hrs to treat</th>
<th>mRS 0-2 @ 90 days</th>
<th>NNT</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. MR CLEAN</td>
<td>500</td>
<td>6hrs</td>
<td>19.1% vs. 32.6%</td>
<td>8</td>
<td>*90% +tPA</td>
</tr>
<tr>
<td>B. ESCAPE trial</td>
<td>316</td>
<td>12hrs</td>
<td>29.3% vs. 53.0</td>
<td>4</td>
<td>*15% &gt; 6hrs</td>
</tr>
<tr>
<td>C. EXTEND-IA trial</td>
<td>70</td>
<td>6hrs</td>
<td>40.0% vs. 71.4%</td>
<td>3</td>
<td>*CT perfusion</td>
</tr>
<tr>
<td>D. SWIFT PRIME</td>
<td>196</td>
<td>6hrs</td>
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<td></td>
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<td>7</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

1. No mortality benefit
2. Very few pts > age 80
3. All manufacture-supported studies (average age = 67.4)
4. 6 hour limit – too few beyond this
5. CTA required to confirm large-vessel clot
6. Last 4 trials halted early: ?exaggerate results
### Endovascular Treatment: What are the outcomes?

#### C. Stent retrievers + IV tPA (vs. standard therapy = IV tPA)

<table>
<thead>
<tr>
<th></th>
<th># of pts</th>
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<td></td>
</tr>
</tbody>
</table>

Some have suggests to **re-organize system** ➔ to specialized centers

Small % are IV tPA candidates
Even less pts are candidates for this…

Ex: Mr. CLEAN – 500pts/300 years/16 centers
Result: 10pts/site = approx 1/month

What would be the unintended consequences (and costs) redirecting/shipping all?
<table>
<thead>
<tr>
<th>Antithrombotic Treatment</th>
<th>COR</th>
<th>LOE</th>
<th>New, Revised, or Unchanged</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For patients with non-cardioembolic AIS, the use of antiplatelet agents rather than oral anticoagulation is recommended to reduce the risk of recurrent stroke and other cardiovascular events.</td>
<td>I</td>
<td>A</td>
<td>Recommendation worded for clarity from 2014 Secondary Prevention. Class and LOE unchanged. See Table LXXXIII in online Data Supplement 1 for original wording.</td>
</tr>
<tr>
<td>1. For patients who have a non-cardioembolic AIS while taking aspirin or switching to an alternative antiplatelet agent for additional benefit in secondary stroke prevention is not well established.</td>
<td>IIb</td>
<td>B-R</td>
<td>Recommendation revised from 2014 Secondary Prevention.</td>
</tr>
</tbody>
</table>

In patients with a non-cardioembolic ischemic stroke, the therapeutic benefit of aspirin is similar across a wide range of doses, but the hemorrhagic risk increases with higher doses. In patients taking aspirin at the time of the incident stroke, the benefit of switching to an alternative antiplatelet agent or combination therapy is not well established. The SPS3 (Secondary Prevention of Small Subcortical Strokes) RCT found no benefit from adding clopidogrel to aspirin compared with placebo in patients with a recent small vessel, lacunar stroke taking aspirin at the time of their index event. However, the median time from qualifying event to enrollment in the SPS3 trial was >40 days, so results may have underestimated benefit in the early poststroke period.327 A recent meta-analysis of 5 studies, including 3 RCTs and 2 observational registries, of patients with non-cardioembolic stroke taking aspirin at the time of the index event found a decreased risk of major cardiovascular events and recurrent stroke in patients switching to an alternative antiplatelet agent or combination antiplatelet therapy. This analysis included data from aspirin failure subgroups in the CHANCE trial of dual antiplatelet therapy in patients with minor stroke or TIA and the SOCRATES trial of aspirin versus ticagrelor. However, there was significant heterogeneity among the included studies, and results may have been driven from registries susceptible to unmeasured confounders and bias. See tables LXXIV and LXXV in online Data Supplement 1.
The benefit of prophylactic-dose subcutaneous heparin (unfractionated heparin [UFH] or LMWH) in immobile patients with AIS is not well established. ASA/AHA 2018; IIb A
New recommendation.

The most recent and comprehensive meta-analysis of pharmacological interventions for venous thromboembolism prophylaxis in AIS included 1 very large trial (n=14 578) and 4 small trials of UFH, 8 small trials of LMWHs or heparinoids, and 1 trial of a heparinoid. Prophylactic anticoagulants were not associated with any significant effect on mortality or functional status at final follow-up. There were statistically significant reductions in symptomatic pulmonary embolisms (OR, 0.69; 95% CI, 0.49–0.98) and in DVTs, most of which were asymptomatic (OR, 0.21; 95% CI, 0.15–0.29). There were statistically significant increases in symptomatic intracranial hemorrhage (OR, 1.68; 95% CI, 1.11–2.55) and symptomatic extracranial hemorrhages (OR, 1.65; 95% CI, 1.0–2.75). There may be a subgroup of patients in whom the benefits of reducing the risk of venous thromboembolism are high enough to offset the increased risks of intracranial and extracranial bleeding; however, no prediction tool to identify such a subgroup has been derived.
AHA/ASA 2018 Acute Stroke recommendations

<table>
<thead>
<tr>
<th>4.9 Depression Screening</th>
<th>COR</th>
<th>LOE</th>
<th>New, Revised, or Unchanged</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Administration of a structured depression inventory is recommended to routinely screen for poststroke depression, but the optimal timing of screening is uncertain.</strong></td>
<td>I</td>
<td>B-NR</td>
<td>Recommendation revised from 2016 Rehab Guidelines.</td>
</tr>
</tbody>
</table>

A meta-analysis of studies assessing poststroke depression screening tools (24 studies, n=2907) found several inventories with high sensitivity for detecting poststroke depression. However, further research is needed to determine the optimal screening method and timing to diagnose and treat poststroke depression.

| **2. Patients diagnosed with poststroke depression should be treated with antidepressants in the absence of contraindications and closely monitored to verify effectiveness.** | I   | B-R| Recommendation and Class unchanged from 2016 Rehab Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System. |

See table IV in online Data Supplement 1.
Adult Pulmonary Infections

Dana King, MD, MS, FAAFP
Professor & Chair, Family Medicine
West Virginia University School of Medicine
Morgantown, West Virginia
Disclosure Statement

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. List the diagnostic and risk factor approaches to common types of pneumonia.
2. Discuss the IDSA/ATS guidelines for management of adults with pneumonia.
3. Explain the use and CDC/ACIP recs for pneumonia/influenza vaccines.
4. Manage a patient with positive test for TB.
Community Acquired Pneumonia (CAP)

- Leading cause of infection-related death
- 20% require hospitalization
  - 60% of these are > 65 years old
- Mortality rate is <5% for those treated as outpatients
  - Up to 25% for those requiring hospitalization
  - Up to 50% when ICU is needed
CAP Etiology

• 3 routes for bacteria to enter the lungs:
  - Inhalation
  - Aspiration
  - Hematogenous spread
CAP Etiology

Most common pathogens

• *Streptococcus pneumoniae* 20-60%
• *Mycoplasma pneumoniae* 1-40%
• *Chlamydia pneumoniae* 4-10%
• *Haemophilus influenzae* 3-10%
• *Legionella* 2-10%
• *Moraxella catarrhalis* 1-5 %
• Viruses
CAP Etiology

Less common pathogens
- *Staphylococcus*
- Gram negative bacilli (3-10%)
- Pneumocystis
- *Mycobacterium tuberculosis*

Other causes
- Aspiration (6-10%)
CAP Diagnosis

• CXR confirms the clinical diagnosis
  • Lobar consolidation, effusion, bilateral interstitial infiltrates
  • May help exclude illnesses that mimic CAP
• Routinely Repeat CXR—No, if symptoms resolved in 7 days or less
Chest Radiography in CAP

• Typical (RML Infiltrate)

• Atypical
Diagnosis of CAP

• Ultrasound (SOR: C)
  - Comparable to radiography in recent study
  - Can be done at bedside
  - No ionizing radiation
  - Can detect other disorders
    • Pleural effusion
    • Pneumothorax
    • Pulmonary Embolism
    • Pulmonary Contusion

• Computed Tomography
  - Interstitial lung disease
  - Cavitary lesions
  - Sarcoidosis
  - Masses/Malignancy
1. A 22 year old male presents to the ED with a 3 day history of fever (101.5°F) and a productive cough. His parents smoke in the home. Which of the following are recommended for initial treatment?

A. Azithromycin 250 mg daily
B. Amoxicillin 1 g three times daily
C. Clarithromycin 250 mg twice daily
D. Doxycycline 100 mg daily
New CAP guidelines 2019

• Key questions

• Am J Resp and Critical Care Med, Oct 2019
  • Question 1: In Adults with CAP, Should Gram Stain and Culture of Lower Respiratory Secretions Be Obtained at the Time of Diagnosis?
    • Yes, if severe CAP, MRSA or *P. aeruginosa* suspected or previous, hospital 90 days, intubated

• Question 2: In Adults with CAP, Should Blood Cultures Be Obtained at the Time of Diagnosis?
  • Yes, if hospitalized for CAP, being treated for MRSA or *P. aeruginosa* hospital 90 days
Testing

• **Question 3:** In Adults with CAP, Should *Legionella* and Pneumococcal Urinary Antigen Testing Be Performed at the Time of Diagnosis?
  • No, unless severe CAP or local outbreak

• **Question 4:** In Adults with CAP, Should a Respiratory Sample Be Tested for Influenza Virus at the Time of Diagnosis?
  • No, unless flu suspected or prevalent in local community
Procalcitonin, admit patient?

- **Question 5:** In Adults with CAP, Should Serum Procalcitonin plus Clinical Judgment versus Clinical Judgment Alone Be Used to Withhold Initiation of Antibiotic Treatment?
  - No Procalcitonin testing recommended, do NOT withhold antibiotics based on procalcitonin
  - (sensitivity varies 38-91%)

- **Question 6:** Should a Clinical Prediction Rule for Prognosis plus Clinical Judgment versus Clinical Judgment Alone Be Used to Determine Inpatient versus Outpatient Treatment Location for Adults with CAP?
  - Use Pneumonia Severity Index (not CURB-65) plus clinical judgement
ICU level

- Question 7: How to Determine Level of Inpatient Treatment Intensity (ICU, Step-Down, or Telemetry Unit) for CAP?
- Decide based on hypotension and need for mechanical ventilation, plus severity scores
Which Antibiotics Are Recommended for Empiric Treatment of CAP in Adults?

• For healthy outpatient adults without comorbidities or risk factors for antibiotic resistant pathogens:
  – • Amoxicillin 1 g three times daily (strong recommendation, moderate quality of evidence), or
  – • Doxycycline 100 mg twice daily (conditional recommendation, low quality of evidence), or
  – • Macrolide (azithromycin 500 mg then 250 mg daily or clarithromycin 500 mg twice daily or clarithromycin extended release 1,000 mg daily)
  – Only in areas with pneumococcal resistance to macrolides <25% (conditional recommendation, moderate quality of evidence).
For outpatient adults with comorbidities

- Combination therapy:
  - ○ Amoxicillin/clavulanate or a cephalosporin (cefpodoxime 200 mg twice daily or cefuroxime 500 mg twice daily);
  - AND
  - ○ Macrolide (azithromycin or clarithromycin (strong), or doxycycline 100 mg twice daily (weak evidence); OR
- • Monotherapy:
  - ○ Respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily, or gemifloxacin 320 mg daily)
## Inpatient–Non-Severe--CAP in Adults without Risk Factors for MRSA and *P. aeruginosa*

<table>
<thead>
<tr>
<th>Severity</th>
<th>Standard Regimen</th>
<th>Prior Respiratory Isolation of MRSA</th>
<th>Prior Resp. <em>Pseudomonas aeruginosa</em></th>
<th>Recent Hospitalization and Parenteral Antibiotics Risk Factors for MRSA</th>
<th>Recent Hospitalization and Parenteral Antibiotics Risk for <em>P. aeruginosa</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonsevere inpatient pneumonia*</td>
<td>B lactam + macrolide or respiratory fluroquinolone</td>
<td>Add MRSA coverage§ and obtain cultures/nasal PCR to allow deescalation</td>
<td>Add coverage for <em>P. aeruginosa</em>¶ and obtain cultures to allow deescalation</td>
<td>Obtain nasal PCR or cultures but withhold MRSA coverage unless test results are positive.</td>
<td>Obtain cultures but initiate coverage for <em>P. aeruginosa</em> only if culture results are positive</td>
</tr>
</tbody>
</table>
## Severe Inpatient Pneumonia

<table>
<thead>
<tr>
<th>Severity</th>
<th>Standard Regimen</th>
<th>Prior Respiratory Isolation of MRSA</th>
<th>Prior Pseudomonas aeruginosa</th>
<th>Recent Hospitalization and Parenteral Antibiotics Risk Factors for MRSA</th>
<th>Recent Hospitalization and Parenteral Antibiotics Risk for P. aeruginosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe inpatient pneumonia*</td>
<td>β-Lactam + macrolide(^+) or β-lactam + fluroquinolone(^+)</td>
<td>Add MRSA coverage(^6) and obtain cultures/nasal PCR to allow deescalation or need for continued therapy</td>
<td>Add coverage for P. aeruginosa(^11) and obtain cultures to allow deescalation or need for continued therapy</td>
<td>Add MRSA coverage(^6) and obtain nasal PCR and cultures to allow deescalation or confirmation of need for continued therapy</td>
<td>Add coverage for P. aeruginosa(^11) and obtain cultures to allow deescalation or confirmation of need for continued therapy</td>
</tr>
</tbody>
</table>
• Question 10: In the Inpatient Setting, Should Patients with Suspected Aspiration Pneumonia Receive Additional Anaerobic Coverage beyond Standard Empiric Treatment for CAP?
  - DO NOT routinely add anaerobic coverage for suspected aspiration pneumonia unless lung abscess or empyema is suspected

• Question 11: In the Inpatient Setting, Should Adults with CAP and Risk Factors for MRSA or *P. aeruginosa* Be Treated with Extended-Spectrum Antibiotic Therapy Instead of Standard CAP Regimens?
  - No more HCAP-- only cover empirically for MRSA or *P. aeruginosa* in adults with CAP if locally validated risk factors (prior resp. or previous hospitalization in 90 days with abx) for either pathogen are present
• Question 15: In Outpatient and Inpatient Adults with CAP Who Are Improving, What Is the Appropriate Duration of Antibiotic Treatment?
  • Unknown--At least 5 days and clinically stable
• Question 16: In Adults with CAP Who Are Improving, Should Follow-up Chest Imaging Be Obtained?
  • No repeat CXR if pneumonia clinically resolved in 7 days
• Question 12: In the Inpatient Setting, Should Adults with CAP Be Treated with Corticosteroids?
  • No, except refractory septic shock

• Question 13: In Adults with CAP Who Test Positive for Influenza, Should the Treatment Regimen Include Antiviral Therapy?
  • Yes

• Question 14: In Adults with CAP Who Test Positive for Influenza, Should the Treatment Regimen Include Antibacterial Therapy?
  • Yes
<table>
<thead>
<tr>
<th>Recommendation</th>
<th>2007 ATS/IDSA Guideline</th>
<th>2019 ATS/IDSA Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sputum culture</td>
<td>in patients with severe disease</td>
<td>in patients with severe disease as well as in all inpatients empirically treated for MRSA or <em>Pseudomonas aeruginosa</em></td>
</tr>
<tr>
<td>Blood culture</td>
<td>in patients with severe disease</td>
<td>in patients with severe disease and all inpatients empirically treated for MRSA or <em>P. aeruginosa</em></td>
</tr>
<tr>
<td>Macrolide monotherapy</td>
<td>Strong recommendation for outpatients</td>
<td>Based on resistance levels</td>
</tr>
<tr>
<td>Use of procalcitonin</td>
<td>Not covered</td>
<td><strong>Not recommended</strong></td>
</tr>
<tr>
<td>Use of corticosteroids</td>
<td>Not covered</td>
<td><strong>Not recommended</strong> -- consider in septic shock</td>
</tr>
<tr>
<td>Use of healthcare-associated pneumonia category</td>
<td>Introduced in the 2005 ATS/IDSA hospital-acquired and ventilator-associated pneumonia guidelines</td>
<td>Abandoning this categorization. Emphasis on local epidemiology and risk for MRSA or <em>P. aeruginosa</em> coverage.</td>
</tr>
<tr>
<td>Standard empiric therapy for severe CAP</td>
<td>β-Lactam/macrolide and β-lactam/fluoroquinolone combinations</td>
<td>Stronger evidence in favor of β-lactam/macrolide combination</td>
</tr>
<tr>
<td>Routine use of follow-up chest x-ray</td>
<td>Not addressed</td>
<td>Recommended <strong>not to obtain.</strong></td>
</tr>
</tbody>
</table>

ATS = American Thoracic Society; IDSA = Infectious Diseases Society of America
CAP Modifying Factors

Pediatric patients
• Age 4 mo to 4 yrs
  - Most common pathogen
    • RSV
  - Peak incidence
    • 2-7 mo of age

• Age 5-18 yrs
  - Most common pathogen
    • *Mycoplasma pneumoniae*
  - Treat with a macrolide
MRSA Risk Factors

• Hemodialysis
• Previous MRSA
• Hospitalization or Antibiotics in last 90 days
• IV drugs, prisoners, recent influenza, empyema
Etiology Modifying Factors

- **Alcoholism**: anaerobes, *Klebsiella pneumoniae*
- **Aspiration**: anaerobes
- **Bioterrorism**: *Bacillus anthracis* (anthrax), *Francisella tularensis* (tularemia), *Yersinia pestis* (plague)
- **COPD**: *H influenzae*, *M catarrhalis*
- **Exposure to farm animals or droppings**: *Histoplasma*, *Blastomyces*, *Coccidioides*
- **Hotel or cruise ship** travel in past two weeks: *Legionella*
- **Influenza** infection in past few weeks: *S. aureus*
- **Recent travel outside US**: Avian influenza
CAP Diagnosis

- CXR confirms the clinical diagnosis
  - Lobar consolidation, effusion, bilateral interstitial infiltrates
  - May help exclude illnesses that mimic CAP
- **Routine Repeat CXR– No**, if most symptoms resolved in 7 days or less
2. A 68 year old female is admitted to the ICU with severe CAP. Her urine should be tested for which one of the following antigens?

A. Chlamydia  
B. Mycoplasma  
C. Legionella  
D. Pseudomonas
CAP Work-Up (SOR: C)

• Testing for specific pathogens with cultures or urine antigens unnecessary for most outpatients
• Overall rate of pathogen detection low at 30-40%
• Not recommended routinely unless results would alter standard empiric therapy
• Consider for inpatients, and for certain patient-specific risk factors:
Biomarkers for CAP?

- Procalcitonin –**not routinely recommended** because you cannot opt out of empiric therapy on basis of the test
- May be useful in septic shock
- More research needed to see if useful
CAP: Inpatient or Outpatient?

• Costs of hospitalization high—admit?
  – CURB-65 (or CRB-65) score (severity of illness)—no longer preferred
  – Pneumonia Severity Index (prognostic model)—recommended in 2019 guidelines
# CURB-65
Severity Scores for CAP

<table>
<thead>
<tr>
<th>Clinical Factors</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>1</td>
</tr>
<tr>
<td>Uremia (BUN &gt;19mg/dl or 7mmol/L)</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory Rate &gt;30/min</td>
<td>1</td>
</tr>
<tr>
<td>Blood Pressure: SBP &lt;90 or DBP &lt;60</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥65</td>
<td>1</td>
</tr>
</tbody>
</table>
Pneumonia Severity Index (PSI)

• Age (years), gender (10), NH resident (10)
• Co-morbidities- cancer (30), liver disease (20), heart failure (10), stroke (10), CKD (10)
• Exam—altered mental status (20), Resp. >30 (20), BP <90 (20), temp <35 or >40 (15), pulse >125 (10).
Pneumonia Severity Index (PSI)

• Arterial pH < 7.35 (30)
• BUN > 30 (20), Na < 130 (20), gluc > 250 (10), Hematocrit < 30 (10)
• $\text{PaO}_2$ < 60 (10), pleural effusion (10)
• Total up the points for severity
PSI points

• I – score 0
• II - <70
• III- 71-90
• IV- 91-130= 9.3% mortality
• V- >130= 27 % mortality
3. 55 year old male presents with a 4 day history of productive cough, fever at home and a CXR showing a RLL infiltrate. He has DM and HTN. The appropriate choice for outpatient CAP treatment is?

A. Levofloxacin
B. Azithromycin
C. Amoxicillin
D. Augmentin
For outpatient adults with comorbidities

- Combination therapy:
  - ○ **Amoxicillin/clavulanate** or a **cephalosporin** (cefpodoxime 200 mg twice daily or cefuroxime 500 mg twice daily);
  - **AND**
  - ○ **Macrolide** (azithromycin or clarithromycin (strong), or doxycycline 100 mg twice daily (weak evidence)); **OR**
- Monotherapy:
  - ○ **Respiratory fluoroquinolone** (levofloxacin 750 mg daily, moxifloxacin 400 mg daily, or gemifloxacin 320 mg daily)
CAP Prevention: Pneumococcal Vaccination

- **S. pneumoniae consequences:**
  - 400,000 possibly preventable deaths per year due to pneumonia, bacteremia, and meningitis

- **PCV-13**—Pneumococcal Conjugate vaccine (Prevnar 13)
  - T-cell response

- **PPSV23**—Pneumococcal Polysaccharide vaccine (Pneumovax)
  - 23 serotypes that cause 80% of invasive pneumococcal disease
  - B-cell response
  - 96% drop in pneumonia caused by susceptible strains
4. You see an otherwise healthy 43 year old with new-onset Type 2 DM. When discussing vaccination for prevention of pneumonia, which of the following statements is most correct?

A. PCV13 now then PPSV23 in 12 months
B. PCV13 now and PPSV23 at age 65
C. PPSV23 now and again after age 65
D. PPSV23 at age 65
Conjugate Vaccine (PCV13)

- Primary series at 2, 4, 6 months, booster 12-15 months
- Adults ≥ 19 with CSF leaks, cochlear implants, functional asplenia, sickle cell, or immunosuppression need 1 dose
- **All adults ≥ 65 ---Change--**PCV13 for high risk elderly only
Polysaccharide Vaccine (PPSV) 23

- Single dose at age ≥ 65 years
- Indications for **single dose** for those 2-64 years of age:
  - Chronic **cardiac** disease (especially cyanotic congenital and failure)
  - Cirrhosis, chronic liver disease, alcoholism
  - Cochlear implants, cerebrospinal fluid leak
  - **Diabetes**
  - Chronic **lung** disease, asthma, **cigarette smoker**
  - Residents of chronic care institutions
- Indications for **2 doses** 5 years apart ages 2-64
  - Chronic renal disease (renal failure and nephrotic syndrome)
  - Asplenia, sickle cell
  - Immunocompromised (HIV, congenital, leukemia/lymphoma, multiple myeloma, drugs or radiation, organ transplant)
How to Give Both Vaccines

• Age 19-64 at high risk – give PCV13 first followed by PPSV23 at least 8 weeks later

• Age ≥ 65 consider PCV13 first, followed by PPSV23 1 year later
  - If your patient has received PPSV23 first, the dose of PCV13 should be given at least 1 year later
  - If given PPSV23 prior to age 65, give next dose at least 5 years later
<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Medical Condition</th>
<th>PCV13</th>
<th>PPSV23</th>
<th>2nd PPSV23 After 5 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immune Competent</td>
<td>Chr Dz (heart, lung, liver)</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alcoholism</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cigarette smoking</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSF leaks</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cochlear implants</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Functional or Anatomic Asplenia</td>
<td>Sickle cell; congenital or acquired asplenia</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Immune Compromised</td>
<td>HIV, cancer, CRF, organ transplant, immunosuppression</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
Who Needs TB Testing?

• TB tests are generally not needed for people with a low risk of infection.
• Testing indicated for higher-risk populations including:
  • Contact with a patient with active TB
  • HIV infection or immune suppression
  • People from a country where TB disease is common (most countries in Latin America, the Caribbean, Africa, Asia, Eastern Europe, and Russia)
  • Occupational or social situations at risk (homeless shelters, prison or jails, or some nursing homes)
  • Use of illicit substances
  • Those with symptoms (unexplained weight loss, fevers, night sweats, cough for at least 2 weeks, hemoptysis)
Testing for 
*M. Tuberculosis* Infection

- **Mantoux tuberculin skin test (TST)**
  - Injection of PPD into skin that produces delayed-type hypersensitivity reaction in persons with *M. tuberculosis* infection

- **Interferon-Gamma Release Assays (IGRAs)**
  - QuantiFERON® Gold (QFT-G), T-SPOT
  - Blood test that measures and compares amount of interferon-gamma (IFN-γ) released by blood cells in response to antigens
IGRAs

- CDC recommends that IGRAs can be used in all circumstances in which the TST is currently used, including contact investigations.
- A positive test should prompt the same evaluation and management as a positive TST.
- **NO** reason to follow a (+) IGRA with a TST.
IGRAs

- **Pros**
  - Requires a single visit
  - Results available within 24 hours
  - No reader bias
  - No booster phenomenon
  - Not affected by BCG (bacille Calmette-Guérin) vaccination
  - *Preferred* method for:
    - Poor compliance with TST
    - Prior BCG vaccine

- **Cons**
  - Must be processed within 8-16 hours (30 hours with T-Spot)
  - Errors in collection or transportation
  - Limited data on the use of IGRAs:
    - Children younger than 5 yrs; persons recently exposed to *M. tuberculosis*
    - Immunocompromised persons (TST preferred in those settings)
  - Expensive
Reading a TST

• Measure reaction in 48 to 72 hours
• Measure **induration**, not erythema
• Record reaction **in millimeters**, not “negative” or “positive”
• Ensure trained health care professional measures and interprets the TST
  - Positive TST reactions can be measured accurately for up to 7 days
  - Negative reactions can be read accurately for only 72 hours
TB Skin Testing

> 5 mm is considered positive if:

- HIV sero-positive
- Recent TB direct contact
- CXR shows prior inactive TB
- Immunosuppressed patients
  - Prednisone > 15 mg/day
  - TNF-a antagonists
  - Organ transplant recipients
TB Skin Testing

> 10 mm is considered positive if:

- Diabetic
- Renal failure
- Cancer
- Recent immigrant (< 5 yrs) from high-risk country
- High-prevalence area
- Long-term care facility Resident or employee
- Inmate
- IV drug user
- Children < 4 yrs of age
- Mycobacteriology lab personnel
TB Skin Testing

> 15 mm is considered positive if:

- Any person with no known risk factors
  - Even if prior BCG vaccination
Work-Up of Positive TST or IGRA

- Check CXR for active disease
  - If CXR Negative (Latent tuberculosis, or LTBI)
    - Once-weekly isoniazid and rifapentine for 12 weeks now recommended over isoniazid for 9 months (per CDC)
      - Self-administered therapy (SAT) now approved in addition to directly observed therapy (DOT)
      - Safe from age 2, and in HIV or AIDS
      - Improved compliance
      - Reduced hepatotoxicity
5. A 52 year old immigrant from Cambodia presents with a 1-month history of cough, night sweats, and weight loss. His PPD is positive at 14 mm, and CXR reveals a LUL cavitary lesion. Induced sputum smear shows acid-fast bacilli. Which one of the following is the most appropriate therapy while awaiting formal cultures?

A. Isoniazid (INH) monotherapy
B. INH and ethambutol
C. INH, ethambutol, and pyrazinamide
D. INH, ethambutol, rifampin, and pyrazinamide
Work-Up of Positive TST or IGRA

• If CXR positive (Active tuberculosis)
  • **Aggressive Combination therapy** indicated to decrease mortality, transmission, and resistance
  • **Four-drug treatment** initially:
    - Isoniazid (INH)
    - Rifampin (RIF)
    - Ethambutol (EMB)
    - Pyrazinamide (PZA)
  • Treatment regimen modified once culture results received
Post-Treatment Follow-Up

• DO NOT RE-TEST
• Patient should receive documentation of
  - TST or IGRA results, Radiograph results, Dosage and duration of medication
• Present this document any time future testing is requested
• Re-educate pts about signs and symptoms of TB
• Regardless of whether Rx for LTBI was completed, serial or repeat CXRs are not indicated unless signs or symptoms of TB develop
Viral Lung Infections (Influenza)

- **Abrupt** onset of respiratory/constitutional symptoms (cough, fever, myalgia, headache, malaise, sore throat, and rhinitis)
- Aerosol spread in winter, incubation ~2 days, lasting 3-7 days
- Rapid tests available, but false-negative rate is high
- Antiviral meds should be started ASAP (within 48 hours)
Antivirals for Influenza

- **Oseltamivir** (Tamiflu) preferred *(SOR: A)*
  - Adults: 75 mg po BID x 5 days (QD x 7 days for *prophylaxis*)
  - Childhood dose with oral suspension is weight dependent
- **Zanamivir** (Relenza) except in asthma, COPD *(SOR: A)*
  - Adults and children ≥7: 2 inhalations BID x 5 d (QD x 7d for *prophylaxis*)
- **Peramivir** (Rapivab)
  - Adults: 600 mg IV infusion once
- **NEW--Xoflusa** –
  - Single oral dose of 40 mg (40-80kg) or 80 mg (over 80kg)

*Chemoprophylaxis considered for recent exposure in high-risk patients and recommended for outbreaks in an institutional setting*
6. A 40 year old male respiratory therapist presents for a health examination prior to hospital employment. His history reveals that as a child he lived on a farm in Ohio, and his examination is unremarkable, but a CXR shows multiple bilateral BB-sized nodules in a miliary pattern. No other findings noted, and PPD is negative. These findings are most likely a result of?

A. Histoplasmosis  
B. Coccidioidomycosis  
C. Cryptococcosis  
D. Tuberculosis
Fungal Lung Infections

• Rare in immune competent
• Infection occurs after inhalation of spores (bird, bat droppings in soil
• Opportunistic (more likely in immunocompromised)
  • Aspergillosis
  • Candidiasis
• Endemic (farm workers, etc)
  • Mississippi/Ohio Valley: Histoplasmosis and Blastomycosis
  • Southwest: Coccidiodomycosis
• Presentation
  • Often asymptomatic
  • May have fever, cough
  • Incidental findings (Multiple pulmonary nodules on CXR/lung CT)
• Treatment usually not necessary for endemic mycoses unless immunocompromised or symptomatic
References

- Infectious Diseases Society of America/American Thoracic Society Consensus Guidelines
- Pneumonia vaccine recommendations:
  - [https://www.cdc.gov/vaccines/vpd/pneumo/hcp/recommendations.html](https://www.cdc.gov/vaccines/vpd/pneumo/hcp/recommendations.html)
Answers

1. B
2. C
3. A
4. C
5. D
6. A
The Surgical Abdomen

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Disclosure Statement

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All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Recognize the signs and symptoms of intra-abdominal conditions requiring surgical intervention.
2. Perform specialized maneuvers to narrow the differential diagnosis of acute abdominal pain.
3. Appropriately utilize labs and radiology tests in the evaluation of acute abdominal pain.
4. Appreciate that acute abdominal pain in children could be due to different etiologies than adult patients.
Abdominal Pain

Non-surgical

Surgical “acute” abdomen

I. peritonitis
- Blood
- Pus
- Foreign material

II. obstruction
Location, Location, Location…

- RUQ----------------------> hepatitis/GB
- LUQ----------------------> gastric/spleen
- Periumbilical-----------> pancreatitis/early appy
- RLQ----------------------> appy/GYN (torsion, cysts, PID, ectopic)
- LLQ----------------------> diverticulitis/GYN
- General/ill-defined--> ischemia, obstruction
Location, Location, Location…

*with visceral pain – ill-defined location*

- RUQ----------------------> hepatitis/GB
- LUQ----------------------> gastric/spleen
- Periumbilical---------> pancreatitis/*early appy*
- RLQ----------------------> appy/GYN (torsion, cysts, PID, ectopic)
- LLQ----------------------> diverticulitis/GYN
- General/ill-defined--> *ischemia, obstruction*
Location, Location, Location…

*when parietal peritoneum involved – localizes*

- **RUQ** -----> hepatitis/GB
- **LUQ** -----> gastric/spleen
- **Periumbilical** -----> pancreatitis/early appy
- **RLQ** -----> appy/GYN (torsion, cysts, PID, ectopic)
- **LLQ** -----> diverticulitis/GYN
- **General/ill-defined** -----> ischemia, obstruction
Abdominal Pain and Analgesia: *Give it!!*

- Pain relief does not increase the risk of diagnostic and management errors

- Dose: morphine 0.1 - 0.2 mg/kg IV

*Manterola C, et al. Cochrane Database, 2011*
Peritonitis and Antibiotics

Regimens: Must cover Gr (-) aerobes and anaerobes

Resistance of Bacteroides
- PIP/TZ, AM-SB, TC-CL .......... Near zero
- Ertapenem, tigecycline
- FQ + metronidazole
- Cefoxitin, cefotetan ................. 4-25% (?add Metro?)

No one regimen is proven better than another...

(40 trials, 5094 patients – Cochrane review, 2012)
Nasogastric Tubes and Abdominal Surgery

- 37 randomized trials, postop patients
- 2866 pts with NG tube, 2845 pts (-) NG tube

Results: No NG tube=>
  - Earlier return of bowel function
  - Fewer pulmonary infections
  - Trend toward fewer wound infections and ventral hernias
  - Trend toward improved patient comfort, less nausea and vomiting, and decreased length of stay
  - No difference in anastomotic leaks
  - Shorter length of stay

Cochrane Library 2010
Acute Abdominal Pain in the Elderly:
Be Careful!!!

- More likely to require hospitalization
- More likely to require surgery
- More likely to be misdiagnosed
- More likely to die

...compared to younger patients

Lyon C, et al. AFP, 2006
Laurell H. et al. Gerontology, 2006
Abdominal Wall and Hernias

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1. A 72 yo female presents with a 6-hour hx of a painful lump in her groin. Some nausea, no vomiting. No fever/chills. Exam: Abdomen: soft, non-tender, R groin with palpable mass below (inferior to) inguinal ligament. Despite gentle, firm pressure, the mass does not disappear.

The most likely diagnosis is:
A. Strangulated indirect inguinal hernia
B. Reducible direct inguinal hernia
C. Incarcerated femoral hernia
D. Incarcerated Spigelian hernia
Abdominal Wall and Hernias

Epidemiology

• 1 million hernia repairs are performed each year in the US
• Inguinal hernia repairs constituting > 3/4 of these cases
• Approximately 90% of all inguinal hernia repairs are performed on men

Terminology

– Reducible
– Incarcerated: *i.e.*, “Stuck!” (despite gentle firm pressure)
– Strangulated: vascular compromise (surgical emergency)
Abdominal Wall Hernias: Types

• **Indirect inguinal hernia**: 75% of all hernias!!!
  - Most common hernia in both sexes!!!
  - Men are 5x more common
  - More likely to incarcerate/strangulate than direct

• **Direct inguinal hernia**: 2nd most common

  **Note:** You can NOT differentiate between direct and indirect hernias on exam!!!

• **Femoral hernias**: more common in women
  - Located below inguinal ligament, medial to femoral pulse
Abdominal Hernias:
Do You Remember These?

- **Spigelian hernia**: rare, located along lateral border of rectus muscle, below umbilicus, at junction of arcuate line

- **Richter hernia**: When less than full circumference of bowel is trapped
Groin Hernia – Is Watchful Waiting Appropriate?

• **Yes** – if...
  - Absent or minimal discomfort
  - Is completely reducible
  - Patient preference to forego operation

• **Counseling points**
  - Low chance of presenting as surgical emergency (1.8 per 1000 person/yr)
  - But, 70% typically go onto surgery because of pain
  - No evidence that physical activity results in incarceration on worsening of existing hernia

2. A 67 yo female with a history rheumatoid arthritis presents with 6 hours of sudden, severe diffuse abdominal pain. Medications: Prednisone 15 mg qd x 5 yrs, celecoxib (Celebrex). Vital Signs: BP=140/90, P=105, RR=30, afebrile. Her abdomen is diffusely tender, with guarding and rebound.

The most cost-effective first test is:

A. An upright CXR
B. Supine abdomen x-ray
C. Abdominal ultrasound
D. A CT of the abdomen and pelvis with contrast
An Upright CXR is 80% Sensitive for Free Air

Can detect as little as 1-2 mL of gas under the diaphragm or lateral margin of the liver

Courtesy: Wikimedia - https://commons.wikimedia.org/wiki/File%3APneumoperitoneum_modification.jpg
Pneumoperitoneum: Etiology

- **Perforated duodenal ulcer** – *The most common cause*
  Especially of the anterior aspect of the first part of the duodenum

- Perforated peptic ulcer
- Bowel obstruction
- Ruptured diverticulum
- Penetrating trauma
- Ruptured inflammatory bowel disease (e.g., megacolon)
- Necrotizing enterocolitis
- Cancer
- Ischemic bowel
- After laparotomy; after laparoscopy
3. A 60 yo male presents to the ED/office with 3 days of worsening RUQ pain. The pain radiates to the right scapula. (+) nausea and vomiting. He is febrile (temp = 39 C, 102.2 F), P = 122, BP = 90/45 He is jaundiced (total bilirubin = 7.8), RUQ is tender.

The most likely diagnosis is:

A. Acute cholecystitis
B. Ascending cholangitis
C. Gallstone pancreatitis
D. Gallstone ileus
Gallstone Disease: Who Is at Risk?

• First-degree relative with Hx of gallstones
• Obesity, sedentary lifestyle, cyclic weight change

   \[\text{Think recent bariatric surgery!!!}\]

• Medical conditions: DM, hyperlipidemia
• Surgical conditions: short bowel syndrome, terminal ileal resection (think Crohn’s disease)
• Drugs: ceftriaxone, post-menopausal estrogen, TPN
• Hemolytic diseases

   \textit{Sickle cell disease} \rightarrow \text{black pigmented stones}
Gallstone Disease

• Cholesterol stones most common (80%)
  • Due to bile supersaturation with cholesterol ===> Crystal formation

• **Asymptomatic stones (cholelithiasis)**
  Do **NOT** recommend prophylactic surgery
  - 10% will go on to symptoms in 5 yrs

• **Symptomatic stones (biliary colic)**
  Now consider surgery. Why? Randomized trial noted
  - Observation = 20% hospitalization rate with recurrent pain
  - After 67 months – Complication Rates
    Observation = 4% vs. Surgery = 1%

Complications of Gallstone Disease

Liver

- Common hepatic duct
- Cystic duct
- Common bile duct

GB

Pancreas

Duodenum

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Complications of Gallstone Disease

1. **Cholecystitis**: in 10% of patients with biliary colic
   Occluded cystic duct $\Rightarrow$ RUQ pain and tender, +/-fever, +/-WBC
   
   ***(+)** Murphy sign: cessation of inspiration

2. **Ascending (acute) cholangitis**
   Result of occluded CBD (*choledocholithiasis*)
   50-70% (+) **Charcot’s triad**: fever, abd pain, and jaundice
   Reynolds’ pentad---Charcot’s + confusion + shock

3. **Gallstone pancreatitis**: obstructed ampulla of Vater
   $\Rightarrow$ reflux of bile

4. **Gallstone ileus**: biliary-enteric fistula, 6/1000 SBO
Gallstone Disease: Evaluation

• **Clinical Suspicion:** Classic history
• **Ultrasound** – 99% specific
  – If high degree of suspicion, but negative US… *Think Functional Gallbladder Disorder!!*

• **Functional Gallbladder Disorder** *(Dyskinesia, dysmotility)*:
  gallbladder ejection fraction < 40% is abnormal (HIDA scan)
  in conjunction with typical clinical symptoms (Rome III criteria)*

  **70-94% of patients with dyskinesia, symptoms improve or the disease is cured after cholecystectomy**

## Appendicitis

- Develops in 6-7% of population
- It is the most common cause of surgical abdomen
- Due to intraluminal (e.g., appendicolith) OR extraluminal obstruction (e.g., lymphadenopathy)

### Signs

**Rovsing’s sign:** LLQ palpation ==> RLQ pain

**Psoas sign:** RLQ pain on thigh extension while lying in left lateral decubitus position

**Obturator sign:** RLQ pain with internal rotation of the flexed right thigh

**Carnett sign:** perform abdominal crunch (+) if pain persists/worsens ==> abdominal wall pathology
Absence of These Signs Does Not "Rule Out" Appendicitis

**Psoas sign:** suggests inflamed appendix is retrocecal irritating iliopsoas muscle

**Obturator sign:** suggests inflamed appendix is in pelvis irritating obturator internus muscle

Hardin DM. *Am Fam Physician*. 1999 Nov1;60(7):2027-2034.
Two More Signs…

- **Dunphy sign**: cough elicits pain
  (also known as “cough sign”)
- **Markle sign**: patient drops from standing on toes to the heels with a jarring landing ==> pain

*Both suggest peritoneal inflammation*

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And the rectal exam: is useless!!!

Study: 1024 pts with possible appy + rectal exam
Physicians asked opinion before and after exam

*Result: made no difference*

---

Appendicitis Labs: Worthless!

• **WBC**
  – Elevated in 80-85% of pts
  – *But only 60-65% in children and elderly!!!*

• **CRP** – elevates within 6-12 hrs

What happens when you combine: WBC + CRP???
  • **Sensitivity:** 85-99%
  • **Specificity:** very poor!!!!
4. You are evaluating a 6 yo for abdominal pain. You have a moderate degree of suspicion that the patient may have appendicitis. The American College of Radiology Appropriateness Criteria recommends which of the following as the first choice to evaluate this patient?

A. Abdominal x-ray
B. Abdominal ultrasound
C. CT scan of abdomen and pelvis
D. MRI of abdomen and pelvis
Variation 4: Fever, leukocytosis, possible appendicitis, atypical presentation in children (younger than age 14).

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US abdomen</td>
<td>8</td>
<td>Perform this procedure with graded compression.</td>
<td>0</td>
</tr>
<tr>
<td>CT abdomen and pelvis with contrast</td>
<td>7</td>
<td>This procedure may be useful following negative or equivocal US. Oral or rectal contrast may not be needed depending on institutional preference.</td>
<td>▲▲▲▲</td>
</tr>
<tr>
<td>X-ray abdomen</td>
<td>6</td>
<td>This procedure may be useful in excluding free air or obstruction.</td>
<td>▲▲</td>
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<tr>
<td>US pelvis</td>
<td>5</td>
<td>This procedure is appropriate in women with pelvic pain.</td>
<td>0</td>
</tr>
<tr>
<td>CT abdomen and pelvis without contrast</td>
<td>5</td>
<td>Use of oral contrast depends on institutional preference.</td>
<td>▲▲▲▲</td>
</tr>
<tr>
<td>MRI abdomen and pelvis without and with contrast</td>
<td>5</td>
<td>See statement regarding contrast in text under “Anticipated Exceptions.”</td>
<td>0</td>
</tr>
<tr>
<td>MRI abdomen and pelvis without contrast</td>
<td>4</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>CT abdomen and pelvis without and with contrast</td>
<td>3</td>
<td></td>
<td>▲▲▲▲</td>
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<tr>
<td>X-ray contrast enema</td>
<td>2</td>
<td></td>
<td>▲▲▲▲</td>
</tr>
<tr>
<td>Tc-99m WBC scan abdomen and pelvis</td>
<td>2</td>
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**Rating Scale:** 1, 2, 3 Usual not appropriate; 4, 5, 6 May be appropriate; 7, 8, 9 Usually appropriate

**Relative Radiation Level**

ACR Appropriateness Criteria: 2 Right Lower Quadrant Pain—Suspected Appendicitis

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Appendicitis: Diagnostic Imaging

• **X-ray**: rarely useful
  – Unless appendicololith seen

• **US**: first choice: age <14 yrs and pregnancy
  – 26 studies (as of 2006) of US in pediatrics
  – Sensitivity: 88%; specificity of 94%\(^1\)

• **CT**: study of choice in adults
  – No advantage to using contrast

• **MRI**: good sensitivity and specificity
  – Greater cost, longer acquisition time, and less clinical availability

5. The most common cause of large bowel obstruction is:

A. Adhesions (from previous surgery)
B. Neoplasm
C. Herniation
D. Volvulus
Intestinal Obstruction

**Small bowel (85%)**
- Adhesions from previous surgery (60%)
- Malignant tumor (20%)
- Herniation (10%)
- Inflammatory bowel disease (5%)
- Volvulus (3%)
- Misc. (2%)

**Large bowel (15%)**
- Neoplasm (60%)
- Diverticulitis (20%)
- Volvulus (10-15%)
- Intussusception (<5%)
- Misc.
Small Bowel Obstruction

A. **Symptoms**
• Colicky abdominal pain
• Nausea and vomiting
• Diarrhea (early finding)

B. **Signs**
• Distention
• Tympany, high-pitch BS

C. **Late Findings**
• Lack of flatus and constipation
• Fever/tachycardia (*with strangulation*)
• Abdominal tenderness and peritoneal signs
  (*with strangulation*)
Small Bowel Obstruction: Radiography

• Dilated loops of bowel
• Paucity of air in colon
• Air fluid levels

Jackson PG, et al. AFP 2011
Small Bowel Obstruction: Radiography

- Dilated loops of bowel
- Paucity of air in colon
- Air fluid levels

May be “normal”: i.e., false neg (-) early or in high jejunal or duodenal obstruction

High clinical suspicion and neg (-) X-ray should

*Non-contrast* CT evaluation
Small Bowel Obstruction: Management

A. Clinically stable: no suggestion of strangulation
   • NGT, IV hydration, analgesia
   • Nonoperative trial up to 3 days is warranted.
     ➔ Successful 40-70%

B. If unstable/peritonitis or (+) suggestion of strangulation…

    Go to surgery!!!!
Large Bowel Obstruction

**Symptoms**
- More common in elderly
- Crampy abdominal pain
  - Sudden onset: think acute obstruction (e.g., volvulus)
- Nausea, vomiting, distension

**Signs**
- Hypertympanic to percussion
- Bowel sounds normal early, then become quiet
- Fever/tenderness/rigidity – is a bad sign
- *Cecum is region most likely to perforate*
Large Bowel Obstruction

- A “closed loop” obstruction
  *(with a competent ileocecal valve)*

- Cecum preferentially dilates

- Dilation > 12-14 cm increases risk of perforation
Sigmoid Volvulus

A long mesentery with a narrow base of fixation to the retroperitoneum and elongated, redundant bowel predisposes to the formation of volvulus

Sigmoid colon most common
Result of chronic constipation

At-risk patients
• Neuropsychiatric disorders
• Institutionalized/NH patients
• Parkinson disease
• Multiple sclerosis
• Spinal cord injury
• Excessive laxatives, enemas

Sigmoid Volvulus

Average age: 8th decade

Treatment: endoscopic decompression
- Then semi-elective surgery
- If no surgery: up to 50% will have recurrence

12-15% mortality rate

Cecal Volvulus

**Hereditary condition:** congenital incomplete dorsal mesenteric fixation of the cecum or ascending colon associated with an abnormally elongated mesentery distal to this area of absent mesentery

Women > men

Most common: 6th decade of life

**Treatment:** Surgery

Right hemicolecotomy

A. Chronic mesenteric ischemia ("Abdominal angina")

B. Acute mesenteric arterial thrombosis

C. Ischemic colitis

D. Acute mesenteric venous thrombosis
Vascular Disease and the Abdomen: 4 Cases

A. Chronic mesenteric ischemia ("Abdominal angina")
B. Acute mesenteric arterial thrombosis
C. Ischemic colitis
D. Acute mesenteric venous thrombosis
Chronic Mesenteric Ischemia
Also Known as – “Abdominal Angina”

• **Etiology:** atherosclerotic disease
  - Involves proximal celiac, SMA, IMA arteries
  - Because of collateral circulation, 2 of 3 involved
• **Mean age:** 60 yrs, women > men; 3:1
• **Presentation:** postprandial pain
• **Workup:** Duplex US, **CT-Angiography**, MRA or conventional angiography
• **Treatment:** angioplasty, stenting, surgery
Case #1: 60 yo female 4-6 month hx of **worsening postprandial abdominal pain**. Described an “ache,” in midepigastric-central location. Pain starts 15 min. after eating, increases over the next 1-2 hrs., then abates. Worse with large meals. Subsequently, she has lost 20 lbs in 6-8 weeks.

**PMHx:** *HTN, hyperlipidemia, tobacco abuse*

**Physical exam:** unremarkable

Labs, CT scan, upper and lower endoscopy – all “normal”

She has been told she has “IBS.”

**A. Chronic mesenteric ischemia**
**B. Acute mesenteric arterial thrombosis**
**C. Ischemic colitis**
**D. Acute mesenteric venous thrombosis**
Vascular Disease and the Abdomen: 4 Cases

A. Chronic mesenteric ischemia ("Abdominal angina")
B. Acute mesenteric arterial thrombosis
C. Ischemic colitis
D. Acute mesenteric venous thrombosis
Acute Mesenteric Arterial Occlusion

- **Etiology:** embolus > thrombosis
  - SMA preferentially involved

- **Presentation:** “Pain out of proportion to physical findings”

- **Mortality:** very high
Case #2: 78 yo male presents to ED with 90-minute history of **severe diffuse abdominal pain. Started suddenly** at 7:30 p.m. (+) nausea, vomiting. No change in bowel/bladder habits.

**PMHx:** CAD, HTN, **Afib**, frequent falls, early dementia  
**Meds:** metoprolol, ASA, donepezil  
**VS:** BP = 115/70, P = 110, **irreg.** RR = 28, afebrile  
**PE:** The patient is **writhing in bed, very restless, little to no relief with opiate analgesia.** Abdomen: soft, non-tender, absent bowel sounds, no rebound or guarding.

A. Chronic mesenteric ischemia  
**B. Acute mesenteric arterial thrombosis**  
C. Ischemic colitis  
D. Acute mesenteric venous thrombosis
Vascular Disease and the Abdomen: 4 Cases

A. Chronic mesenteric ischemia ("Abdominal angina")
B. Acute mesenteric arterial thrombosis
C. Ischemic colitis
D. Acute mesenteric venous thrombosis
Ischemic Colitis

- **Etiology:** “low-flow” state
  - Nongangrenous – 80-85%; gangrenous – 15-20%
- **Age:** 90% over the age of 60 yrs
- **Location:** left colon 75%
- **Presentation:** varies on severity
  - **Mild case:** crampy abd pain, diarrhea, heme (+) stool
  - **Severe:** peritonitis
- **Work-up:** CT, MRA or colonoscopy
- **Treatment:**
  - **Mild case:** liquid diet, antibiotics
  - **Severe:** IV fluids, antibiotics, surgery
Case #3: 82 yo NH resident with one week of progressive weakness. Crampy abdominal pain, (+) diarrhea. Rare vomiting, decreased po intake. Outpatient identified UTI - Rx with nitrofurantoin (Macrodantin).

Vitals: BP = 90/45, P = 115, RR = 28, T = 100.6

PE: Ill-appearing, restless. **Mucus membranes: very dry.**
The abdomen is distended and tympanic; absent BS, Mild **left-sided tenderness**, but **no rebound or guarding.**
Rectal exam = brown stool, **heme (+)**
Labs: Na+ 146, K+ 2.7, Cl 115, **HCO3- 15, BUN 66/Cr 2.2**
WBC = 15.5, H/H = 10.5/31.5 **U/A = WBC - TNTC**

A. Chronic mesenteric ischemia
B. Acute mesenteric arterial thrombosis
C. Ischemic colitis
D. Acute mesenteric venous thrombosis
Vascular Disease and the Abdomen: 4 Cases

A. Chronic mesenteric ischemia ("Abdominal angina")
B. Acute mesenteric arterial thrombosis
C. Ischemic colitis
D. Acute mesenteric venous thrombosis
Acute Mesenteric Venous Thrombosis

• Frequency: 10-15% of all mesenteric ischemia
• At-risk population: hypercoagulable state
• Presentation: insidious over 7-10 days
• Workup:
  - X-rays: nonspecific findings (ileus)
    • Late findings: thumbprinting, pneumatosis or portal venous gas
  - Duplex US: useful if used early
  - CT: may ==> enlarged mesenteric or portal vein and thrombus within the vein
    • Gas in the wall of the bowel, fat streaking, and thickened bowel wall have also been noted
• Treatment: anticoagulation, thrombolytics
  - Surgery: for bowel infarction, peritonitis
Case #4: 42 y/o female with **7-10 day hx** of vague, midabdominal pain. 
(+ ) nausea and vomiting 
(+ ) anorexia and occasional diarrhea. No fever.

**PMHx:** HTN  
**FHx:** *Mother PE age 40*, Father: Unknown  
**Meds:** HCTZ, *OCP*  
**SHx:** married, (+ ) *smokes 1pk/day*

**Vitals:** BP = 130/70, P = 105, RR = 28, T = 99.4

**PE:** Appears uncomfortable, non-toxic. Abdomen: soft, slightly distended and tympanic, rare BS, no rebound/guarding. Rectal exam = brown stool, heme (+)

**Labs:** WBC = 15.5, H/H = 10.5/31.5, **HCO3 = 18.**

A. Chronic mesenteric ischemia  
B. Acute mesenteric arterial thrombosis  
C. Ischemic colitis  
D. Acute mesenteric venous thrombosis
Intestinal (Mesenteric) Ischemia: Remember Mechanisms

A. Low-flow state: ischemic colitis
B. Mesenteric venous thrombosis: 
   \textit{Think – hypercoaguable states}
C. Arterial occlusion
   1. Atherosclerosis: “intestinal angina”
   2. Thromboembolic phenomenon: 
      \textit{- “Pain out of proportion to physical findings”}
Pediatric Surgery

A. Intussusception
B. Meckel’s diverticulum
C. Hypertrophic pyloric stenosis
D. Necrotizing enterocolitis (NEC)
Intussusception

- **Sex**: Male > female; 3:1
- **Etiology**: unclear. Likely lead point => invagination
- **Peak age**: 5-10 months
- **Presentation**: *Classic triad* (Note: triad only present 30% of cases)
  - A) vomiting, B) abdominal pain, C) “*currant jelly*” (bloody) stool
  - Abdominal pain: colicky, severe, intermittent
- **Abdominal exam**
  - R-sided “*sausage*”-like mass, Empty RLQ (*Dance sign*)
- **Diagnosis**: U/S, barium enema
- **Treatment**: Barium, water-soluble or air-contrast enema

**Lead Points:** Adults = polyps, cancer
Child = idiopathic - ? Peyer’s patch
Meckel’s Diverticulum: “The Rule of 2s”

- 2% of the population harbor it
  - Complications occur in minority (4-16%)
- 2x more common in males
- Within 2 feet of ileocecal valve

**Presentation:** with one of 2 complications
1. Children: Painless bleeding due to heterotopic gastric tissue
2. Adults: Obstruction

**Diagnosis:** technetium-99m pertechnetate scan
- Known as a *Meckel’s scan* (80-90% sensitive)
Hypertrophic Pyloric Stenosis

- **Etiology**: Marked hypertrophy and hyperplasia of the muscular layers of the pylorus --> leading to narrowing of the gastric antrum.
- **Sex**: Male > female; 4:1
- **Peak age**: 3 weeks (Range: 1-18 weeks)
- **Risk factor**: erythromycin, azithromycin
- **Presentation**: nonbilious vomiting/regurgitation
  - *after which the infant is still hungry*
  - Dehydration and poor weight gain can occur
- **Abdominal exam**: RUQ “olive”
- **Diagnosis**: Ultrasound
- **Treatment**: Surgery
Necrotizing Enterocolitis (NEC)

- Incidence: *increases with prematurity*
- Time of onset
  - ≤ 30 weeks EGA: avg. time of onset = 20.2 days
  - 31-33 weeks EGA: avg. time of onset = 13.8 days
  - ≥ 34 weeks EGA: avg. time of onset 5.4 days
  - Term infants: usually develop in first 1-3 days of life
- Presentation: *starts with feeding intolerance, then-->* vomiting, diarrhea
  - **Clinical triad** may ultimate develop
    a) abdominal distension, b) bloody stools, and
    c) pneumatosis intestinalis*** (*pathognomonic*)
- Treatment: NGT decompression, antibiotics, TPN
Thank you!
Answers

1. C
2. A
3. B
4. B
5. B
Supplemental Slides
Pneumoperitoneum: Mimics

- Subphrenic abscess
- Chilaiditi syndrome:
  - Bowel interposed between liver and diaphragm
- Pneumoperitoneum: Benign etiology
  
  $S/P$ Laparoscopy/laparotomy: air remains up to 6 days
<table>
<thead>
<tr>
<th>Must include episodes of pain located in the epigastrium and/or right upper quadrant and all of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Gallbladder is present</td>
</tr>
<tr>
<td>• LFT’s, bilirubin, amylase/lipase are normal</td>
</tr>
<tr>
<td>• Episodes last longer than 30 minutes</td>
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<tr>
<td>• Recurrent symptoms occur at different intervals (not daily)</td>
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<tr>
<td>• The pain builds up to a steady level</td>
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<tr>
<td>• The pain is moderate to severe enough to interrupt daily activities or lead to ED visit</td>
</tr>
<tr>
<td>• The pain is not relieved by bowel movement</td>
</tr>
<tr>
<td>• The pain is not relieved by positional change</td>
</tr>
<tr>
<td>• The pain is not relieved by antacids</td>
</tr>
<tr>
<td>• Other structural diseases that would explain the symptoms are excluded</td>
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</tbody>
</table>
Acute Colonic Pseudo-Obstruction (ACPV): Olgilvie Syndrome

- **Population at risk: older, hospitalized**
  - With a variety of medical and surgical conditions
- Perforation (cecum) reported 3-40%
- **Treatment:**
  - NPO, IV fluids, rectal tube, correct electrolytes
  - **Neostigmine** is effective in 85-90% of cases
    - Lasts 1-2 hours, multiple doses may be needed
    - Cardiac monitor, atropine at bedside
  - Colonoscopy if medical therapy fails
Asthma: Pediatric and Adult

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Disclosure Statement

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Learning Objectives

1. Identify a treatment approach for the patient who presents with an acute asthma exacerbation.
2. Describe pharmacologic therapy in the treatment of asthma.
3. State the current guidelines for the treatment of chronic asthma.
4. Discuss the approach to the pregnant patient with asthma.
Asthma – NHLBI Guidelines and GINA 2019 Guidelines

- Recommend assessing asthma **severity** as initial step
- Assess asthma **control** to guide adjustments in Rx (SOR: B,C)
- Address symptom control in terms of daily **impairment** and **risk of exacerbations/hosp** (SOR: A)
- Feature 3 age breakdowns (0-4 yrs, 5-11 yrs, ≥12 yrs) and a step approach to **management** (SOR: C)
- Less use of SABA alone
Asthma Physiology

- Chronic airway inflammation
- Bronchial hyperactivity
- Airflow limitation
  - Bronchiolar obstruction
  - Airway remodeling
Atopy and Asthma

- Atopy is a strong predisposing factor for asthma
  - Genetic IgE mediated immune response
  - **Atopic triad:** Atopic Dermatitis, Allergic Rhinitis, Asthma

Infant Atopic Dermatitis

Childhood Allergic Rhinitis

Asthma
Asthma Symptoms

• Intermittent/Recurrent
  - Cough
  - **Wheeze**
  - Dyspnea
  - Chest pain

• Exacerbations
  - Episodic

• Triggers
  - Perennial
  - Seasonal
## Common Asthma Triggers

<table>
<thead>
<tr>
<th>URI</th>
<th>Environment</th>
<th>Drugs</th>
<th>Illnesses</th>
</tr>
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<tbody>
<tr>
<td>Viral</td>
<td>Allergens</td>
<td>ASA</td>
<td>CHF (cardiac asthma)</td>
</tr>
<tr>
<td>Bacterial</td>
<td>Irritants (perfumes, smoke)</td>
<td>NSAIDs</td>
<td>GERD</td>
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<td></td>
<td>Temperature</td>
<td>Beta Blockers</td>
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<td></td>
<td>Humidity</td>
<td>Sulfites (food)</td>
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<tr>
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<td>Exercise</td>
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Asthma Differential Diagnoses

- Viral pneumonitis/bronchitis
- COPD
- GERD
- Pneumothorax
- Pulmonary embolism
- Vocal cord dysfunction syndrome
- Pulmonary edema
- Endobronchial obstruction (tumor or FB)
- Acute hypersensitivity pneumonitis
- Epiglottitis
# COPD vs Asthma

<table>
<thead>
<tr>
<th>Symptom</th>
<th>COPD</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic cough &amp; sputum:</td>
<td>Common</td>
<td>Variable</td>
</tr>
<tr>
<td>Breathlessness on exertion or poor lung function:</td>
<td><strong>Persistent</strong></td>
<td><strong>Intermittent, reversible</strong></td>
</tr>
<tr>
<td>Onset prior to 40 yrs:</td>
<td><strong>Uncommon</strong></td>
<td><strong>Common</strong></td>
</tr>
<tr>
<td>Tobacco use:</td>
<td>Almost always</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Airway hyper-responsiveness:</td>
<td>Common</td>
<td>Always</td>
</tr>
<tr>
<td>Progression:</td>
<td><strong>Slowly; little variability</strong></td>
<td><strong>Episodic and variable</strong></td>
</tr>
<tr>
<td>Identifiable triggers:</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
<tr>
<td>Bronchodilator response:</td>
<td>Modest</td>
<td>Often marked</td>
</tr>
</tbody>
</table>
1. A 12 yo male is brought into the office for a well visit. His parents report he has nighttime cough and wheezing for the past several months. He is otherwise healthy and up-to-date on immunizations. Which one of the following would be most appropriate at this time?

A. Treat empirically with a short-acting beta-agonist  
B. Order CXR  
C. Perform spirometry  
D. Start an inhaled corticosteroid
Asthma Diagnosis and Assessment

- Verify airflow obstruction: medical history, physical exam
- **Spirometry** (PFT) recommended
- To make the **diagnosis**, assess treatment effect, and repeat periodically (even annually per GINA)
- (If pt <5 yrs of age, a therapeutic trial of medication is recommended)
- Assess treatment, side effects, inhaler technique, action plan, goals
- Assess and treat co-morbidities
2. When performing spirometry after the administration of a bronchodilator (adults), what percentage of airway reversibility and change in $\text{FEV}_1$ is consistent with the diagnosis of asthma?

A. 12% and 500 mL  
B. 25% and 200 mL  
C. 12% and 200 mL  
D. 18% and 100 mL
Spirometry in Asthma

• FEV1 is normal (intermittent) or decreased to <80% predicted
• TLC is normal to elevated
• FRC is usually elevated
• Significant reversibility after inhaling a SABA
  Increase by ≥12% and 200 mL in FEV1
Why Perform Spirometry?

• Measure airflow obstruction
• More definitive diagnosis of Asthma
• Assess bronchodilator response
• Assess severity of airflow obstruction
• Assess response to therapy
• Distinguish between obstruction and restriction
• Assess worsening/progression of condition
• Perform pre-operative assessment
Typical Spirometric Tracings

Note: Each FEV₁ represents the highest of three reproducible measurements

GINA 2014 ©Global Initiative for Asthma
Spirometry Measures: TLC, total lung capacity; V, tidal volume; IC, inspiratory capacity; FRC, functional residual capacity; ERV, expiratory reserve volume; VC, vital capacity; RV, residual volume.
Risk Factors for Poor Outcomes

• Not on ICS, poor adherence, poor inhaler technique
• Frequent use of rescue inhaler
• Low FEV1 (<60% predicted)
• Psychological and/or socioeconomic problems
• Smoking, allergen exposure
• Co-morbidities: obesity, chronic sinusitis, allergies
• Eosinophilia or elevated fractional exhaled nitric oxide (FENO), a measure of inflammation of airways (<25ppb is low, >50ppb is high)
3. An asthmatic patient with symptoms requiring an albuterol rescue inhaler 3-4 times weekly, with nocturnal symptoms 3 times monthly, would be best classified as which one of the following severity levels?

A. Mild intermittent
B. Mild persistent
C. Moderate persistent
D. Severe persistent
# Asthma Classification – NHLBI

<table>
<thead>
<tr>
<th></th>
<th>Mild Intermittent</th>
<th>Mild Persistent</th>
<th>Moderate Persistent</th>
<th>Severe Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Symptoms (&lt;2x/week) but not daily; may affect activity</td>
<td>Symptoms (&gt;2x/week)</td>
<td>Daily symptoms, daily use of SABA; affect activity and may last days</td>
<td>Continual symptoms; limited activity</td>
</tr>
<tr>
<td>Nocturnal symptoms</td>
<td>Nocturnal symptoms (&lt;2x/month)</td>
<td>Nocturnal symptoms (&gt;2x/month)</td>
<td>Nocturnal symptoms (&gt;2x/week)</td>
<td>Frequent nocturnal symptoms</td>
</tr>
</tbody>
</table>
4. A 30 yo female with well-controlled asthma admits to clear nasal discharge, sneezing, nasal congestion and itching occurring every spring and fall. The most effective medication for treatment and prevention would be:

A. Cetirizine
B. Cromolyn nasal spray (NasalCrom)
C. Fluticasone nasal spray (Flonase)
D. Montelukast (Singulair)
Asthma Management: Upper Airway

- **Avoidance** of allergens or environmental irritants is key
- **Intranasal corticosteroids**
  Monotherapy first-line for mild to moderate allergic rhinitis (SOR: A)
  Reduction in upper airway inflammation may protect lower airway
- Second-line agents
  - Antihistamines
  - Leukotriene modulators
  - Immunotherapy
  - May reduce development of asthma in patients with allergic rhinitis
Asthma Management

Albuterol

- The most appropriate treatment for acute bronchospasm is an inhaled SABA – **GINA 2019 recommends not using this alone** *(no update from NHLBI yet)*
- GINA 2019 recommends using **ICS-formoterol prn (!)**
- Use of a spacer recommended
Inhaled corticosteroids (ICS)

- Most potent and effective long-term controller therapy
- Foundation of therapy for patients of all ages who have asthma (SOR: A)
- ICS improve long-term outcomes in children with mild to moderate persistent asthma (SOR: A)

Combined ICS/LABA – for moderate-severe asthma

- ICS effective in combination with LABA
**Low-, Medium- and High-Dose Inhaled Corticosteroids**

**Adults and Adolescents (≥12 years)**

GINA 2015, Box 3-6 (1/2)

<table>
<thead>
<tr>
<th>Inhaled corticosteroid</th>
<th>Total daily dose (mcg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Beclometasone dipropionate (CFC)</td>
<td>200–500</td>
</tr>
<tr>
<td>Beclometasone dipropionate (HFA)</td>
<td>100–200</td>
</tr>
<tr>
<td>Budesonide (DPI)</td>
<td>200–400</td>
</tr>
<tr>
<td>Ciclesonide (HFA)</td>
<td>80–160</td>
</tr>
<tr>
<td>Fluticasone propionate (DPI or HFA)</td>
<td>100–250</td>
</tr>
<tr>
<td>Mometasone furoate</td>
<td>110–220</td>
</tr>
<tr>
<td>Triamcinolone acetonide</td>
<td>400–1000</td>
</tr>
</tbody>
</table>

- Most of the clinical benefit from ICS is seen at low doses
- High doses are arbitrary, but for most ICS are those that, with prolonged use, are associated with increased risk of systemic side-effects
Inhaled Corticosteroids in Children

- **Do not** have long-term, clinically significant, or irreversible effects on these outcomes:
  -- Vertical growth
  -- Bone mineral density (BMD)
  -- Suppression of adrenal/pituitary axis

- **Do** improve health outcomes *(SOR: A, B)*
  For children with mild or moderate persistent asthma
  The potential, but small, risk of delayed growth is well balanced by their effectiveness
Early Intervention With ICS and the Progression of Asthma

- Evidence is insufficient to draw conclusions
- Early intervention with inhaled steroids likely will improve overall asthma management, but its effect on preventing irreversible airway injury remains to be determined (SOR: A, B)
Asthma Management

• **Long-acting inhaled Beta$_2$-agonists (LABA)**
  Used concomitantly with low- to medium-dose ICS are the preferred combination therapy for long-term control and prevention of symptoms in *moderate and severe persistent asthma* (SOR: A, B)
  Not recommended as monotherapy!
Asthma Management

• **Inhaled cromolyn**
  Used as alternative (not preferred) medications for the treatment of mild persistent asthma (SOR: A, B)

• **Leukotriene modifiers**
  Alternative medication for the treatment of persistent asthma (SOR: B)

• **Biologics**
  Omalizumab (Anti-igE), Mepolizumab (Anti-IL-5), Reslizumab (Anti-IL-5)
STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0-4 YEARS OF AGE

**Step 1**
Preferred: Low-dose ICS
Alternative: Cromolyn or Montelukast

**Step 2**
Preferred: Medium-dose ICS + either LABA or Montelukast

**Step 3**
Preferred: Medium-dose ICS + either LABA or Montelukast

**Step 4**
Preferred: High-dose ICS + either LABA or Montelukast
Oral systemic corticosteroids

**Step 5**
Preferred: High-dose ICS + either LABA or Montelukast

**Step 6**
Preferred: High-dose ICS + either LABA or Montelukast
Oral systemic corticosteroids

**Patient Education and Environmental Control at Each Step**

- Quick-Relief Medication for All Patients
  - SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms.
  - With viral respiratory infection: SABA q 4-6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if exacerbation is severe or patient has history of previous severe exacerbations.
  - Caution: Frequent use of SABA may indicate the need to step up treatment. See text for recommendations on initiating daily long-term-control therapy.

**Step up if needed** (first, check adherence, inhaler technique, and environmental control)
**Assess control**
**Step down if possible** (and asthma is well controlled at least 3 months)
STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5-11 YEARS OF AGE

Step 1
Preferred: SABA PRN
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

Step 2
Preferred: Low-dose ICS
Either: Low-dose ICS + either LABA, LTRA, or Theophylline OR Medium-dose ICS

Step 3
Preferred: Medium-dose ICS + LABA
Alternative: High-dose ICS + either LTRA or Theophylline

Step 4
Preferred: High-dose ICS + LABA
Alternative: High-dose ICS + either LTRA or Theophylline

Step 5
Preferred: High-dose ICS + LABA + oral systemic corticosteroid
Alternative: High-dose ICS + either LTRA or Theophylline + oral systemic corticosteroid

Step 6
Preferred: Assess control
Step up if needed (first, check adherence, inhaler technique, environmental control, and comorbid conditions)
Step down if possible (and asthma is well controlled at least 3 months)

Persistent Asthma: Daily Medication
Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

Each step: Patient education, environmental control, and management of comorbidities.
Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Caution: Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EB) generally indicates inadequate control and the need to step up treatment.
STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥12 YEARS OF AGE AND ADULTS

Intermittent Asthma

Persistent Asthma: Daily Medication
Consult with asthma specialist if step 4 care or higher is required.
Consider consultation at step 3.

Step 1
Preferred: SABA PRN
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

Step 2
Preferred: Low-dose ICS + LABA
Alternative: Medium-dose ICS

Step 3
Preferred: Medium-dose ICS + LABA
Alternative: Low-dose ICS + either LTRA, Theophylline, or Zileuton

Step 4
Preferred: High-dose ICS + LABA AND
Consider Omalizumab for patients who have allergies

Step 5
Preferred: High-dose ICS + LABA + oral corticosteroid AND
Consider Omalizumab for patients who have allergies

Step 6

Each step: Patient education, environmental control, and management of comorbidities.
Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

Step up if needed (first, check adherence, environmental control, and comorbid conditions)
Assess control
Step down if possible (and asthma is well controlled at least 3 months)
Box 3-5A
Adults & adolescents 12+ years

Personalized asthma management:
Assess, Adjust, Review response

Asthma medication options:
Adjust treatment up and down for individual patient needs

**PREFERRED CONTROLLER**
to prevent exacerbations and control symptoms

**PREFERRED RELIEVER**
Other reliever option

**PREFERRED CONTROLLER**
As-needed low dose ICS-formoterol *

As-needed low dose ICS-formoterol *

**STEP 1**
Daily low dose inhaled corticosteroid (ICS),
or as-needed low dose ICS-formoterol *

Leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA is taken †

Medium dose ICS, or low dose ICS+LTRA #

High dose ICS, add-on tiotropium, or add-on LTRA #

Add low dose OCS, but consider side-effects

Confirmation of diagnosis if necessary: Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient goals

Treatment of modifiable risk factors & comorbidities
Non-pharmacological strategies
Education & skills training
Asthma medications

**STEP 2**
Low dose ICS-LABA

Medium dose ICS-LABA

**STEP 3**
As-needed low dose ICS-formoterol ‡

**STEP 4**
As-needed short-acting β₂-agonist (SABA)

As-needed short-acting β₂-agonist (SABA)

**STEP 5**
High dose ICS-LABA

Refer for phenotypic assessment ± add-on therapy, e.g. tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R

LOW Dose ICS-form is the reliever for patients prescribed bud-form or BDP-form maintenance and reliever therapy

# Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV₁ >70% predicted

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Box 3-5A

**Adults & adolescents 12+ years**

**Personalized asthma management:**
Assess, Adjust, Review response

‘Controller’ treatment means the treatment taken to prevent exacerbations

**Asthma medication options:**
Adjust treatment up and down for individual patient needs

**PREFERRED CONTROLLER**
to prevent exacerbations and control symptoms

**PREFERRED RELIEVER**
Other reliever option

**STEP 1**
As-needed low dose ICS-formoterol *

Low dose ICS taken whenever SABA is taken †

**STEP 2**
Daily low dose inhaled corticosteroid (ICS), or as-needed low dose ICS-formoterol *

Leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken †

**STEP 3**
Low dose ICS-LABA

Medium dose ICS-LABA

High dose ICS, or low dose ICS+LTRA #

**STEP 4**
Medium dose ICS, or low dose ICS+LTRA #

High dose ICS, add-on tiotropium, or add-on LTRA #

Add low dose OCS, but consider side-effects

**STEP 5**
High dose ICS-LABA

Refer for phenotypic assessment ± add-on therapy, e.g. tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R

**Confirmation of diagnosis if necessary**
Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient goals

**Treatment of modifiable risk factors & comorbidities**
Non-pharmacological strategies
Education & skills training
Asthma medications

**Symptoms**

**Exacerbations**

**Side-effects**

**Lung function**

**Patient satisfaction**

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* Off-label; data only with budesonide-formoterol (bud-form)
† Off-label; separate or combination ICS and SABA inhalers
‡ Low-dose ICS-form is the reliever for patients prescribed bud-form or BDP-form maintenance and reliever therapy
# Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV >70% predicted
Background to Changes in 2019 – The Risks of ‘Mild’ Asthma

- Patients with apparently mild asthma are at risk of serious adverse events
  - 30-37% of adults with acute asthma
  - 16% of patients with near-fatal asthma
  - 15-20% of adults dying of asthma

- Exacerbation triggers are variable (viruses, pollens, pollution)

- Inhaled SABA has been first-line treatment for asthma for 50 years
  - This dates from an era when asthma was thought to be a disease of bronchoconstriction
  - Patient satisfaction with, and reliance on, SABA treatment is reinforced by its rapid relief of symptoms, its prominence in ED and hospital management of exacerbations, and low cost
  - Patients commonly believe that “My reliever gives me control over my asthma,” so they often don’t see the need for additional treatment

had symptoms less than weekly in previous 3 months (Dusser, Allergy 2007)
Background to Changes in 2019
– The Risks of SABA-only Treatment

• Regular or frequent use of SABA is associated with adverse effects
  – β-receptor downregulation, decreased bronchoprotection, rebound hyperresponsiveness, decreased bronchodilator response (Hancox, Respir Med 2000)
  – Increased allergic response, and increased eosinophilic airway inflammation (Aldridge, AJRCCM 2000)

• Higher use of SABA is associated with adverse clinical outcomes
  – Dispensing of ≥3 canisters per year (average 1.7 puffs/day) is associated with higher risk of emergency department presentations (Stanford, AAAI 2012)
  – Dispensing of ≥12 canisters per year is associated with higher risk of death (Suissa, AJRCCM 1994)
Step 1 – ‘Preferred’ Controller Option

- Step 1 is for patients with symptoms less than twice a month, and with no exacerbation risk factors
- As-needed low dose ICS-formoterol (off-label)

Evidence
- Indirect evidence from SYGMA 1 of large reduction in severe exacerbations vs SABA-only treatment in patients eligible for Step 2 therapy (O’Byrne, NEJMed 2018)

Values and preferences
- High importance given to reducing exacerbations
- High importance given to avoiding conflicting messages about goals of asthma treatment between Step 1 and Step 2
- High importance given to poor adherence with regular ICS in patients with infrequent symptoms, which would expose them to risks of SABA-only treatment
Step 1 – Other Controller Option

Low dose ICS taken whenever SABA is taken (off-label)

• Evidence
  − Indirect evidence from studies in patients eligible for Step 2 treatment (BEST, TREXA, BASALT)

• Values and preferences
  − High importance given to preventing severe exacerbations
  − Lower importance given to small differences in symptom control and the inconvenience of needing to carry two inhalers
  − Combination ICS-SABA inhalers are available in some countries, but approved only for maintenance use

Daily ICS is no longer listed as a Step 1 option
  − This was included in GINA 2014-18, but with high-probability of poor adherence
  − Now replaced by more feasible as-needed controller options for Step 1
Asthma Monitoring

• Follow-up
  --At 2- to 6-week intervals
  --Assess inhaler technique, adherence
  --Once controlled, reassess at least every 6 months
  --Measures of control are the same as those to assess severity
  --Validated questionnaires like the asthma control test (ACT)

• Step down can be considered if asthma is well controlled for
  3 months or more
  Decrease dose of ICS gradually, by 25-50% every 3-6 mo
Asthma Action Plans

- Benefits: reduce hospitalizations, ED visits, symptoms, nightly awakenings, time off work, and improve quality of life
- Action plans should
  - Be written and easy to understand
  - Describe how to recognize and respond to worsening asthma
  - Address individual symptoms
  - Provide advice about a change in ICS
  - Base responses on patient PEF personal best
Asthma Action Plan

**Green Zone**
- Usual activity
- PEF 80% or more of personal best

**Yellow Zone**
- Some of usual activity
- PEF 50-80% of personal best

**Red Zone**
- Cannot do usual activities
- PEF less than 50% of personal best
Patient Education

- Self-monitoring
- Following a plan for managing asthma long term
- Prompt handling signs of worsening asthma
- Smoking cessation
- Assess occupational asthma
- Avoid NSAIDs if sensitivity
5. A 14 yo sees you in the office for asthma symptoms 1-2 times a month, not seasonal or related to exercise. Which one of the following treatment is recommended for treatment of this level of asthma symptoms?

A. Daily inhaled budesonide inhaler
B. Prn use of budesonide-formoterol inhaler
C. Prn use of formoterol inhaler
D. Daily use of montelukast tablet
Acute Asthma Exacerbation

• Characterized by
  Decreased PEF (<50% predicted normal)
  • FEV1 may be more useful in predicting exacerbations
  Failure to respond to a beta$_2$-agonist
  Physical signs and symptoms
    • Extreme anxiety due to breathlessness
    • Gasping for air, sweaty, or cyanotic
    • Rapid deterioration over a few hours
    • Severe retractions and nasal flaring
    • Hunched forward
Acute Asthma Exacerbation

Historical risk factors for death from asthma

- History of severe exacerbations requiring intubation
- Prior admission to ICU for asthma
- Emergency care visit for asthma in the past year
- Current use or recent withdrawal from systemic corticosteroids
- Not currently using ICS
- H/O psychiatric disease or psychosocial problems
- Overuse (>1 canister) per month of inhaled short-acting beta$_2$-agonist
- Poor compliance with meds or action plan
Acute Asthma Exacerbation

• Physical risk factors for death from asthma
  • Altered mental status
  • Absence of wheezing (silent chest)
  • Paradoxical chest or abdominal movement
  • PaCO$_2$ $>$42 mm Hg
  • FEV$_1$ $<$40% predicted after initial treatment
Asthma Exacerbation Management

• Recommended
  **Oxygen**
  **SABA** by MDI or nebulizer (continuous superior to intermittent)
  **Systemic corticosteroids** – Oral or IV
  **Inhaled Ipratropium**

• Not recommended
  Methylxanthines
  Chest PT
  Mucolytics
  Sedation
**PRIVERY CARE**

Patient presents with acute or sub-acute asthma exacerbation

**ASSESS the PATIENT**

Is it asthma?
Risk factors for asthma-related death?
Severity of exacerbation?

**MILD or MODERATE**

Talks in phrases, prefers sitting to lying, not agitated
Respiratory rate increased
Accessory muscles not used
Pulse rate 100–120 bpm
O₂ saturation (on air) 90–95%
PEF >50% predicted or best

**START TREATMENT**

SABA 4–10 puffs by pMDI + spacer, repeat every 20 minutes for 1 hour
Prednisolone: adults 1 mg/kg, max. 50 mg, children 1–2 mg/kg, max. 40 mg
Controls oxygen (if available): target saturation 93–95% (children: 94–98%)

**SEVERE**

Talks in words, sits hunched forwards, agitated
Respiratory rate >30/min
Accessory muscles in use
Pulse rate >120 bpm
O₂ saturation (on air) <90%
PEF ≤50% predicted or best

**LIFE-THREATENING**

Drowsy, confused or silent chest

**TRANSFER TO ACUTE CARE FACILITY**

While waiting: give SABA, O₂, systemic corticosteroid

**URGENT**

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GINA 2014, Box 4-3 (2/3) ©Global Initiative for Asthma

AMERICAN ACADEMY OF FAMILY PHYSICIANS

© Global Initiative for Asthma
Asthma Exacerbations and Antibiotics

• Benefit from antibiotic therapy for asthma exacerbations has not been demonstrated unless strong evidence of lung infection (SOR: B)
  • Fever
  • Purulent sputum
  • CXR evidence of pneumonia

• Aggressive treatment with steroids should be implemented before antibiotics considered
6. A 26 yo male with H/O exercised-induced asthma complains of worsening cough and decreasing performance when he runs. He is training for a marathon and is now requiring daily use of his SABA. Which one of the following would be the next best step in his treatment regimen?

A. Add a daily inhaled low-dose corticosteroid
B. Increase frequency of SABA use
C. Substitute a LABA prior to exercise
D. Lifestyle modifications (decrease frequency of exercise, warming up) until symptoms improve
Exercised-induced Bronchoconstriction

- Due to **dry air**, cold air, ozone, particulates
- Occurs in 90% of asthmatics and 10% of athletes
- Diagnosed with **spirometry**
  - ↓ in FEV\(_1\) of 10% after exercise diagnostic
- Pretreatment prior to exercise – **ICS-formoterol (or SABA)** preferred
- NEW – LABA no longer recommended
- NEW – Use daily low-dose **ICS**
Asthma COPD Overlap Syndrome

• Distinguishing asthma from COPD can be problematic, particularly in smokers and older adults
• Patients with features of both asthma and COPD have worse outcomes than those with either alone
  • Frequent exacerbations
  • Poor quality of life
  • More rapid decline in lung function
  • Higher mortality
  • Greater health care utilization
ACOS

- Prevalence of the ‘overlap’ syndrome varies by definition (not a single disease)
  - Reported rates are between 15-55% of patients with chronic airways disease
  - Concurrent doctor-diagnosed asthma and COPD are found in 15-20% of patients with chronic airways disease
  - Prevalence varies by age and gender
Asthma COPD Overlap Syndrome

- Treat toward predominant symptoms (asthma or COPD)
  - Asthma predominant
    - Emphasis on ICS
    - No LABA as monotherapy
  - COPD predominant
    - Emphasis on combination bronchodilators
    - No ICS as monotherapy
- Nonpharmacological strategies including smoking cessation, pulmonary rehabilitation, vaccinations, treatment of comorbidities
Goals of Asthma Therapy

- Minimal or no chronic symptoms day or night
- Minimal or no exacerbations
- No limitations on activities; no school or work missed
- Maintain (near) normal pulmonary function
- Minimal use of short-acting inhaled beta$_2$-agonist
- Minimal or no adverse effects from medications
Asthma During Pregnancy

• Extremely variable – symptom severity may improve, worsen, or remain unchanged in approximately equal portions as compared with the pregravid state
• Increased risks
  - Perinatal mortality
  - Preeclampsia
  - IUGR
  - Preterm birth
  - LBW infants (greater risk for DM, hypertension, heart disease as adults)
Asthma During Pregnancy

- Monthly evaluation of asthma history and pulmonary function
- **Albuterol** is the preferred SABA (Category C)
- **ICS** are preferred controller medication
  - **Budesonide** preferred because it has the most reliable safety profile
- Cromolyn, LTRAs, LABAs, and theophylline may be alternatives, but have lower efficacy or less safety data available
- LABA should not be used as monotherapy
Asthma During Pregnancy

- Avoid allergens and irritants (smoking)
- Recognize and manage comorbid conditions
  - Allergic rhinitis
    - Nasal corticosteroids
    - Antihistamines (loratadine and cetirizine preferred)
  - Sinusitis – treat
  - GERD – treat

Inadequate control of asthma poses a greater risk to the fetus than asthma medications!
Theophylline

• Studies and clinical experience confirm the safety of theophylline at recommended doses during pregnancy
  - Serum concentration 5-12 mcg/mL
• Monitor closely for side effects and discontinuation of medication
## Stepwise Treatment Approach

<table>
<thead>
<tr>
<th>Severity</th>
<th>Symptoms/Day</th>
<th>Symptoms/Night</th>
<th><em>Preferred Treatment</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Intermittent</td>
<td>≤ 2d/week</td>
<td>≤ 2n/month</td>
<td>Prn budesonide-formoterol (GINA) or Prn SABA (NHLBI)</td>
</tr>
<tr>
<td>Mild Persistent</td>
<td>&gt; 2d/w, but &lt; daily</td>
<td>&gt; 2n/month</td>
<td>Low-dose inhaled corticosteroid* (&lt;sup&gt;(FDA Category C)&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Moderate Persistent</td>
<td>Daily</td>
<td></td>
<td>Low-dose inhaled or medium-dose inhaled corticosteroid; +/- long-acting inhaled beta&lt;sub&gt;2&lt;/sub&gt;-agonist (&lt;sup&gt;(FDA Category C)&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Severe Persistent</td>
<td>Continual</td>
<td></td>
<td>High-dose inhaled corticosteroid AND long-acting inhaled beta&lt;sub&gt;2&lt;/sub&gt;-agonist, AND, if needed, systemic corticosteroid (&lt;sup&gt;(FDA Category C)&lt;/sup&gt;)</td>
</tr>
</tbody>
</table>

* More data on using budesonide during pregnancy than on using other inhaled corticosteroids.
References

• Expert Panel Report 3 (EPR3): Guidelines for the Diagnosis and Management of Asthma
  • http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm
• ICSI Guidelines: Diagnosis and Management of Asthma
  • https://www.icsi.org/guideline/asthma-diagnosis-and-management-of/
• GINA Approach to Asthma:
• FENO: ATS Guidelines:
  https://www.thoracic.org/statements/resources/allergy-asthma/feno-document.pdf
Answers

1. C
2. C
3. B
4. C
5. B
6. A
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Selected Issues in Women’s Health

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Department of Family and Community Medicine
University of Nevada, Las Vegas School of Medicine
Disclosure Statement

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Discuss what is known about risk factors for common malignancies.
2. Recommend methods of screening for cancer in women.
3. Discuss the management of vasomotor instability and atrophic vaginitis.
4. Describe principles of patient selection regarding contraceptives.
5. Discuss the contraindications for various contraceptive methods.
6. State the indications regarding methods of emergency contraception.
7. Summarize the basic steps for the initial evaluation of the infertile couple.
8. Review the diagnosis and management of common breast issues.
Cancer

• Endometrial
• Ovarian
• Cervical
1. A 59 yo postmenopausal female presents with a recent onset of painless vaginal bleeding. Her last menses occurred 7 years ago and she has had no bleeding until 1 week ago. She reports that her Papanicolaou tests have always been normal, with the most recent obtained a year ago. A pelvic examination today is normal. Which one of the following management options is the preferred next diagnostic step?

A) Colposcopy with endocervical curettage
B) Transvaginal ultrasonography
C) Saline infusion sonohysterography
D) Hysteroscopy
Endometrial Cancer – Key Facts

- Most common gynecologic malignancy in the USA (adenocarcinoma)
- Abnormal uterine bleeding is the presenting sign in 85% of women with endometrial cancer.
  - Only 10-20% of postmenopausal women who are evaluated for uterine bleeding are diagnosed with endometrial cancer
  - Most common cause of postmenopausal bleeding is endometrial atrophy
  - Ensure that women understand the importance of reporting ANY postmenopausal bleeding. (There is no screening test.)
- Strongest association with reduced risk: Combined hormonal contraception use
  - 50% reduction in risk
  - Protection for 10-15 years after discontinuation
Histopathology

• Types
  – Type I, Endometroid adenocarcinoma – 70% of cases
    • Associated with unopposed estrogen stimulation (endogenous or exogenous)
    • Generally low-grade tumors
  – Type II, Papillary serous or clear cell; tend to be high grade – 10% of cases
    • Poor prognosis
    • High risk of relapse and metastasis
    • Associated with 40% of related deaths
  – Familial tumors – 10% of cases
    • Commonly found in association with Lynch Syndrome (hereditary nonpolyposis colorectal cancer)
  – Hyperplasia
    • Endometrial, 1-3% risk of progression
    • Atypical, 30-40% of patients with concomitant adenocarcinoma
## Risk Factors for Type I Uterine Cancer

### Factors Influencing Risk

<table>
<thead>
<tr>
<th>Factor</th>
<th>Estimated RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older age</td>
<td>2-3</td>
</tr>
<tr>
<td>Residency in North America or</td>
<td></td>
</tr>
<tr>
<td>Northern Europe</td>
<td>3-18</td>
</tr>
<tr>
<td>Higher level of education or income</td>
<td>1.5-2</td>
</tr>
<tr>
<td>White race</td>
<td>2</td>
</tr>
<tr>
<td>Nulliparity</td>
<td>3</td>
</tr>
<tr>
<td>History of infertility</td>
<td>2-3</td>
</tr>
<tr>
<td>Menstrual irregularities</td>
<td>1.5</td>
</tr>
<tr>
<td>Late age at natural menopause</td>
<td>2-3</td>
</tr>
<tr>
<td>Early age at menarche</td>
<td>1.5-2</td>
</tr>
<tr>
<td>Long-term use of opposed estrogen</td>
<td>10-20</td>
</tr>
<tr>
<td>Tamoxifen use</td>
<td>2-3</td>
</tr>
<tr>
<td>Obesity</td>
<td>2-5</td>
</tr>
<tr>
<td>Estrogen-producing tumor</td>
<td>&gt;5</td>
</tr>
<tr>
<td>History of type 2 diabetes, hypertension, gallbladder disease, or thyroid disease</td>
<td>1.3-3</td>
</tr>
<tr>
<td>Lynch syndrome</td>
<td>6-20</td>
</tr>
</tbody>
</table>
Younger Women

• Most common risk factors for development of endometrial cancer in young women:
  – Increasing BMI
  – Nulliparity
  – Irregular menses
    • Chronic anovulation (e.g., PCOS)
• Risk may increase as much as 22X in women younger than 45 whose BMIs are > 35
Unopposed Endogenous Estrogen

• Adipose tissue
  − Excessive peripheral conversion of androgens to estrone
  − Case-control studies have demonstrated a 200-400% linear increase in risk of endometrial cancer in individual with BMI > 25
Endometrial Cancer in Premenopausal Women?

- 20% of cases
- ACOG Recommendation – Evaluate
  - AUB ≥ 45 years
  - AUB < 45 years and have a history of unopposed estrogen exposure
SERMs and Endometrial Cancer

• Although raloxifene has estrogen-like effects on the uterus, it has NOT been shown to increase the risk of endometrial cancer. (SOR A)

• Tamoxifen is a selective estrogen receptor modulator that has estrogen-like effects. While it has a protective effect on breast tissue, its effect on the uterus INCREASES the risk of endometrial cancer. (SOR A)
Diagnostic Studies

• Type of initial study depends on availability of options and their level of invasiveness, and patient and physician preference
  − Transvaginal Ultrasonography
  − Endometrial Sampling
  − Saline Infusion Sonohysterography
  − Hysteroscopy
**Postmenopausal Bleeding: An Evidence-Based Workup**

H&P, Pap ± CBC, STD testing*

Perform EMB or TVUS

**EMB**
- Abnormal results
  - Refer for treatment
  - Normal results
    - Bleeding continues?
      - No: Begin observation period
      - Yes: Perform TVUS, SIS, or hysteroscopy

**TVUS**
- ET ≤ 4 mm (> 95% sensitivity)
  - Atrophic endometrium
- ET > 4 mm
  - Perform SIS, EMB, or hysteroscopy with biopsy

Refer for treatment

**Preferred initial test for a patient with painless postmenopausal bleeding**

---

**Can the “content” of the endometrial stripe be reliably assessed by TVUS?**
What Are We Looking for on the Endometrial Sampling?

• Cytologic atypia is the SINGLE most important histologic finding.
• Only ATYPICAL hyperplasia has a significant risk of developing into endometrial cancer.  
  − 29% progresses to invasion.  
  − Need to rule out cancer if atypia is present.
• Endometrial hyperplasia is a BENIGN condition, not a cancer precursor.
Triage Guidelines
Reproductive Age Women

• No cytologic atypia
  – Simple EMHP with abnormal bleeding
    • Progestin withdrawal for 6 months, then rebiopsy
  – Complex (adenomatous) EMHP
    • Progestin withdrawal, then rebiopsy

• Cytologic atypia
  – High-dose progestins, megestrol, or medroxyprogesterone (Depo-Provera) for 3 months, then rebiopsy
Triage Guidelines

Postmenopausal Women

- No cytologic atypia
  - Progestins for 6 months, then rebiopsy
  - TAH for recurrent EMHP or bleeding
- Cytologic atypia (substantial risk of deeply invasive or poorly differentiated cancer)
  - Hysterectomy
Treatment

• Surgery
  − Hysterectomy
  − Debulking

• Adjuvant radiotherapy

• Systemic adjuvant therapy
  − Chemotherapy
  − Hormone Therapy
<table>
<thead>
<tr>
<th>Clinical Recommendation</th>
<th>Evidence Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women older than 65 years should be informed of the risks and symptoms of endometrial</td>
<td>C</td>
</tr>
<tr>
<td>cancer and advised to seek evaluation if symptoms occur.</td>
<td></td>
</tr>
<tr>
<td>Women with abnormal uterine bleeding should be evaluated for endometrial cancer if they</td>
<td>C</td>
</tr>
<tr>
<td>are older than 45 years or if they have a history of unopposed estrogen exposure.</td>
<td></td>
</tr>
<tr>
<td>In postmenopausal women, the endometrial thickness on transvaginal ultrasonography</td>
<td>C</td>
</tr>
<tr>
<td>should be less than 4 to 5 mm. With thickness above this level, biopsy should be</td>
<td></td>
</tr>
<tr>
<td>considered to rule out endometrial hyperplasia or cancer.</td>
<td></td>
</tr>
</tbody>
</table>
Ovarian Cancer

• The most lethal of the gynecologic malignancies
  – Epithelial ovarian is the most common type (90%)
  – Most commonly diagnosed in those 55 to 64 years of age
  – 10-12% of cases are genetically predisposed
• Majority have no identifiable risk factors (90%)
  – Lifetime risk of 1.3%
• Highest risk factor: genetic predisposition
  – 90% are inherited mutations in either BRCA1/2 genes
• Assess response to treatment by serial Ca-125 levels
  – 90% correlation with disease progression
# Ovarian Cancer

## Risk Factors Summary

<table>
<thead>
<tr>
<th>Increased Risk</th>
<th>Decreased Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Delayed childbearing</td>
<td>• Breastfeeding &gt; 18 months</td>
</tr>
<tr>
<td>• Early menarche</td>
<td>• Early menopause</td>
</tr>
<tr>
<td>• Endometriosis</td>
<td>• Multiparity (risk decreases with each additional pregnancy)</td>
</tr>
<tr>
<td>• ERT &gt; 5 years</td>
<td>• Salpingectomy</td>
</tr>
<tr>
<td>• Family history suggesting genetic predisposition</td>
<td>• Late menarche</td>
</tr>
<tr>
<td>• Genetic syndromes</td>
<td>• Low-fat diet</td>
</tr>
<tr>
<td>• High-fat diet</td>
<td>• OCP use</td>
</tr>
<tr>
<td>• Late menopause</td>
<td>• DMPA</td>
</tr>
<tr>
<td>• Low parity</td>
<td>• Tubal ligation</td>
</tr>
<tr>
<td>• Obesity or weight gain</td>
<td></td>
</tr>
</tbody>
</table>

**Best Evidence**

AMERICAN ACADEMY OF FAMILY PHYSICIANS
Ovarian Cancer Prevention

- **OCPs and a decreased incidence**
  - 40% reduction among all users
  - 50% reduction with use > 5 years
  - Up to 80% reduction with use > 10 years
  - Protective effect persists up to 15 years after discontinuation.
  - *50% in BRCA-mutation carriers with long-term use (> 4 years)*

- **DMPA use**
- **Breastfeeding**
  - Each month of breastfeeding results in a 1-2% decrease.

- **Tubal sterilization**
  - Decreases risk by ~ 18-40%; mechanism for the protective effect is unknown; some experts theorize it stops carcinogens from reaching the ovaries after they enter the body via the vagina.

- **Avoid talc powders in genital hygiene.**
- **Greater than one full-term pregnancy prior to age 35**
- **Prophylactic oophorectomy**
Pathogenesis

- Epithelial ovarian cancer
  - 90% of ovarian cancers
  - 90% of deaths from ovarian cancer
- Traditional view – epithelial ovarian cancer derives from elements of the ovary
- New view – epithelial ovarian cancer derives from elements of the fallopian tube and endometrium
- Research has also pointed to a protective effect of tubal ligation against endometroid and clear cell carcinomas, suggesting these tumors may arise from retrograde menses
Pathogenesis

• Lim and Oliva – 2013
  - Lining epithelium of the adjacent fallopian tubes – especially their fimbriated ends – can give rise to pre- and then fully malignant transformation with sloughing, seeding, invaginations, and cyst formation within the adjacent ovary
  - Bilateral salpingectomies prior to the full fruition of this fallopian epithelial process, most serous ovarian cancers can be prevented before they begin

ACOG Opinion
Committee on Gynecologic Practice
Obstet Gynecol. 2015;125:279-281

• Opinion specifically addresses women at “population risk” for ovarian cancer – women without a genetic risk – but who are having routine pelvic surgery for benign disease

• “Salpingectomy at time of hysterectomy or as a means of tubal sterilization appears to be safe, without an increase in complications…compared with hysterectomy alone or tubal ligation.”
ACOG Recommendations – 2015

• In women at population risk for ovarian cancer, surgeons should discuss the potential benefits of salpingectomy.
• In women considering laparoscopic sterilization, physicians can discuss the fact that bilateral salpingectomy provides effective contraception, while pointing out that this procedure eliminates the option of tubal reversal.
• Prophylactic salpingectomy may prevent ovarian cancer in some patients.
• More RCTs are needed to support the use of salpingectomy in reducing ovarian cancer.
Evaluation

- **Transvaginal ultrasonography**
  - Test of choice for suspected adnexal mass
  - Looking for: evidence of metastatic disease, suspicious or persistent complex adnexal mass, increased ovarian volume (>20 mL in premenopausal; >10 after menopause)
- **Consider CA 125**
  - > 200 U per mL in premenopausal women
  - Any elevation in postmenopausal women
Treatment

- Surgery
- Chemotherapy
  - Postsurgical adjuvant chemotherapy (intraperitoneal and intravenous) for late-stage disease; not indicated for disease confined to the ovary
  - Neoadjuvant chemotherapy has no advantage over postsurgical initiation
- Evidence does not support routine maintenance chemotherapy following the primary course
Screening

• USPSTF recommends AGAINST screening
  − (Ultrasound and CA-125)
• High-risk family history (two or more first- or second-degree relatives with a history of ovarian cancer or a combination of breast and ovarian cancer, or a woman of Ashkenazi Jewish descent with a first-degree relative or two second-degree relatives on the same side of the family) with breast OR ovarian cancer
  − Offer referral for genetic counseling and, if appropriate, genetic testing
### Best Practice Recommendations

<table>
<thead>
<tr>
<th>Clinical Recommendation</th>
<th>Evidence Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women should undergo diagnostic imaging with transvaginal ultrasonography if there is strong clinical suspicion for ovarian cancer based on clinical presentation or a pelvic mass.</td>
<td>C</td>
</tr>
<tr>
<td>The USPSTF and the AAFP recommend against routine screening for ovarian cancer in asymptomatic women.</td>
<td>C</td>
</tr>
<tr>
<td><strong>The USPSTF and the AAFP recommend that women with a family history associated with an increased risk of harmful BRCA mutations be referred for genetic counseling.</strong></td>
<td>A</td>
</tr>
<tr>
<td>The American College of Physicians recommends against routine screening pelvic examinations in asymptomatic women.</td>
<td>C</td>
</tr>
</tbody>
</table>
Cervical Cancer

Cervical cancer is an STD caused by HPV!

- Worldwide – the fourth leading cause of cancer deaths in women
  - Developing countries – second most common cause of cancer deaths in women
- Screening programs have dramatically reduced the rate in screened population.
  - 70% reduction in the U.S. over the past five decades
- **Condoms appear to be an effective barrier against HPV transmission.**
  - HPV infection is primarily transmitted through contact with infected skin or mucosal surfaces.
2. As part of routine care for a 33 yo female, you obtain a Pap test for cervical cancer screening. The cytology results are negative for intraepithelial neoplasia, and the sample is positive for the presence of HPV but negative for serotypes 16 and 18. Which one of the following is the most appropriate management for this patient?

A. Immediate colposcopy  
B. Repeat HPV testing in 6 months  
C. Repeat Pap and HPV testing in 12 months  
D. Repeat Pap and HPV testing in 36 months
## Screening for Cervical Cancer

<table>
<thead>
<tr>
<th>Group</th>
<th>USPSTF – 2018*</th>
<th>ACS, ASCCP, ACCP – 2012*; ACOG 2013*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women ages 21-29</td>
<td>Screen with cytology q 3 years. (A)</td>
<td>Screen with cytology q 3 years. (A)</td>
</tr>
<tr>
<td>Women ages 30-65</td>
<td>Screen with cytology alone q 3 years OR HPV testing <strong>alone</strong> q 5 years. (A)</td>
<td>Screen with co-testing (cytology/HPV) q 5 years (<strong>preferred</strong> or cytology q 3 y. (A)</td>
</tr>
<tr>
<td>Women &lt; age 21</td>
<td>Do not screen. (D)</td>
<td></td>
</tr>
<tr>
<td>Women &gt; 65 who have had adequate prior screening and are NOT at high risk</td>
<td>Do not screen. (D)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The ACS/ASCCP/ASCP/ACOG guidelines define adequate prior screening: 3 consecutive (-) cytology results or 2 consecutive (-)HPV results within 10 y before cessation of screening, with the most recent test occurring within 5 y.</td>
<td></td>
</tr>
<tr>
<td>Women after hysterectomy with removal of cervix AND no history of HGSIL or cervical CA</td>
<td>Do not screen. (D)</td>
<td></td>
</tr>
<tr>
<td>Women &lt; age 30</td>
<td>Do not screen with HPV testing (alone or with cytology) (D)</td>
<td></td>
</tr>
</tbody>
</table>

*This recommendation statement applies to all women who have a cervix, regardless of sexual history*
• *Do not* perform Papanicolaou tests for surveillance of women with a history of endometrial cancer

*Source: [http://www.choosingwisely.org](http://www.choosingwisely.org). For supporting citations and to search Choosing Wisely recommendations relevant to primary care, see [http://www.aafp.org/afp/recommendations/search.htm](http://www.aafp.org/afp/recommendations/search.htm).*
Cytology Negative, but HPV Positive

Management of Women ≥ Age 30, who are Cytology Negative, but HPV Positive

- Repeat Cotesting @ 1 year Acceptable
  - Cytology Negative and HPV Negative
    - Repeat Cotesting @ 3 years
  - ≥ ASC or HPV Positive
- HPV DNA Typing Acceptable
  - HPV 16 or 18 Positive
  - Repeat Cotesting @ 1 year
  - HPV 16 and 18 Negative
- Colposcopy
  - Manage per ASCCP Guideline

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AMERICAN ACADEMY OF FAMILY PHYSICIANS
FDA Panel: HPV DNA Test Before Pap for Cervical Cancer Screening

(24 April 2014)

• Approval for the cobas human papillomavirus (HPV) test (Roche) alone for primary cervical cancer screening of women aged ≥ 25 years.
  – Using a sample of cervical cells, the cobas HPV Test detects DNA from 14 high-risk HPV types; including HPV 16 and 18.
  – Previously, FDA-approved (2011) for use along with cervical cytology in women aged ≥ 30 years to screen for the presence or absence of high-risk HPV types, 16 and 18; also used as a follow-up test in patients aged 21 years and older with abnormal cytology results.
• Recommended indication is for first-line primary cervical screening to detect high-risk HPV, including genotyping for genotypes 16 and 18.
...and what is the follow-up?

• Women who test **negative** for high-risk HPV types should have follow-up in accordance with the physician's assessment of screening and medical history, other risk factors, and **professional guidelines**.

• Women who test **positive** for HPV genotypes 16 and/or 18 by the cobas HPV Test should be referred to **colposcopy**.

• Women who test high-risk HPV positive and 16/18 **negative** by the cobas HPV Test (12 other [high-risk] HPV positive) should be evaluated by **cervical cytology** to determine the need for colposcopy.
More Sensitive Than Cytology?

Ronco G et. al., http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(13)62218-7/fulltext

• Prospective Cohort Study – 47,208 women
  - Cobas HPV test (candidate) and Cytology at baseline (comparator)

• Disease evaluation
  - Abnormal cytology
  - Positive cobas HPV test
  - Randomly assigned subset of patients with high-risk HPV negative and normal cytology results

• The candidate was also tested against the currently recommended cervical cancer screening algorithm, which includes cytology testing on all women and HPV testing on a subset of women according to their age and cytology results
### Results

<table>
<thead>
<tr>
<th></th>
<th>Candidate (95% CI)</th>
<th>Comparator (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity for $\geq$ CIN3</td>
<td>58.26% (44.02-74.37)</td>
<td>42.63% (31.75-55.41)</td>
</tr>
<tr>
<td>PPV $\geq$ CIN3 in women referred to colposcopy</td>
<td>12.25% (10.69-13.91)</td>
<td>6.47% (5.54-7.50)</td>
</tr>
<tr>
<td>Risk for $\geq$ CIN3 in those not referred for colposcopy</td>
<td>0.42% (0.20-0.74)</td>
<td>0.59 (0.36-0.92)</td>
</tr>
<tr>
<td>False (+) rate for $\geq$ CIN3</td>
<td>4.09% (3.89-4.28)</td>
<td>6.04 (5.81-6.27)</td>
</tr>
</tbody>
</table>

✓ 3 very different options that have very potentially different intervals, different triage trees

✓ The challenge is now there for professional societies...to put together data-driven, evidence-based algorithms to the extent that there is data, and then go forward with robust education for providers and for patients
Next Step…

• ASCCP and SGO have developed a guidance document – based on the final ATHENA study data being published

  Guidance Report
  • http://www.asccp.org/Portals/9/docs/News/HPV%20Guidance%20Doc%20Article_main.pdf

  ATHENA Study
  • http://www.asccp.org/Portals/9/docs/News/ATHENA-article_YGYNO_975716.pdf
Rescreening after a negative primary hrHPV screen should occur no sooner than every 3 years.

Primary hrHPV screening should begin 3 years after the last negative cytology and should not be performed automatically at 25 if screening is up to date.
# Gynecological Conditions:

**Screening With the Pelvic Examination**

**USPSTF – MARCH 2017**

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade (What’s This?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic, nonpregnant adult women who are not at increased risk for any specific gynecologic condition</td>
<td>The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of performing screening pelvic examinations in asymptomatic women for the early detection and treatment of a range of gynecologic conditions. This statement does not apply to specific disorders for which the USPSTF already recommends screening (i.e., screening for cervical cancer with a Papanicolaou [“Pap”] smear, screening for gonorrhea and chlamydia). See the Table for more information.</td>
<td>I</td>
</tr>
</tbody>
</table>
What This Statement DOES NOT Mean...

• The USPSTF has clarified that it is recommending neither for nor against screening with pelvic examination for gynecologic conditions other than cervical cancer, gonorrhea, or chlamydia.
• **Recommendation:** The American College of Physicians recommends against performing screening pelvic examination in asymptomatic, nonpregnant, adult women (*strong recommendation, moderate-quality evidence*).

• Current evidence shows that harms outweigh any demonstrated benefits associated with the screening pelvic examination.

• Indirect evidence showed that screening pelvic examination does not reduce mortality or morbidity rates in asymptomatic adult women, as 1 trial showed that screening for ovarian cancer with more sensitive tests (transvaginal ultrasonography and CA-125) also did not reduce mortality or morbidity rates. Because CA-125 and transvaginal ultrasonography found all cancer detected by the screening pelvic examination as well as additional cancer and this earlier detection did not lead to a reduction in morbidity or mortality rates, the guideline authors conclude that the screening pelvic examination alone would also not reduce morbidity or mortality rates.

• No studies assessed the benefit of pelvic examination for other gynecologic conditions, such as asymptomatic pelvic inflammatory disease, benign conditions, or gynecologic cancer other than cervical or ovarian cancer.

• Low-quality evidence that screening pelvic examination leads to harms, including fear, anxiety, embarrassment, pain, and discomfort, and possibly prevents women from receiving medical care.

• False-positive screening results can lead to unnecessary laparoscopies or laparotomies.

• Note that this guideline is focused on screening asymptomatic women; full pelvic examination with bimanual examinations is indicated in some non-screening clinical situations.

• This guideline does not address women who are due for cervical cancer screening. **However, the recommended cervical cancer screening examination should be limited to visual inspection of the cervix and cervical swabs for cancer and human papillomavirus and should not entail a full pelvic examination.**

Resources

- American Society for Colposcopy and Cervical Pathology: [www.asccp.org](http://www.asccp.org)
  - Algorithms
  - Applications
Essential Changes From 2006 Guidelines

• Cytology reported as negative but lacking endocervical cells – managed without early repeat.

• CIN 1 on endocervical curettage should be managed as CIN 1, NOT as a positive ECC.

• Cytology reported as unsatisfactory requires repeat even if HPV negative.

• Genotyping triages HPV-positive women with HPV type 16 or type 18 to earlier colposcopy only after negative cytology; colposcopy is indicated for all women with HPV and ASC-US, regardless of genotyping result.
Essential Changes From 2006 Guidelines

• For ASC-US cytology, immediate colposcopy is NOT an option. The serial cytology option for ASC-US incorporates cytology at 12 months, NOT 6 months and 12 months, and then if negative, cytology every 3 years.

• HPV-negative and ASC-US results should be followed with co-testing at 3 years rather than 5 years.

• HPV-negative and ASC-US results are insufficient to allow exit from screening at age 65 years.

• The pathway to long-term follow-up of treated and untreated CIN 2+ is more clearly defined by incorporating co-testing.
Essential Changes From 2006 Guidelines

• More strategies incorporate co-testing to reduce follow-up visits. Pap-only strategies are now limited to women younger than 30 years, but co-testing is expanded even to women younger than 30 years in selected circumstances.

• **Women aged 21-24 years are managed conservatively.**
Prevention

• **Condom use**
  – May reduce the risk for HPV-associated diseases (e.g., genital warts and cervical cancer)
  – Use associated with higher rates of regression of CIN and clearance of HPV infection in women; regression of HPV-associated penile lesions in men
  – Limited number of prospective studies have demonstrated a protective effect of condoms on the acquisition of genital HPV

• **Tobacco cessation**
  – Quit

• **Vaccination – Gardasil 9**
HPV Vaccine – 2019

• Begin series BEFORE age 15 (well known – antibody response STRONGER in young children)
  – Two dose vaccine series
  – Time zero and 6-12 months
• Routine vaccination at age 11-12
  – Can begin as young as age 9 REGARDLESS of whether they have a history of sexual assault or abuse (Starting at a younger age helps take the question of sexual activity out of the discussions?)
• To be considered immunized, 5 or more months MUST have passed between the first and second doses, other wise third dose should be given at 6 months
• Immunocompromised persons (regardless of age) and ANYONE starting series AFTER age 15, 3 doses (Time 0, 1-2 months, six months)

Best Practice Recommendations

✓ Data does not support cervical cancer screening in girls and young women < 21 years of age.
✓ Do not screen women for cervical dysplasia after hysterectomy with removal of cervix AND no history of HGSIL or cervical CA.
✓ Do not perform Papanicolaou tests for surveillance of women with a history of endometrial cancer.
✓ Adolescent prevention programs should focus on prevention of HPV infection through universal HPV vaccination.
✓ The nonavalent human papillomavirus vaccine may be considered in males and females 9 to 26 years of age to prevent genital warts and cervical and anal cancers.
Menopause

• Vasomotor Instability
• Atrophic vaginitis
Hot Flashes

• After menopause, up to 85% of women experience hot flashes as a result of vasomotor instability.

• Probably hypothalamic origin
  o Menopause
  o Thyroid disease
  o Panic or anxiety disorder
  o Insulinoma
  o Autoimmune disorders
  o Pheochromocytoma
  o Carcinoid syndrome
  o Tamoxifen and raloxifene
Influences on Hot Flashes

• Cultural
  – More prevalent in African American and Latin American women than in white women
  – Less common in Chinese and Japanese women

• Other variables associated with increased reporting of hot flashes
  – Cigarette smoking
  – Potential risk factors with inconsistent association
    • Maternal history
    • Early age of menarche and menopause onset
    • History of irregular menses
    • Higher BMI
    • Alcohol use
    • Hot/humid weather
Hormonal Medications Effective in Treating VMS

• Systemic HT with estrogen alone or in combination with progestin, is THE MOST EFFECTIVE therapy for vasomotor symptoms related to menopause
  – Orally or transdermally
• Data DO NOT SUPPORT the use of the following
  – Progesterone-only medications
  – Testosterone
  – Compounded bioidentical hormones
NAMS Position Statement on HT – 2017

• Most effective treatment for vasomotor symptoms (VMS) and the genitourinary syndrome of menopause (GSM)
• Has been shown to PREVENT bone loss AND fracture
• Risks differ depending on type, dose, duration of use, route of administration, timing of initiation, AND whether a progestogen is used
• Treatment should be individualized to identify the most appropriate HT type, dose, formulation, route of administration, and duration of use, using the best available evidence to maximize benefits and minimize risks, with periodic reevaluation of the benefits and risks of continuing or discontinuing HT.
NAMS Position Statement on HT – 2017

• Women aged < 60 years OR who are within 10 years of menopause onset and have no contraindications, the benefit-risk ratio is most favorable for treatment of bothersome VMS and for those at elevated risk for bone loss or fracture.

• For women who initiate HT > 10 or 20 years from menopause onset or are aged > 60 years, the benefit-risk ratio appears less favorable because of the greater absolute risks: coronary heart disease, stroke, venous thromboembolism, and dementia.

• Longer durations of therapy should be for documented indications such as persistent VMS or bone loss, with shared decision-making and periodic reevaluation.
FDA Indications

• Indications for hormone therapy approved by the U.S. Food and Drug Administration (FDA) in menopausal women are limited to the treatment of menopausal symptoms and the prevention of postmenopausal osteoporosis

• An FDA-issued black box warning indicates that estrogen therapy, with or without progestin, should be prescribed at the lowest effective dose and for the shortest duration consistent with the patient's treatment goals and risks.

# Hormonal Treatment Options

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dosage/Regimen</th>
<th>Evidence of benefit*</th>
<th>FDA Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estrogen alone or combined with progestin</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Dose</td>
<td>Conjugated estrogen 0.625 mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Micronized estradiol-17β 1mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Transdermal estradiol-17β 0.0375-0.05 mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Low Dose</td>
<td>Conjugated estrogen 0.3-0.45 mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Micronized estradiol-17β 0.5mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Transdermal estradiol-17β 0.025 mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ultra-Low Dose</td>
<td>Micronized estradiol-17β 0.25 mg/d</td>
<td>Mixed</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Transdermal estradiol-17β 0.014 mg/d</td>
<td>Mixed</td>
<td>No</td>
</tr>
<tr>
<td><strong>Estrogen combined with estrogen agonist/antagonist</strong></td>
<td>Conjugated estrogen 0.45 mg/d and bazedoxifene 20mg/d</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Progestin</strong></td>
<td>Depot medroxyprogesterone acetate</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Testosterone</strong></td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Tibolone (Synthetic steroid)</strong></td>
<td>2.5 mg/d</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Compounded bioidentical hormones</strong></td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

*Compared with placebo
### Selected Estrogen and Progestin Preparations for the Treatment of Menopausal Vasomotor Symptoms

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Doses (mg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estrogen</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>Conjugated estrogens</td>
<td>Premarin</td>
<td>0.3, 0.45, 0.635, 1.25</td>
</tr>
<tr>
<td>17β-Estradiol</td>
<td></td>
<td>Estrace</td>
<td>0.5, 1.0, 2.0</td>
</tr>
<tr>
<td>Transdermal</td>
<td>17β-Estradiol</td>
<td>Alora</td>
<td>0.025, 0.05, 0.075, 0.1 (patch applied twice weekly)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Climara</td>
<td>0.025, 0.0375, 0.05, 0.075, 0.1 (patch applied weekly)</td>
</tr>
<tr>
<td>Vaginal</td>
<td>Estradiol acetate</td>
<td>Femring vaginal ring ±</td>
<td>0.05, 0.1 (inserted every 90 days)</td>
</tr>
<tr>
<td><strong>Progestogen</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>MPA</td>
<td>Provera</td>
<td>2.5, 5.0, 10.0</td>
</tr>
<tr>
<td></td>
<td>Micronized progesterone</td>
<td>Prometrium</td>
<td>100, 200 (in peanut oil)</td>
</tr>
<tr>
<td>Vaginal</td>
<td>Progesterone</td>
<td>Prochieve 4%</td>
<td>45</td>
</tr>
<tr>
<td><strong>Combination preparation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral sequential €</td>
<td>Conjugated estrogens and MPA</td>
<td>Premphase</td>
<td>0.625 conjugated estrogens plus 5.0 MPA</td>
</tr>
<tr>
<td>Oral continuous ¥</td>
<td>Conjugated estrogens and MPA</td>
<td>Prempro</td>
<td>0.625 conjugated estrogens plus 2.5-5.0 MPA; 0.45 conjugated estrogens plus 2.5 MPA; or 0.3 or 0.45 conjugated estrogens plus 1.5 MPA;</td>
</tr>
<tr>
<td>Transdermal continuous ¥</td>
<td>17β-estradiol-norethindrone acetate</td>
<td>Activella</td>
<td>1.0 estradiol plus 0.5 norethindrone</td>
</tr>
<tr>
<td></td>
<td>17β-estradiol-levonorgestrel</td>
<td>Climara Pro</td>
<td>0.045 estradiol plus 0.015 levonorgestrel (patch applied weekly)</td>
</tr>
<tr>
<td></td>
<td>17β-estradiol-norethindrone acetate</td>
<td>CombiPatch</td>
<td>0.05 estradiol plus 0.14 or 0.25 norethindrone (patch applied twice weekly)</td>
</tr>
</tbody>
</table>
Bioidentical Hormones

• Plant derived, chemically similar or structurally identical to those produced by the body
  − FDA Approved
    • Micronized progesterone
    • Estradiol
    • Estrone
  − Non-FDA regulated
    • Compounded preparations; purity, potency, and quality are concern
    • Overdosage and underdosage possible because of variable bioactivity and bioavailability
NAMS Position Statement 2017

*(Bioidentical HT)*

- Compounded bioidentical HT presents safety concerns such as minimal government regulation and monitoring, overdosing or underdosing, presence of impurities or lack of sterility, lack of scientific efficacy and safety data, and lack of a label outlining risks.
- Salivary hormone testing to determine dosing is unreliable.
- Prescribers of compounded bioidentical HT should document the medical indication for compounded HT over government-approved therapies, such as allergy or the need for dosing or a formulation not available in FDA-approved products.
Testosterone?

• In combination with HT has been investigated for treatment of menopausal symptoms
  – No benefit
  – Potential adverse effects
    • Detrimental effects on lipid parameters
    • Clitoromegaly
    • Hirsutism
    • Acne
• In combination with HT for postmenopausal women
  – Improved sexual function scores
  – Improved number of satisfying sexual episodes
• Alone, NOT FDA-approved for use in women

Menopausal Hormone Therapy for the Primary Prevention of Chronic Conditions – 2017

• The USPSTF recommends against the use of combined estrogen and progestin for the prevention of chronic conditions in postmenopausal women. Grade: D Recommendation

• The USPSTF recommends against the use of estrogen for the prevention of chronic conditions in postmenopausal women who have had a hysterectomy. Grade: D Recommendation
### Risks

*( Majority of trials – conjugated equine estrogen alone or in combination with medroxyprogesterone acetate)*

<table>
<thead>
<tr>
<th>Estimated Event Rate Difference Associated with <strong>Combined Estrogen and Progestin Use vs. Placebo</strong> in Postmenopausal Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
</tr>
<tr>
<td>Breast Cancer (invasive)</td>
</tr>
<tr>
<td>Coronary Heart Disease</td>
</tr>
<tr>
<td>Dementia (probable)*</td>
</tr>
<tr>
<td>Gallbladder disease</td>
</tr>
<tr>
<td>Stroke</td>
</tr>
<tr>
<td>Venous thromboembolism</td>
</tr>
<tr>
<td>Urinary incontinence</td>
</tr>
</tbody>
</table>

**Harms**

* - Women aged 65 years and older
Risks

(Majority of trials – conjugated equine estrogen alone or in combination with medroxyprogesterone acetate)

<table>
<thead>
<tr>
<th>Estimated Event Rate Difference Associated with Combined Estrogen and Progestin Use vs. Placebo in Postmenopausal Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>All fractures (hip and vertebral)</td>
</tr>
<tr>
<td>Colorectal cancer</td>
</tr>
</tbody>
</table>

---

## Risks

*(Majority of trials – conjugated equine estrogen alone or in combination with medroxyprogesterone acetate)*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Absolute event rate difference per 10,000 woman-years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estimated Event Rate Difference</strong>&lt;br&gt;Associated with Estrogen Use Alone vs. Placebo in Postmenopausal Women</td>
<td></td>
</tr>
<tr>
<td>Dementia (probable)*</td>
<td>12</td>
</tr>
<tr>
<td>Gallbladder disease</td>
<td>30</td>
</tr>
<tr>
<td>Stroke</td>
<td>11</td>
</tr>
<tr>
<td>Venous thromboembolism</td>
<td>11</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>1,261</td>
</tr>
</tbody>
</table>

**Harms**

* -Women aged 65 years and older
## Risks
*(Majority of trials – conjugated equine estrogen alone or in combination with medroxyprogesterone acetate)*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Absolute event rate difference per 10,000 woman-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td></td>
</tr>
<tr>
<td>Breast cancer (invasive)</td>
<td>-7</td>
</tr>
<tr>
<td>All fractures (hip and vertebral)</td>
<td>-53</td>
</tr>
<tr>
<td>Diabetes</td>
<td>-19</td>
</tr>
</tbody>
</table>

3. A 52 yo patient currently takes no prescribed or over-the-counter medications and declines estrogen replacement therapy. Which one of the following would be most effective for relieving this patient’s menopausal symptoms?

A. Venlafaxine (Effexor)
B. Propranolol
C. Soy protein
D. Vitamin E
## Nonhormonal Medications

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Evidence of Benefit in treating VMS</th>
<th>FDA Approved for treatment of VMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSRIs and SSNRIs</td>
<td>Yes, but less effective than HT for vasomotor symptoms</td>
<td>Paroxetine mesylate (7.5 mg/d) is the ONLY nonhormonal therapy FDA approved (6/2013)</td>
</tr>
<tr>
<td>Clonidine</td>
<td>Small benefit compared to placebo; less benefit compared to HT</td>
<td>No</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>Yes; but HT more effective</td>
<td></td>
</tr>
<tr>
<td>Phytoestrogens (plant-derived substances with estrogenic biologic activity; e.g., isoflavones, genistein, daidzein) found in soybeans, soy products, red clover</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[Lethaby A et al., Phytoestrogens for VMS. Cochrane Database of Systematic Reviews 2007, Issue 4. Art. No.:CD001395.]</td>
<td>No</td>
</tr>
<tr>
<td>Herbal remedies e.g. ginseng, black cohosh, ginko biloba</td>
<td>Insufficient data to support use of herbal remedies</td>
<td>No</td>
</tr>
<tr>
<td>Vitamins</td>
<td>Limited data; one less hot flush per day has been reported with Vitamin E (800 IU/d)</td>
<td>No</td>
</tr>
</tbody>
</table>
# Menopausal Symptoms – Nonhormonal Treatment Options

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (orally daily)</th>
<th>Side Effects</th>
<th>Superior to Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conventional</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clonidine</td>
<td>0.1-0.4 mg</td>
<td>Drowsiness, dry mouth, constipation, hypotension, insomnia, postural</td>
<td>Yes; no long-term studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hypotension, reaction to skin patch; to discontinue slowly reduce dose to</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>avoid rebound hypertension, headaches, and agitation</td>
<td></td>
</tr>
<tr>
<td>SSRIs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoxetine</td>
<td>20-30 mg</td>
<td>Dry mouth, insomnia, sedation, decreased appetite, constipation</td>
<td>Inconsistent effect; few studies, side</td>
</tr>
<tr>
<td>ParoxetineXR</td>
<td>12.5-25 mg</td>
<td></td>
<td>effects profile significant, no long-term</td>
</tr>
<tr>
<td>Venlafaxine XR</td>
<td>37.5-75 mg</td>
<td></td>
<td>studies</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>900 mg in divided</td>
<td>Somnolence, fatigue, dizziness, and palpitations</td>
<td>Yes; no long term studies</td>
</tr>
<tr>
<td></td>
<td>doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alternative</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Cohosh</td>
<td>2-4 mg of terpene</td>
<td>Diarrhea and vomiting, skin rash, dizziness, headaches, weight gain. Case</td>
<td>Yes, but inconclusive results, long-term</td>
</tr>
<tr>
<td></td>
<td>glycoside or 4 mL</td>
<td>reports on autoimmune hepatitis and asthenia</td>
<td>safety not known; caution with estrogen-</td>
</tr>
<tr>
<td></td>
<td>of tincture</td>
<td></td>
<td>dependent tumors</td>
</tr>
<tr>
<td>Red Clover</td>
<td>40-80 mg</td>
<td>Headache, myalgia, arthralgia, nausea, diarrhea. Contraindicated in bleeding</td>
<td>Inconsistent effect; few studies, long-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disorders</td>
<td>term safety unknown</td>
</tr>
<tr>
<td>Phytoestrogens</td>
<td>34-100 mg</td>
<td>Mastalgia, weight gain, a case report of hypertensive crisis</td>
<td>Inconclusive</td>
</tr>
<tr>
<td>Ginseng</td>
<td>200 mg</td>
<td>Insomnia, mastalgia, skin eruptions, G1, interacts with warfarin</td>
<td>Few studies</td>
</tr>
<tr>
<td>Evening Primrose</td>
<td>500 mg</td>
<td>Gastrointestinal, headache, lowers seizure threshold in epileptics</td>
<td>Only one randomized study</td>
</tr>
<tr>
<td>Dong quai</td>
<td>450 mg</td>
<td>Photosensitization, warfarin interaction</td>
<td>Only one randomized study</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>50-100 mg</td>
<td>Diarrhea, abdominal pain</td>
<td>Only one randomized study</td>
</tr>
</tbody>
</table>
Alternative Techniques

- Acupuncture
  - No benefit over placebo
- Reflexology
  - No benefit compared with nonspecific foot massage
- Local injection of anesthetic into the stellate ganglion¹
  - May reduce VMS in women with contraindications to HT
  - More studies needed

Best Practice Recommendations

• Systemic HT, with estrogen alone or in combination with progestin, is the most effective therapy for vasomotor symptoms related to menopause. (SOR: A)

• Given the variable response to HT and the associated risks, it is recommended that health care providers individualize care and treat women with the lowest effective dose for the shortest duration that is needed to relieve symptoms. (SOR: C)

• The decision to continue HT should be individualized and be based on a woman’s symptoms and the risk-benefit ratio, REGARDLESS OF AGE. (SOR: C)

• Combined estrogen/progesterone therapy, but NOT estrogen alone, increases the risk of breast cancer after three to five years of use (SOR: B)

• Data do not support the use of progestin-only medications, testosterone, or compounded bioidentical hormones for the treatment of vasomotor symptoms.

• Vaginal estrogen therapy preferred over systemic therapy for women treated solely for vaginal atrophy symptoms. (SOR: B)
Atrophic Vaginitis
Definition

• **Atrophic vaginitis** (also known as **vaginal atrophy** or **urogenital atrophy**) – inflammation of the vagina (and the outer urinary tract) due to the thinning and shrinking of the tissues, as well as decreased lubrication. Symptoms are due to lack of estrogen.

• Cause of vaginal atrophy is the decrease in estrogen
  - Naturally (perimenopause, and increasingly so in post-menopause)
  - Breastfeeding
  - Medications intended to decrease estrogen to, for example, treat endometriosis
Signs and Symptoms

• **Genital symptoms**
  – Dryness, itching, burning, soreness, pressure, white discharge, malodorous discharge due to infection, painful sexual intercourse, bleeding after intercourse
  – In addition, sores and cracks may occur spontaneously
  – Atrophic vaginitis is **one possible cause** of postmenopausal bleeding

• **Shrinkage of the tissues and loss of flexibility can be extreme enough to make intercourse impossible**

• **Urinary symptoms**
  – Painful urination, blood in the urine, increased frequency of urination, incontinence, and increased likelihood and occurrence of infections
Mechanical Measures

- **Sexual activity**
  - Mechanical stretching; increased vaginal blood flow

- **Dilators**
  - Contraindications to estrogen AND who desire vaginal intercourse
  - Particularly effective in women who avoid intercourse due to pain
  - Instruction by physician or pelvic physical therapist
Moisturizers and Lubricants

• Improve coital comfort and increase vaginal moisture; do not reverse atrophic changes
• Moisturizers – use one or more times per week, not just during sexual activity
  – e.g., Replens, Vagisil Feminine Moisturizer, Feminease, K-Y Silk-E
• Lubricant at time of coitus to decrease irritation
  – Water-based, silicone based, oil-based (find the one that meets your needs)
Estrogen Therapy

- Vaginal preferred over systemic for women treated solely for vaginal atrophy symptoms
- If receiving systemic estrogen therapy for vasomotor symptoms, low dose vaginal therapy MAY be added if relief of atrophic symptoms is insufficient
  - Low dose = \(<50\) mcg estradiol or \(<0.3\) mg conjugated estrogens/0.5 g cream
Atrophy of Vagina (Dryness)

Suckling et al. (Cochrane – 2010)

- Local estrogens equally effective
  - Vaginal estradiol ring (worn 90 days)
  - Vaginal estradiol tablets
    - Can be used in place of somewhat higher doses if there is concern about small amounts of systemic absorption
  - Vaginal cream (e.g., Premarin)
    - More uterine bleeding, breast pain than tablets
    - Significantly more endometrial stimulation than estradiol ring

- Recommended (+) uterus use additional progestagen protection when using conjugated equine estrogen cream if dose used results in systemic estrogen absorption (usually doses of estradiol > 0.5 mg/d)

- (+) postmenopausal bleeding with local estrogen use – should have endometrial investigation
## Vaginal Estrogen Preparations

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Available Strengths</th>
<th>Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vaginal Ring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estrin*</td>
<td>7.5 mcg estradiol/day released over 90 days</td>
<td>Inserted into vagina by patient or clinician. Removed and replaced with new ring every 90 days</td>
</tr>
<tr>
<td><strong>Vaginal Tablet</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vagifem*</td>
<td>5-10 mcg estradiol/tablet</td>
<td>Insert 1 tablet intravaginally daily for two weeks, followed by twice weekly</td>
</tr>
<tr>
<td><strong>Vaginal Cream</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premarin</td>
<td>0.625 mg conjugated estrogens/g of cream</td>
<td>0.5 g of cream intravaginally administered twice weekly.</td>
</tr>
<tr>
<td>Estrace</td>
<td>100 mcg estradiol/g of cream</td>
<td>2 to 4 g of cream intravaginally administered daily for 1 or 2 weeks, then gradually reduce to half the initial dosage for a similar period. A maintenance dosage of 1 g of cream, 1 to 3 times per week may be used</td>
</tr>
</tbody>
</table>

* Lowest dose options for vaginal estrogen therapy

**Note:** Ring, tablet, or “minidose” of cream (0.25g twice weekly) – no routine opposing progestin to prevent endometrial neoplasia; If needed with use of vaginal cream - opposing progestin – typical regimen – 10-12 days/month; e.g., 10 mg medroxyprogesterone
Vaginal estrogen preparations

- Some vaginal preparations administer higher doses of estrogen and some are intended to deliver systemic doses e.g. Femring 50-100 mcg/day
- Start with cream if symptomatic vulvar atrophy (e.g., fissures – so that cream may be applied to areas of vulva affected by atrophy – when atrophy improves, switch to vaginal tablet or ring, depending upon patient preference
NAMS Position Statement – 2017

• For bothersome GSM symptoms not relieved with over-the-counter therapies and without indications for use of systemic HT, low-dose vaginal estrogen therapy or other therapies are recommended.

• Vaginal estrogen (and systemic if required) or other nonestrogen therapies may be used at any age for prevention or treatment of GSM.
Nonpharmacologic is Not Sufficient

• Cannot (severe arthritis, obesity, vulvodynia) or prefer not to use a vaginal product
  o Ospemifene

• Women with breast cancer
  o First Line – lubricants and moisturizers
  o On aromatase inhibitors (stop the production of estrogen in postmenopausal women e.g., Arimidex, Aromasin, Femara) – avoid vaginal estrogen therapy
  o Low risk of recurrence – low dose, in consultation with patient’s oncologist and after explanation of potential risk to the patient
    • There is no evidence that using low-dose vaginal estrogen increases the risk of breast cancer recurrence
Ospemifene

- SERM that acts as an estrogen agonist in the vagina and appears to have no clinically significant estrogenic effect in the endometrium or breast.
- Approved by FDA 2/2013 for the treatment of moderate to severe dyspareunia caused by vulvovaginal atrophy
  - 60 mg po daily
- Disadvantages compared with vaginal estrogen
  - Need for daily use
  - Systemic side effects – hot flashes, potential risk of VTE
- Potential benefit – reduction in bone turnover


Treatment

Summary

- Regular sexual activity helps maintain vaginal health
- Regular use of vaginal moisturizing agents supplemented by water-based lubricants during vaginal intercourse (Grade 2B)
- **Low dose vaginal estrogen** – if treating solely for vaginal atrophy (not for other menopausal symptoms)
- Choice of vaginal delivery system (tablet, ring, cream) depends on patient preference
- Women using intravaginal estrogenic preparations who have postmenopausal bleeding should have endometrial investigation.
- **It is recommended that women with a uterus use additional progestagen protection when using conjugated equine estrogen cream if the dose used results in systemic estrogen absorption (usually associated with doses of estradiol greater than 0.5 mg daily).**
Breast Disease

- Mass
- Mastitis
- Paget disease of the breast
4. A 51 yo woman presents to the office with the complaint of a left breast mass. She reports she was in an automobile accident 5 months ago and first noted the mass at that time. She thought it was due to the seat belt she was wearing. On examination you note a 1 cm hard mass in the upper outer quadrant of the left breast. It is mobile and nontender. There is no overlying change in the skin, nipple discharge, or nipple retraction. You review her chart and note she had a negative screening mammogram 6 months ago. Which of the following is the first diagnostic imaging study that should be performed in evaluating this new palpable breast mass?

A. Ultrasound
B. MRI
C. Mammogram
D. CT
Breast Mass

- May be benign or malignant
  - ~90% of palpable breast masses in women 20s to early 50s are benign
- Benign mass may be solid or cystic
- Malignant mass is TYPICALLY solid
- Cystic mass with solid components (complex cyst) can also be malignant
Differential

**Benign**
- Fibroadenoma
- Cyst
- Fibrocystic changes
- Galactocele
- Fat necrosis

**Malignant**
- Infiltrating ductal
  - Accounts for 70-80% of invasive breast cancers
- Infiltrating lobular
- Mixed ductal/lobular
Evaluation of Breast Mass

• Characterization of mass
  - Location, size, margin irregularity, relationship to the chest wall, density of the breast tissue; evaluation of the skin overlying the mass and nipple
• Supraclavicular, cervical, axillary nodes
• Breast imaging
Imaging

• Palpable mass
  o Unilateral diagnostic mammogram
    - First imaging study for a woman with a new, palpable breast mass, and should be performed even if recent mammogram was negative
    - A normal mammogram DOES NOT eliminate the need for further evaluation of a suspicious mass [even though the false (-) rate of mammograms is <5% for clinically palpable breast cancers].
  o Ultrasound
    - Always perform in setting of new palpable abnormality – help differentiate benign cyst from a benign or malignant solid mass
    - For young women with a clinically benign mass e.g., fibroadenoma and no family history of premenopausal breast cancer, US is a useful initial diagnostic imaging study
  o MRI is NOT indicated for the work-up of an undiagnosed mass – reserved for diagnostic dilemmas
Biopsy

- Diagnosis of benign or malignant mass is confirmed by a breast biopsy
- Core needle biopsy using image guidance (or FNA with experienced cytopathologist) for ANY mass not identified as a simple cyst
- Image guidance ensures adequate localization of the mass and placement of localizing clip for future identification of the mass if required for surgical intervention (open biopsy)
5. A 32 yo breastfeeding female presents to the office with redness over her right breast and a fever of 101°F. The redness started 3 days ago and the fever within the past 12 hours. She delivered via cesarean 14 days ago and remained in the hospital for 7 days secondary to the development of endomyometritis. She is non-toxic in appearance. Her exam reveals a hard, red, tender, swollen area over the right breast measuring 4 by 6 cm. There is no axillary adenopathy. The remainder of the examination is normal. Which one of the following would be the most appropriate management option?

A. Dicloxacillin
B. Clindamycin
C. Cephalexin
D. Augmentin
Mastitis

• Majority is lactational; usually secondary to breastfeeding problems
• Ultrasound is the most effective method of differentiating mastitis from breast abscess
• Most lactation associated breast infections are caused by *staphylococcus aureus*. MRSA is becoming an increasingly important pathogen in cases of lactational mastitis
• Manage initially with systematic emptying of the breast, anti-inflammatory agents and symptomatic treatment to reduce pain and swelling. **If symptoms do not improve (48-72h), treatment with antibiotics**
• Breastfeeding continues during treatment for lactation-associated breast infections. Breast emptying is essential throughout the course of treatment.
Mastitis

- Hard, red, tender, swollen area
- Fever >38.3° (typically)
Clinical Manifestations

- Lactational mastitis typically presents as a hard, red, tender, swollen area of one breast associated with fever >38.3°C in a nursing mother.
- Other systemic complaints may variably include myalgia, chills, malaise, and flu-like symptoms.
- In the early stages of breast infection the presentation can be subtle with few clinical signs, while patients with advanced infection may present with a large area of breast swelling with overlying skin changes (e.g., erythema).
- Reactive lymphadenopathy can also cause axillary pain and swelling.
Differential

- Plugged ducts
- Galactoceles
- Inflammatory breast cancer
  - In inflammatory breast cancer the skin examination will demonstrate thickening, erythema, peau d'orange, and there is often associated axillary lymphadenopathy.
  - It is important to rule out inflammatory breast cancer if a suspected breast infection does not respond to antibiotics.
Treatment

• Non severe infection, absence of risk factors for MRSA
  • Dicloxacillin – 500 mg po QID
  • Cephalexin – 500 mg po QID
  • Clindamycin – 300 mg po QID
• Nonsevere infection with risk for MRSA…
Risk Factors for Methicillin-resistant *Staphylococcus aureus* (MRSA)

✓ Recent hospitalization
  • Residence in a long-term care facility
✓ Recent antibiotic therapy
  • HIV infection
  • Men who have sex with men
  • Injection drug use

• Incarceration
• Military service
• Sharing needles, razors, or other sharp objects
• Sharing sports equipment
• Diabetes
✓ Prolonged hospital stay
• Hemodialysis
Treatment

• Non severe infection, absence of risk factors for MRSA
  • Dicloxacillin – 500 mg po QID
  • Cephalexin – 500 mg po QID
  • Clindamycin – 300 mg po QID

• Non severe infection with risk for MRSA
  • Clindamycin – 300 mg po QID
  • Trimethoprom-Sulfamethoxazole – 1-2 tabs po BID
  • Linezolid – 600 mg po BID

• Setting of severe infection (e.g., hemodynamic instability, progressive erythema)
  • Empiric inpatient therapy with vancomycin (15 to 20 mg/kg/dose every 8 to 12 hours, not to exceed 2 g per dose), therapy tailored to culture and sensitivity results
  • Gram stain results (+) for gram negative rods – empiric antibiotic therapy against these organisms with a third-generation cephalosporin or a combination beta-lactam/beta-lactamase agent
Paget Disease of the Breast (PDB)

- 1-3% of new cases of female breast cancer
- Presentation
  - Scaly, raw, vascular or ulcerated lesion on the nipple then spreads to areola; (+/-) bloody discharge
  - Pain, burning, pruritus – may be present before the development of clinically apparent disease
- An **underlying breast cancer is present in 85% of cases** – although often **without** an associated breast mass or mammographic abnormality
Paget Disease of the Breast Presentation

- Various presentations
- Paget disease is *typified* by erythematous, scaly, and weeping "eczema" that involves the *nipple*.
- Discoloration, depigmentation and desquamation of the nipple and areola are sometimes seen.
Differential

**Benign**
- Eczema
- Contact dermatitis
- Nipple adenoma

**Malignant**
- Bowen’s disease (Squamous carcinoma of the epidermis)
- Basal cell carcinoma
- Superficial spreading malignant melanoma
Evaluation

• Full thickness wedge or punch biopsy of the nipple
  - Pathologic hallmark is malignant, intraepithelial adenocarcinoma cells (Paget cells) within the epidermis of the nipple
• Bilateral mammography to identify associate mass as well as rule out synchronous cancers
• Prognosis is dependent upon the presence of an underlying invasive ductal carcinoma or axillary node metastasis
• PDB presenting with a palpable mass is usually associated with more advanced disease than cases without a palpable mass
CONTRACEPTION
Combined Hormonal Options

- **Pill**
  - Monophasic pills recommended as the first choice for women starting combined OCPs (Cochrane 2005).
  - 25-year mortality from all causes same for OCP users vs nonusers.
- **Ring**
- **Patch**
  - Highly efficacious in women < 90 kg
  - Safety warning (FDA)
    - ~ 60% more estrogen per cycle than 35 mcg pill (11/2005)
    - > 3x risk of VTE compared to combined OCP

- Inhibit ovulation at pituitary and hypothalamus
- **Estrogen**
  - Ethinyl estradiol
- **Progestins**
  - Drospirenone – no risk of hyperkalemia
## Progestins

<table>
<thead>
<tr>
<th>First</th>
<th>Second</th>
<th>Third</th>
<th>Fourth</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Original pills”</td>
<td>Levonorgestrel&lt;br&gt;Alesse&lt;br&gt;Levlite&lt;br&gt;Nordette&lt;br&gt;Levlen</td>
<td>Norgestimate&lt;br&gt;Ortho-Cyclen&lt;br&gt;Ortho-Tri-cyclen</td>
<td>Drospirenone&lt;br&gt;Yasmin&lt;br&gt;Yaz&lt;br&gt;&lt;i&gt;Anti-androgenic&lt;/i&gt;</td>
</tr>
<tr>
<td></td>
<td>Norethindrone acetate&lt;br&gt;LoOvral</td>
<td>Desogestrel&lt;br&gt;Mircette&lt;br&gt;Desogen&lt;br&gt;Orthocept&lt;br&gt;Cyclessa</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Norethindrone&lt;br&gt;Ortho-Novum 1/35&lt;br&gt;Ovcon 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ethynodiol diacetate&lt;br&gt;Demulen 1/35</td>
<td></td>
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</tr>
</tbody>
</table>

Descending order of androgenic potency
Prerequisite Preventive Services?
Stewart et al. *Systematic Review*

- Consensus statement reviewing and summarizing relevant medical literature and policy statements
- No evidence supporting necessity of CBE and pelvic examination
- The available evidence supports prescribing hormonal contraception based only on:
  - Blood pressure measurement
  - Review of medical history
Medical History

- **Chronic diseases**
  - Hypertension
  - DM
  - Hyperlipidemia
  - Migraine
  - Immune deficiency states
  - Cancer

- **Gynecologic history**
  - Infections
  - Pap

- Previous contraceptive methods, successes and failures
- VTE
- Tobacco use
Bottom Line

• Requiring prerequisite preventive services, such as cervical cytology; breast examination; or evaluation for sexually transmitted infections, diabetes mellitus, dyslipidemia, liver disease, or thrombophilia, can introduce unnecessary barriers to contraceptive care.

• Do not require a pelvic exam or other physical exam to prescribe oral contraceptive medications.
Combined Contraceptives Benefits

• Less risk of ectopic pregnancy
• Increases bone mass
  – Reduces risk of postmenopausal hip fractures
• Relieves dysmenorrhea
• Improves symptoms of PCOS
  – High estrogen/progestin ratio
• Low-dose pills useful for management of perimenopause
Combined Hormonal Contraceptives *Decrease*

- Iron deficiency anemia
- Fibrocystic breast disease
- Functional ovarian cysts (use high estrogen content/fibroids)
- Pelvic inflammatory disease
  - Cervical mucus/reduced menstrual blood flow
  - Less retrograde menstruation
- Cancer
  - Ovarian and endometrial (OR 0.57; NNT 60)* cancers
    - Protective effects persist up to 20 years after discontinuation.
  - Colorectal cancer (OR 0.86; NNT 132)*
- Endometriosis (use strong progestin component)

Combined Contraceptives Side Effects

(Excess)

- **Estrogen**
  - N/V
  - Bloating/edema
  - Hypertension
  - Migraine HA
  - Breast tenderness
  - Decreased libido
  - Weight gain
  - Heavy bleeding
  - Leukorrhea

- **Progestin**
  - Acne
    - (Ortho-Tri-Cyclen approved for treatment)
  - Increased appetite
  - Hypertension
  - Fatigue
  - Depression
  - Hirsutism
  - Vaginal yeast infection
Combined Contraceptives Side Effects

(Deficiency)

- **Estrogen**
  - Spotting/breakthrough
  - Amenorrhea
  - Vaginal dryness

- **Progestin**
  - Amenorrhea
  - Late breakthrough or heavy bleeding
Drug Interactions With Combined Hormonal Contraception

• Drugs likely to lead to **contraceptive failure**
  - Rifampin – otherwise little effect from antibiotics [SOR:A]
  - Anticonvulsants (significant effect) – except valproic acid
  - Antifungals (griseofulvin)
  - HIV medications
Extended vs. 28-day Cycle OCPS

Cochrane 2014

- Similar pregnancy rates, safety profiles, compliance
- The continuous or extended-cycle and traditional regimens appeared similar, as judged by bleeding, discontinuation rates, and reported satisfaction.
- Extended regimens fared better: headaches, genital irritation, tiredness, bloating, and menstrual pain.
Progestin Only Options

• **Pill**
  - Must be taken q day at SAME time (2 h window)
    - Back-up if > 3 h late

• **Implant**
  - q 3 years
  - < 125% IBW

• **IUS**
  - q 3-5 years

• **DMPA**
  - q 3 months

• No effect on BP; risk of VTE, CVA, MI [SOR: B]

• **Most common side effect: Irregular bleeding**
### Management of Unscheduled Bleeding in Women Using Contraception

<table>
<thead>
<tr>
<th>Contraceptive</th>
<th>Preferred Treatment</th>
</tr>
</thead>
</table>
| DMPA                        | • Expectant management  
• 7-14 days oral estrogen (1.25 mg conjugated estrogen or 2 mg micronized estradiol)  
• Transdermal patch (0.1 mg estradiol/24 h)  
• 10-20 days of low-dose combined OCP |
| Etonogestrel implant        | • Expectant management  
• Low-dose combined OCP for 10-20 days (not studied)  
• NSAID for 5-7 days |
| Progestin pills             | • Take at same time each day and minimize missed doses. |
| Levonorgestrel IUD          | • NSAID for 5-7 days (eg, ibuprofen 400 mg, naproxen 250 mg, or mefanamic acid 500 mg TID) |

Depot medroxyprogesterone acetate (DMPA)

- Typical failure rate – ~ 6%
- Side effects
  - Weight gain, amenorrhea, hair loss, bone loss
- ACOG
  - No longer recommends limiting injections to 2 years
  - No routine monitoring of bone density
  - Recommend
    - 1300 mg calcium and 600 IU of vitamin D3 daily
    - Participate in weight-bearing exercise

DMPA

• One week to take effect if given AFTER first five days of the period cycle
• Return to fertility
  – 3-18 months (avg. 9-10 months)
• Benefits
  – Reduced endometrial cancer – 80%
    • Thought to be due to both the direct anti-proliferative effect of progestogen on the endometrium and the indirect reduction of estrogen levels by suppression of ovarian follicular development
  – No increased risk of DVT, PE, CVA, MI
  – Decreased risk
    • PID
    • Ectopic pregnancy
    • Primary dysmenorrhea
    • Ovulation pain
    • Functional ovarian cysts
Progestin-Only Methods More Appropriate Than Combined

• Smoking or obesity AND over age 35 [SOR B, A; respectively]
• Hypertension with vascular disease or > age 35 [SOR B]
• Lupus with vascular disease, nephritis [SOR A]
• Migraine with focal aura [SOR B]
• Current or personal history of VTE associated with pregnancy or estrogen unless on anticoagulation [SOR A]
• Coronary artery/cerebrovascular disease [SOR C]
# Types of IUDs

<table>
<thead>
<tr>
<th>IUD (Copper)</th>
<th>Available Since</th>
<th>Years Effective</th>
<th>Use and FDA Approved</th>
<th>Possible side effects</th>
</tr>
</thead>
</table>
| Copper (Paragard) | 1988 | 10 | • Approved only in parous women, but available to all women regardless of parity  
• Can be used as Emergency Contraception when inserted within 5 days | • Abnormal menstrual bleeding  
• Higher frequency or intensity of cramps/pain |

<table>
<thead>
<tr>
<th>IUD (Hormonal)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| Mirena | 2001 | 5 | Approved only in parous women, but available to all women regardless of parity | • Inter-menstrual spotting in the early months  
• Reduces menstrual blood loss significantly  
• Hormone-related: headaches, nausea, breast tenderness, depression, cyst formation. |
| Skyla (slightly smaller than Mirena) | 2013 | 3 | Approved for women regardless of parity |
| Liletta* | 2015 | 3 | Approved for women regardless of parity |
| Kyleena (lower hormone levels than Mirena) | 2016 | 5 | Approved for women regardless of parity |

*Actavis in conjunction with Medicines360, a non-profit women’s pharmaceutical company, developed Liletta specifically to be low cost and available to public health clinics enrolled in the national 340B Drug Pricing Program, which provides reduced cost pharmaceuticals to providers that serve low-income populations.
Intrauterine Contraceptives

Mechanisms of Action

Levonorgestrel-Releasing Intrauterine System (LNG-IUS, Mirena® Skyla® Kyleena®)

❖ Inhibits fertilization
❖ Thickens cervical mucous
❖ Inhibits sperm function
❖ Thins and suppresses the endometrium

Copper-Releasing Intrauterine Contraceptive (ParaGard® T380A)

❖ Inhibits fertilization
❖ Releases copper ions (Cu²⁺) that reduce sperm motility
❖ May disrupt the normal division of oocytes and the formation of fertilizable ova

Considerations for IUDs

- IUD insertion, not IUD use, is associated with PID
  - Cochrane
  - Systematic Review (Grimes, Mohllajee)
  - ACOG Practice Bulletin 2011
- DO NOT cause future infertility
- Nulliparas can use an IUD; Uterus sounds to depth of a minimum 6 cm
- The USMEC guidelines state that the advantages of using the IUD in adolescents generally outweigh the risks.
- Risk of uterine perforation
# Guidelines for IUDs

<table>
<thead>
<tr>
<th>Organization</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACOG 2007</td>
<td>Asymptomatic women may use an IUD within 3 months of treated pelvic infection or septic abortion.</td>
</tr>
<tr>
<td>ACOG 2007</td>
<td>All adolescents should be screened for GC and chlamydia prior to insertion.ße</td>
</tr>
<tr>
<td>Cochrane 2007</td>
<td>No benefit from doxycycline or azithromycin prior to insertion.</td>
</tr>
<tr>
<td>CDC 2010</td>
<td>Evidence is insufficient to recommend the removal of IUDs in women diagnosed with acute PID. However, caution should be exercised if the IUD remains in place, and close clinical follow-up is mandatory. The rate of treatment failure and recurrent PID in women continuing to use an IUD is unknown, and no data have been collected regarding treatment outcomes by type of IUD (e.g., copper or levonorgestrel).</td>
</tr>
</tbody>
</table>
Intrauterine Contraceptives

**Noncontraceptive Benefits**

- Intrauterine contraceptives decrease the risk for endometrial cancer
- The levonorgestrel-releasing intrauterine system (LNG-IUS) can be used as a first-line option to treat menorrhagia
  - May be used in the presence of fibroids, unless they significantly distort or enlarge the uterine cavity
  - Produces a 97% decrease in menstrual blood loss
  - In a retrospective study, 80% of women who were prescribed the LNG-IUS for menorrhagia chose not to undergo a hysterectomy, as opposed to 9% of women who received normal care for the condition
    - Levonorgestrel system may be an acceptable alternative to hysterectomy in women with AUB-O

Strategies to Reduce Barriers and Increase Use of Implants and IUDS

• Encourage implants and IUDS for all appropriate candidates – including nulliparous women and adolescents.
• Adopt same-day insertion protocols.
  – Screening for chlamydia, gonorrhea, and cervical dysplasia SHOULD NOT be required before implant or IUD insertion but may be obtained on the day of insertion, if indicated.

<table>
<thead>
<tr>
<th>Clinical Recommendation</th>
<th>Evidence Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparous women and adolescents can be offered an IUD, although the 20-mcg per 24 hours levonorgestrel-releasing IUD (Mirena) is not approved by the U.S. Food and Drug Administration for use in nulliparous women</td>
<td>C</td>
</tr>
<tr>
<td>Women who are at high risk of STIs but have no active signs or symptoms of genital tract STI should be tested for STIs at the time of IUD insertion. Insertion of the IUD may occur on the same day as STI testing, without waiting for test results. If results are subsequently found to be positive, treatment can be administered at that time and the IUD left in place.</td>
<td>C</td>
</tr>
<tr>
<td>For women with a known STI that causes cervical infection, it is recommended that IUD insertion be delayed for at least three months after resolution of the infection.</td>
<td>C</td>
</tr>
<tr>
<td>Prophylactic antibiotics should not routinely be administered before IUD insertion. Antibiotic prophylaxis does not have a major effect on reducing the risk of pelvic infection, and does not alter the need for IUD removal in the months after insertion.</td>
<td>B</td>
</tr>
<tr>
<td>Misoprostol (Cytotec) should not be administered before IUD insertion. Although an earlier study showed easier insertion with misoprostol, subsequent studies showed no benefit and increased side effects.</td>
<td>B</td>
</tr>
<tr>
<td>If a woman with an IUD becomes pregnant, the IUD should be removed.</td>
<td>C</td>
</tr>
</tbody>
</table>
Barrier Methods – **Key Points**

- **Sponge**
  - Does not protect against STIs (according to manufacturer)
  - Nonmenstrual toxic shock syndrome (sponge, diaphragm, cap)
    - 2 cases/100,000 users per year

- **Diaphragm**
  - Increased incidence of UTI

- **Latex condom**
  - Consistent use results in 80% reduction of HIV
  - Use only water-based lubricants
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Crown Royal  34.00  
Jack Daniels Black  32.00  
Jim Beam  20.00  
Canadian Mist  17.00  
Ten High  12.00

Schnapps  
Peppermint  16.00  
Pucker - Var.  13.00  
Hot Damn - Cnn.  13.00  
Peachtree  13.00

Rum  
Bacardi Flavors  20.00  
Malibu  20.00  
Captain Morgan  18.00  
Bacardi Light  17.00  
Castillo  12.00

Vodka  
Grey Goose  38.00  
Absolut - Var.  27.00  
Smooff  17.00  
Popov  12.00

Liqueurs  
Jagermeister  28.00  
Kahlua  28.00  
Southern Comfort  24.00

Gin  
Seagram's  16.00  
Gilbey's  13.00

Tequila  
Jose Cuervo 1800  30.00  
Jose Cuervo Gold  26.00  
Montezuma  15.00

Cognac  
Hennessey  42.00  
Courvoisier  38.00

Wine  
Chablis  10.00  
Chardonnay  10.00  
Merlot  10.00  
Sutter Home Wine  10.00  
White Zinfandel  10.00

Mixers  
Bloody Mary  6.00  
Margarita  6.00  
Pina Colada  6.00  
Strawberry Daquiri  6.00  
Sweet & Sour  6.00

Water & Soda (6 pack)  
Bottled Water  5.00  
Pepsi  4.00  
Diet Pepsi  4.00  
Coke  4.00  
Hawaiian Punch  4.00  
Dr. Pepper  4.00  
Orange  4.00  
Root Beer  4.00  
Sprite  4.00

Beer (6 pack)  
Heineken  9.00  
Corona  9.00  
Bacardi Silver-Var.  9.00  
Michelob - Var.  9.00  
Busch  7.00  
Busch Light  7.00  
Miller Lite  7.00

EXTRAS  
Ice bag  2.00  
Cigarettes pack  4.00  
Condoms, 3 pack  4.00

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Maurizio's Salad  35.00  
Veggie Tray  30.00  
Bread Sticks  23.00  
Cheese Garlic Bread  25.00  
Garlic Bread  20.00

By The Pan (serves 24-30)  
Wings, 100 pieces  50.00  
Chicken Drummies  50.00  
Lasagna  45.00  
Baked Mostaccioli  35.00  
Pasta Con Broccoli  35.00  
Toasted Ravioli  35.00

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Natural Family Planning

• **Pluses**
  - No adverse drug effects
  - No medication or device cost; cannot “run out” of method
  - Immediately reversible
  - Acceptable to all major religions
  - Expands couples’ communication and forms of sexual expression

• **Minuses**
  - No noncontraceptive benefits of some other methods
  - Requires periodic abstinence
  - Requires intensive education
ACOG

Breastfeeding: Maternal and Infant Aspects Committee Opinion

• All family planning choices are available to the postpartum lactating woman
• Choice and clinical ramifications merit additional counseling
• Support women in choosing breastfeeding
  – Accurate information
  – Problems arise
• Early discussion of contraception and follow-up
  – Options to be explained in detail
    • Nonhormonal methods
    • Hormonal Methods
    • Lactational Amenorrhea Method
## WHO Medical Eligibility Criteria

<table>
<thead>
<tr>
<th>Duration of BF method</th>
<th>Progestin-only pills</th>
<th>Progestin-only depots</th>
<th>Progestin-only implants/IUD</th>
<th>Combined patch or ring</th>
<th>Low-dose combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 weeks PP</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>≥ 6 w to &lt; 6 m PP (primarily breastfeeding)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>≥ 6 m PP</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

1. No restriction
2. Generally use
3. Not usually recommended
4. Not to be used
<table>
<thead>
<tr>
<th>Method</th>
<th>Effect on Lactation</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAM</td>
<td>No known impact</td>
</tr>
<tr>
<td>Abstinence/</td>
<td></td>
</tr>
<tr>
<td>– Periodic Abstinence/</td>
<td></td>
</tr>
<tr>
<td>– NFP Methods</td>
<td></td>
</tr>
<tr>
<td>Barrier Methods</td>
<td></td>
</tr>
<tr>
<td>IUD</td>
<td>Little to no known impact</td>
</tr>
<tr>
<td>– Copper</td>
<td></td>
</tr>
<tr>
<td>– Sterilization</td>
<td></td>
</tr>
<tr>
<td>Progestin-only</td>
<td>Some reports of</td>
</tr>
<tr>
<td>– Pills</td>
<td>negative impact</td>
</tr>
<tr>
<td>– Injectables</td>
<td>on lactation</td>
</tr>
<tr>
<td>– Implants</td>
<td></td>
</tr>
<tr>
<td>– Levonorgestrel IUD</td>
<td>Expected to have</td>
</tr>
<tr>
<td>Combined pill</td>
<td>negative impact</td>
</tr>
<tr>
<td>Patch</td>
<td>on lactation</td>
</tr>
<tr>
<td>Ring</td>
<td></td>
</tr>
</tbody>
</table>
6. According to ACOG, use of emergency contraception is recommended no longer than how many hours after inadequately protected or unprotected intercourse in women who do not desire pregnancy?

A. 48 hours  
B. 72 hours  
C. 96 hours  
D. 120 hours
## Postcoital Treatments for Preventing Pregnancy

<table>
<thead>
<tr>
<th>Regimen</th>
<th>Formulation</th>
<th>Timing of use after unprotected sexual intercourse(^1)</th>
<th>Access</th>
<th>FDA LABELED FOR USE AS EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective progesterone receptor modulator</td>
<td>1 tablet, containing 30 mg of ulipristal acetate</td>
<td>Up to 5 days</td>
<td>Requires a prescription</td>
<td>Yes</td>
</tr>
<tr>
<td>Progestin only</td>
<td>1 tablet containing 1.5 mg of levonorgestrel</td>
<td>Up to 3 days(^5)</td>
<td>Available OTC without age restriction</td>
<td>Yes</td>
</tr>
<tr>
<td>Combined progestin-estrogen pills</td>
<td>A variety of formulations can be used(^2)</td>
<td>Up to 5 days</td>
<td>Requires a prescription</td>
<td>No(^3)</td>
</tr>
<tr>
<td>Copper IUD</td>
<td>N/A</td>
<td>Up to 5 days</td>
<td>Requires office visit and insertion by a clinician</td>
<td>No(^4)</td>
</tr>
</tbody>
</table>

1. EC is BEST used ASAP after unprotected sex
2. Variety of formulations of combined OCPs can be used for EC. List of appropriate formulations: [http://ec.princeton.edu/questions/dose.html#dose](http://ec.princeton.edu/questions/dose.html#dose)
3. Although not FDA labeled for use as EC, found to be safe and effective when used as EC and can be used off-label for this indication.
4. Most effective method of EC.
5. Off-label
Emergency Contraception (EC)

- Prevent fertilization by inhibition of ovulation (hormonal)
- Use after implantation does not interrupt an established pregnancy

EC Indications

ACOG – 2015

• Inadequately protected or unprotected intercourse in women who do not desire pregnancy (SOR A)
• No evidence that EC is unsafe for women with contraindications to OCPs or for those with medical conditions
• Should be offered up to 120 hours after unprotected intercourse (SOR B)
What does the evidence say?

- ELLA is more effective than the levonorgestrel-only regimen and maintains its efficacy for up to 5 days.
- Levonorgestrel-only regimen is more effective than the combined hormonal regimen and is associated with less nausea and vomiting.
- Insertion of a copper IUD is the most effective method of EC.

What does the evidence say?

- No clinical examination or pregnancy testing is necessary before provision or prescription of EC

- EC should be made available to patients up to 5 days after unprotected or inadequately protected sexual intercourse

- Body weight influences the effectiveness of oral EC. Consider a copper IUD as an alternative in obese women. Oral EC SHOULD NOT be withheld from women who are overweight or obese

What does the evidence say?

- Any EC regimen may be made available to women with contraindications to the use of conventional oral hormonal contraceptive preparations.
- To maximize effectiveness, women should be educated about the availability of EC in advance of need.
- Oral EC may be used more than once, even within the same menstrual cycle.

Clinical Follow-up?

- No scheduled follow-up is required
- Clinical evaluation for women who have used EC IF
  ✓ Menses are delayed by a week or more AFTER the expected time OR
  ✓ If lower abdominal pain or persistent bleeding develops (spontaneous pregnancy loss or ectopic)
Best Practice Recommendations

- Clinicians should consider a tiered approach to contraceptive counseling, whereby the most effective and appropriate options are presented before less effective options.
- Requiring prerequisite preventive services, such as cervical cytology; breast examination; or evaluation for sexually transmitted infections, diabetes mellitus, dyslipidemia, liver disease, or thrombophilia, can introduce unnecessary barriers to contraceptive care.
- If a patient's pregnancy status is uncertain, clinicians may consider same-day start of a nonintrauterine method to provide immediate coverage, and should order follow-up pregnancy testing two to four weeks later.
- Family planning services should be offered to adolescents with assurances of confidentiality, in the context of relevant law.
- Intrauterine devices and contraceptive implants are safe and effective for postmenarchal adolescents.
Infertility
7. Infertility is defined as an inability to conceive in what time period of attempted conception?

A. 6 months  
B. 12 months  
C. 18 months  
D. 24 months
Infertility

Am Soc Reprod Med Practice Comm 2000

- **Defined**: 1 year of attempted conception without successful pregnancy
- 85% of fertile couples would have been successful by this time.
- Earlier evaluation (6 months)
  - Oligomenorrhea/amenorrhea
  - Age > 35 years
  - Known or suspected pelvic pathology
# Etiology

<table>
<thead>
<tr>
<th>Factors</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined factors</td>
<td>40</td>
</tr>
<tr>
<td>Male factors</td>
<td>26-30</td>
</tr>
<tr>
<td>Ovulatory dysfunction</td>
<td>21-25</td>
</tr>
<tr>
<td>Tubal factors</td>
<td>14-20</td>
</tr>
<tr>
<td>Other (e.g., cervical factors, peritoneal factors, uterine abnormalities)</td>
<td>10-13</td>
</tr>
<tr>
<td>Unexplained</td>
<td>25-28</td>
</tr>
</tbody>
</table>

*Lindsay TJ and Vitrikas KR. Am Fam Physician. 2015;91(5):308-214.*
Essential History

- **Sexual**
  - Frequency of intercourse
  - Use of lubricants, etc.
  - Erectile dysfunction
  - Dyspareunia
- **Drug or alcohol use**
  - Particularly has a “toxic” effect on sperm
- **Caffeine**
  - Interferes with muscle contraction of fallopian tube
- **Medications including nonprescription**
- **Chronic disease**
8. A couple with 12 months of infertility presents to the office for evaluation. A semen analysis is completed and found to be normal. What is the first step in evaluating the female?

A. Progesterone level
B. TSH level
C. FSH Level
D. Estradiol level
Primary Objectives at Workup

<table>
<thead>
<tr>
<th>Rule Out</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoospermia</td>
<td>Semen analysis</td>
</tr>
<tr>
<td>Anovulation</td>
<td>Urinary LH and mid-luteal phase progesterone levels (day 21 of cycle for latter)</td>
</tr>
<tr>
<td>Tubal obstruction</td>
<td>Hysterosalpingogram (HSG) or laparoscopy</td>
</tr>
<tr>
<td>Uterine cavity anomalies</td>
<td>HSG or sonohysterogram</td>
</tr>
<tr>
<td>Decreased ovarian reserve</td>
<td>Serum FSH on day 3 of cycle</td>
</tr>
<tr>
<td></td>
<td>↑ FSH (&gt; 15-29 IU/L) are associated with:</td>
</tr>
<tr>
<td></td>
<td>• Poor ovarian response to exogenous gonadotropins</td>
</tr>
<tr>
<td></td>
<td>• Reduced likelihood of successful conception</td>
</tr>
</tbody>
</table>
Male Evaluation

Semen Analysis

If normal, pursue other etiologies

If abnormal, refer to male fertility specialist
# WHO 2010 Semen Analysis Reference Guidelines

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Normal reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphologically normal</td>
<td>4%</td>
</tr>
<tr>
<td>Motility (progressive)</td>
<td>32%</td>
</tr>
<tr>
<td>Motility (total)</td>
<td>40%</td>
</tr>
<tr>
<td>Sperm count</td>
<td>39 million per ejaculate; 15 million per mL</td>
</tr>
<tr>
<td>Vitality</td>
<td>58%</td>
</tr>
<tr>
<td>Volume</td>
<td>At least 1.5 mL</td>
</tr>
</tbody>
</table>


## Male Factor

### History
Paternity, surgery, alcohol use, smoking, marijuana, medications

### Physical Tests Treatment

<table>
<thead>
<tr>
<th>Physical</th>
<th>Tests</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testicular volume, hernia, prostate, penile discharge</td>
<td>Sperm analysis; (+/-) Testosterone and FSH</td>
<td>Intrauterine insemination, IVF, donor</td>
</tr>
</tbody>
</table>
Male Evaluation

• Smoking causes damage to sperm; decreases sperm count; is associated with impotence.
• Marijuana – decreases seminal fluid, lowers total sperm; contributes to abnormal sperm “behavior.”
• If oligospermia or azoospermia is noted, hypogonadism should be suspected. Obtaining morning levels of total testosterone can help differentiate between primary and secondary disorders.
  • A decreased testosterone level with an increased FSH level points to primary hypogonadism.
  • A low testosterone level with a low FSH level signals a secondary cause. Some causes, such as hyperprolactinemia, are reversible with proper treatment.
Varicocele

Surgery or Embolization

- Meshwork of distended blood vessels in the scrotum
- Result of dilatation of spermatic vein
- No evidence that treatment improves couples’ chance of conception when compared to expectant management

Source: OpenI/NIH
Female Evaluation

Ovulation Evaluation (day 21 progesterone level)

- Progesterone level < 5 ng/mL; evaluate for cause
- Progesterone level ≥ 5 ng/mL, indicates ovulation
- TSH, Prolactin, FSH, Estradiol level
- Assess for tubal patency/uterine abnormalities (hysterosalpingography vs. laparoscopy)
Female Evaluation

Ovulation Evaluation (day 21 progesterone level)

- Progesterone level < 5 ng/mL; evaluate for cause
- Progesterone level ≥ 5 ng/mL, indicates ovulation

TSH, Prolactin, FSH, Estradiol level

Assess for tubal patency/uterine abnormalities (hysterosalpingography vs. laparoscopy)
If Not Ovulating …

• TSH, Prolactin

• Check FSH – to ensure that patient is not menopausal.
  – Premature ovarian failure – consider donor oocytes

• Look for
  – Systemic disease
  – Anorexia nervosa, low body fat
  – PCOS/chronic hyperandrogenic anovulation
  – Hypothalamic dysfunction
  – Stress
### WHO Ovulatory Disorders

<table>
<thead>
<tr>
<th>Group</th>
<th>Disorders</th>
<th>Percent</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hypothalamic pituitary failure</td>
<td>10</td>
<td>Present with amenorrhea and low gonadotropin levels, most commonly from low body weight or excessive exercise</td>
</tr>
<tr>
<td>II</td>
<td>Dysfunction of hypothalamic-pituitary-ovarian axis</td>
<td>85</td>
<td>Include those with PCOS, hyperprolactinemia</td>
</tr>
<tr>
<td>III</td>
<td>Ovarian failure</td>
<td>5</td>
<td>Conceive ONLY with oocyte donation and in vitro fertilization</td>
</tr>
</tbody>
</table>

Abnormal TSH, Prolactin etc.

Treat underlying causes

Consider ovulation induction for WHO Group II Disorders* with Clomiphene§

Assess need for Assisted Reproductive Technology

*WHO Group II – Overweight and have PCOS; can benefit from weight loss, exercise, and lifestyle modifications to restore ovulatory cycles and achieve pregnancy.

§Clomiphene has proven effective for ovulation induction in women with PCOS. The addition of 1500-1700 mg of metformin daily MAY increase ovulation and pregnancy rates, but it DOES NOT significantly improve live birth rates over clomiphene alone.
Female Evaluation

Ovulation Evaluation (day 21 progesterone level)

- Progesterone level < 5 ng/mL; evaluate for cause
- Progesterone level ≥ 5ng/mL, indicates ovulation

TSH, Prolactin, FSH, Estradiol level

Assess for tubal patency/uterine abnormalities (hysterosalpingography vs. laparoscopy)
Tubal Patency/Uterine Abnormalities

- Surgical correction of tubal obstruction or uterine adhesions
- Assess need for Assisted Reproductive Technology
## Other Female Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubal</td>
<td>Tubal disease diagnosed by HSG, confirm with laparoscopy; treatment – typically IVF</td>
</tr>
<tr>
<td>Cervical</td>
<td>Previous cryotherapy, LEEP, conization; in-utero DES exposure</td>
</tr>
<tr>
<td>Endometrial</td>
<td>HSG: fibroids, polyps, anomalies; may need sonohysterogram/hysteroscopy</td>
</tr>
<tr>
<td>Peritoneal (endometriosis)</td>
<td><em>Accounts for majority of infertility in young women.</em> Surgical ablation preferred over medical treatment <em>IF</em> pregnancy desired</td>
</tr>
</tbody>
</table>
Lifestyle Factors

- To improve chances of natural conception or using assisted reproductive technology
  - Abstain from tobacco use
  - Limit alcohol consumption
  - Aim for BMI < 30
- Because anxiety over infertility may cause increased stress and decreased libido, further compounding the problem, formal counseling is encouraged for couples experiencing infertility

### SORT: Key Recommendations for Practice

<table>
<thead>
<tr>
<th>Clinical Recommendation</th>
<th>Evidence Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmation of ovulation should be obtained with a serum progesterone level on day 21- of a 28-day cycle or one week before presumed onset of menses</td>
<td>C</td>
</tr>
<tr>
<td>Hysterosalpingography should be offered to screen for uterine and tubal abnormalities in women with infertility who have NO history of pelvic infections, endometriosis, or ectopic pregnancy</td>
<td>C</td>
</tr>
<tr>
<td>Women with UNEXPLAINED infertility should NOT be offered ovulation induction or intrauterine insemination because these have NOT been shown to increase pregnancy rates</td>
<td>C</td>
</tr>
<tr>
<td>Women with a BMI &gt; 30 should be counseled to lose weight because this may restore ovulation.</td>
<td>B</td>
</tr>
</tbody>
</table>

*Lindsay TJ and Vitrikas KR. Am Fam Physician. 2015;91(5):308-214.*
## Recommendations From the Choosing Wisely Campaign

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Sponsoring Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not perform immunological testing as part of the routine infertility evaluation</td>
<td>American Society for Reproductive Medicine</td>
</tr>
<tr>
<td>Do not routinely order thrombophilia testing on patients undergoing a routine infertility evaluation</td>
<td>American Society for Reproductive Medicine</td>
</tr>
</tbody>
</table>

THANK YOU
Answers
1. B
2. C
3. A
4. C
5. B
6. D
7. B
8. A
References

Common Orthopedic Problems in Family Medicine

Joseph Garry, MD, FAAFP, FACSM
Associate Professor
University of Minnesota
Minneapolis
Disclosures

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

The following individual(s) in a position to control content for this session have disclosed the following relevant financial relationships.

• **Joseph Garry, MD** – Stock/bond holdings: Merck Pharmaceuticals (corticosteriods, anti-resportive agents), Amgen (osteoporosis), and Bristol-Meyers Squibb (corticosteriods).

All other individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Cite indications for immediate imaging of the lumbar spine.
2. Know the evidence-based management for low back pain (acute, chronic, discogenic, lumbar spinal stenosis).
3. Cite the risk factors and management of overuse injuries (tendinopathy, shoulder pain, anterior knee pain, carpal tunnel syndrome, trigger finger).
4. State management of three common foot problems (plantar fasciitis, Morton’s neuroma, tarsal tunnel syndrome).
Most Common Causes of LBP in Adults

- Strain or sprain 70%
- Degenerative 10%
- Discogenic 4%
- Osteoporotic fracture 4%
- Spinal stenosis 3%
- Spondylolisthesis 2%

‘Other’ includes neoplasia, pelvic etiology, abdominal etiology, etc.

80% of diagnoses are benign
Immediate imaging recommended for acute LBP with major risk factors for or signs of cauda equina syndrome or severe progressive neurological deficits.

**Imaging after trial of therapy** for those with minor risk factors for cancer, risk factors for inflammatory back disease, risk factors for vertebral compression fracture, signs or symptoms of radiculopathy, or risk factors for or symptoms of symptomatic spinal stenosis.

**Repeated imaging** is only recommended in patients with new or changed low back symptoms.
LBP Imaging – “Red Flags”

History Findings

• Cancer metastatic to bone (breast, lung, thyroid, renal, prostate)
• Urinary or fecal incontinence
• Urinary retention
• Progressive lower extremity motor or sensory loss
• Significant trauma related to age
• Severe pain and lumbar spine surgery in the prior 12 months

Exam Findings

• Major motor weakness or sensory loss
• Saddle anesthesia
• Loss of anal sphincter tone

These are all STRONG findings and the presence of a STRONG finding indicates need for imaging.
1. A 43 yo male was moving a dresser 4 days ago and felt pain in his low back. Pain persists and radiates to left buttock. He was seen and had an MRI which demonstrated a disc protrusion at L5S1. His lower extremity neurologic exam is normal. **Of the following recommendations, which has *not* been shown to be helpful for recovery?**

A. Skeletal muscle relaxant  
B. Use of superficial heat  
C. Corticosteroids  
D. NSAIDs
MRI & the Lumbar Spine

MRI in asymptomatic persons at age 50
   Disc bulging seen in 60%
   Disc herniation seen in 36%
   Spinal stenosis in 21% [>60 years]

Abnormalities increase with age

Acute LBP
Management

• **Beneficial Therapies**
  NSAIDs (A)
  Advice to remain active (A)

• **Likely Beneficial Therapies**
  *Skeletal muscle relaxants* – weigh side effects (B)
  Tramadol
  Superficial heat
  Physical therapy – directed home exercise program

Recommendation 1  Strong Recommendation

Given that most patients with acute or subacute LBP improve over time regardless of treatment, clinicians should select nonpharmacologic treatment with superficial heat (moderate quality evidence), massage, acupuncture, or spinal manipulation (low quality evidence). If pharmacologic treatment is desired then select NSAIDs or skeletal muscle relaxants (moderate quality evidence).

Qaseen A et al. Ann Int Med 2017
Chronic LBP
Beneficial Therapies

**Beneficial**
- NSAID, tramadol, duloxetine
- *Mindfulness-based stress reduction*
- Acupuncture*
- Exercise therapy (walking prgm = PT)
- Yoga
- Massage
- Superficial heat
- Physical therapy
- Intensive multidisciplinary treatment program (B)
- Behavioral therapy (B)

**Likely Beneficial**
- Skeletal muscle relaxants
- PT directed home exercise program
- Prolotherapy**
- Topiramate
- Back school (B)
- **S-adenosyl-L-methionine**
- *Harpagophytum procumbens* (devil's claw)
- *Salix alba* (white willow bark)

*beneficial when used without supplemental medication
**beneficial for degenerative lumbar pain only

Duloxetine is similar to Cox-2 inhibitors, tramadol, opioids in the treatment of chronic LBP.

Chou R et al. Ann Int Med 2017
Chronic LBP & Opiates

• More than half of the people in the U.S. who are regularly treated with prescription opiates are being treated for chronic LBP.

  Hudson TJ et al. J Pain Symptom Manage 2008

• There is uncertainty about the efficacy of opiates for use in acute LBP or in chronic LBP.

  Deyo RA et al. BMJ 2015
Efficacy, Tolerability, and Dose-Dependent Effects of Opioid Analgesics for Low Back Pain
Shaheed CA et al. JAMA Int Med 2016

• Review of placebo controlled RCTs of opiates in adult chronic LBP
• 20 RCTs including 7925 adults

• Opiates provide short to intermediate term pain relief of unclear clinical significance within a range of 40-240 mg of morphine qd

• No evidence that opiates reduce disability in this population
• Approximately 50% dropout rate overall [12-80% dropout due to side effects or lack of efficacy]
Effect of Opioid vs Nonopioid Medications on Pain-Related Function in Patients with Chronic Back Pain or Hip or Knee OA Pain: The SPACE Randomized Clinical Trial

Krebs EE et al. JAMA 2018

• 240 VA patients, 13% female, 12-month intervention

• Outcomes
  1. Function = no difference between opioid vs nonopioid groups
  2. Pain intensity = better pain control in the nonopioid group
  3. Side effects = more side effects noted in the opioid group
Recommendation 2  Strong Recommendation

For patients with **chronic LBP**, clinicians should initially select nonpharmacologic treatment with **exercise, multidisciplinary rehab, acupuncture, mindfulness-based stress reduction** (moderate quality evidence), tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation (low-quality evidence).

Qaseen A et al. Ann Int Med 2017
Recommendation 3

In patients with chronic LBP who had an inadequate response to nonpharmacologic therapy, clinicians should consider pharmacologic treatment with NSAIDs as first-line therapy; tramadol or duloxetine as second-line therapy.

Qaseen A et al. Ann Int Med 2017
New Evidence
Non-Specific LBP

- Gabapentin is no more effective than placebo in the treatment of LBP with or without radiculopathy [Erike O et al. CMAJ 2018]

- Topiramate is more effective than placebo in the short-term treatment of chronic non-specific LBP [Will JC et al. AFP 2018]

- Consider PT referral for McKenzie method techniques to reduce risk of recurrence and need for health care services
2. A 32 yo male with DM2 (A1C 7.4%) presents with acute LB and right leg pain after reaching down to load the dishwasher. The following day he noted right leg pain and dorsal foot paresthesias. At presentation, he complains of worsening right leg pain, and you find dorsiflexor weakness (2/5) in addition to a positive SLR test on the right. Which of the following recommendations is best supported by the clinical evidence?

A. Consider surgical intervention
B. Go to bed for rest and return in 3 days.
C. Start prednisone [40-60 mg qd] for symptom relief.
D. Order a translaminar upper lumbar epidural steroid injection.
Lumbar Disc Herniation [LDH]

Conservative Treatment

- 80% of all adult LBP resolves within 90 days (AHCPR Clinical Practice Guideline No. 14, 1994)
- 90% LDH starts to improve at 6 wks, resolves by 12 wks (Saal et al. Spine 1989)
- Avoid bed rest (Hagen et al. Coch Data Syst Rev 2004)
- Oral corticosteroids and NSAIDs have weak evidence for benefit (Holve et al. JABFM 2008; Roelors et al. Coch Data Syst Rev 2008)
- Transforaminal epidural steroid injection provides benefit in terms of pain relief and preference for nonsurgical treatment (Manchikanti et al. Spine 2011; Benyamin et al. Pain Physician 2012; NASS Evidence Based Guideline 2011)
Lumbar Disc Herniation

Surgical Treatment

• Historical Indications
  Severe progressive motor deficits, cauda equina syndrome, unremitting radiculopathy x 6 weeks

• Spine Patient Outcomes Research Trial
  Surgery provides greater improvements in pain and disability in the first two years vs nonsurgical treatment. Treatment effects are similar at ≥2 yrs
  Surgery directed at symptom relief and primarily “leg” symptoms

• Microdiscectomy as effective as open discectomy

Gibson et al. Cochrane 2007
Weinstein et al. JAMA 2006
Pearson et al. Spine 2012
Evidence-Based Practice
Recommendations for Lumbar Disc Herniation

1. Advice to remain active (A)
2. Oral steroids and NSAIDs have limited benefit (B)
3. ESI provides (short-term) symptom improvement (B)
4. If no “red flags,” then radiculopathy may be managed conservatively, without imaging, for up to 6 weeks (A)
5. Radiculopathy not improving after 6 wks of conservative management may benefit from discectomy for more rapid clinical relief (A)
6. Discectomy has similar long-term outcomes as nonsurgical treatment (A)
Lumbar Spinal Stenosis

• Most common indication for spinal surgery in those >65 years

• **Predictive symptoms:** neurogenic claudication, bilateral buttock/leg pain, symptoms improve with lumbar flexion and worsen with walking, relief with sitting

• **Predictive signs:** wide-based gait, abnormal Romberg

• **MRI without contrast** is diagnostic test of choice

Lumbar Spinal Stenosis
Management

• Non-operative LSS
  15-45% improve
  15-30% worsen
  ~50-70% remain symptomatically stable

• PT beneficial and mainstay of nonsurgical management
• Pharmacological therapy
  Acetaminophen ➤ NSAIDs
• Lumbosacral corset can ▲walking distance & ▼pain (B)

OVERUSE INJURY
Characteristics of Overuse Injury

- **Low-contact activities**/sports that involve long work/training sessions with *repetitive motion*
  - Rapid increase in training
  - Consistent high intensity or repetitive work
  - Limited recovery time

- **Gradual onset** and increase in symptoms make these difficult to identify early

- Consequences include loss of time in activity, reduced function, pain, and psychological exhaustion
3. Which of the following statements best describes an overuse tendinopathy such as lateral epicondylosis or patellar tendinosis?

A. Rehabilitation with eccentric contractions are recommended to resolve these overuse tendinopathies
B. Corticosteroid injections are recommended to resolve these overuse tendinopathies
C. These overuse tendinopathies are characterized by an acute onset
D. These are conditions characterized by inflammation
Overuse Injuries
Tendinosis or Tendinopathy

• *Noninflammatory* degenerative condition
  
  Rotator cuff tendinopathy, epicondylosis, patellar tendinosis, Achilles tendinosis

• Typically insidious onset of pain and symptoms lasting >6 weeks
Overuse Injuries
Lower Extremity Tendinopathy

• Patellar Tendinosis (Jumper’s Knee)

• Achilles Tendinosis
  • **Midsubstance tendinopathy** managed with aggressive eccentric strengthening
Overuse Injuries
Upper Extremity Tendinopathy

- **Lateral Epicondylitis** (Tennis Elbow)
  - Pain at the lateral elbow and aggravated by wrist extension

# Corticosteroid Injection

<table>
<thead>
<tr>
<th>Condition</th>
<th>Effect</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral epicondylitis</td>
<td>Beneficial for ▼ pain reduction for up to 8 weeks but <strong>inferior to other treatments for longer term</strong></td>
<td>Coombes et al. Lancet 2010</td>
</tr>
<tr>
<td>Achilles tendinosis</td>
<td><strong>Not recommended</strong></td>
<td>Kearney RS et al. Coch Database System Rev 2015</td>
</tr>
</tbody>
</table>

*Use of CSI may be considered as adjunct management only to an ongoing rehabilitative program; consider when pain interferes with ability to rehabilitate/strengthen*
Other Evidence-based Treatments
Chronic Tendopathies

• With consistent use, topical nitroglycerin (1/4 of a 5 mg patch) is associated with reduction in pain associated with activity [Gambito ED et al. Arch Phys Med Rehab 2010]

• Platelet-rich plasma and autologous blood injections can be helpful in recalcitrant tendinopathy
Shoulder Impingement

- Rotator Cuff is most often the pain generator
  
  **Age >35**
  
  Pain with overhead activity

  *Supraspinatus tendon most commonly involved followed by infraspinatus*

- Exam tests
  
  (+) test if there is pain with the maneuver

  [Images of Neer’s and Hawkin’s tests]
Shoulder Impingement
Management Therapies

• [SA CSI + exercise + manual therapy] vs. [exercise + manual therapy] resulted in similar outcomes at 3 months but with less pain in the CSI group [Crashaw DP et al. BMJ 2010]

• SA CSI vs PT demonstrated no difference in outcomes at 1 year other than increased likelihood of repeat CSI in the initial group [Rhon DI et al. Ann Int Med 161(3), 2014]

• CSI + exercise is superior to exercise or CSI alone [Dong W. et al. Medicine 94(10), 2015]

SA = subacromial; CSI = corticosteroid injection; PT = physical therapy
Adhesive Capsulitis

- **Definition** = limited ROM with pain at end ranges of motion
- Associated with **diabetes, Parkinson's,** cardiac disease, and thyroid dysfunction

- **3-4 weeks of oral prednisone [20 mg/d] or CSI provides short-term improvements in pain and function** but does not affect long-term outcomes

- **No difference** between the natural history of adhesive capsulitis versus nonoperative management (15-20 months duration).

- Capsular distension by injection (30-35 cc fluid), either with/without corticosteroid, is as effective as manipulation under anesthesia and has lower risk

4. A 29 yo female recently started a running program in order to assist with weight control. She presents with right anterior knee pain that started 3 weeks ago. No history of prior knee pain or injury. She recalls pain was initially noted late in her run, but now is bothersome at 5-6 blocks into her run and painful after the run. Examination demonstrates BMI of 28.4 kg/m2, no joint effusion, full ROM, no ligamentous laxity, but with pain and crepitus with manipulation of the patella. **Which of the following is the most appropriate treatment for her condition?**

A. Patellar taping  
B. Glucosamine and chondroitin  
C. Application of a patellofemoral brace  
D. Reduction in running distance and physical therapy
Anterior Knee Pain
Patellofemoral Pain/Syndrome

Symptoms & Signs
- Women >>> Men
- Peripatellar & anterior knee pain
- Pain with prolonged knee flexion, stairs, running
- (+) Patellar findings on exam
- Lateral patellar tracking
- Tight iliotibial band (Ober’s test)
- Pelvifemoral dysfunction ►
  gluteal, hip abductor, and quad weakness

Management
- Physical therapy and activity modification are best
  (Pelvifemoral rehab)
- Patellar taping (pain relief) has inconsistent results
- Bracing (benefit in runners)


Jones BQ et al. Am Fam Phys 2015
Anterior Knee Pain
Patellofemoral Pain/Syndrome

Symptoms & Signs
- Women >>> Men
- Peripatellar & anterior knee pain with prolonged knee flexion, stairs, running
- (+) Patellar findings on exam
  - Lateral patellar tracking
  - Tight iliotibial band (Ober's test)
  - Pelvifemoral dysfunction
  - Gluteal, hip abductor, and quad weakness

Management
- Physical therapy and activity modification are best (Pelvifemoral rehab)
- Patellar taping (pain relief) has inconsistent results
- Bracing (benefit in runners)

- Choosing Wisely Campaign

Avoid MRI in anterior knee pain in a patient without effusion or mechanical symptoms, unless the patient has not improved after appropriate rehab

- Jones BQ et al. Am Fam Phys 2015

5. Which of the following is the most sensitive finding in patients with carpal tunnel syndrome?

A. Flick sign
B. Tinel’s test
C. Phalen’s test
D. Hypothenar atrophy
Carpal Tunnel Syndrome

• Associated with thyroid disease, diabetes, pregnancy, alcoholism, rheumatoid arthritis

• *Most common* upper extremity entrapment neuropathy

• Compression of the median nerve
  - Sensory ➤ radial 3 ½ digits
  - Motor ➤ intrinsic thumb, radial lumbricals

Flick sign (*most sensitive finding*)
Phalen’s test
Monofilament testing
2-point discrimination
Weak thumb abduction
Tinel’s test less reliable

D’Arcy et al. JAMA 2000
LeBlanc, Am Fam Phys 2011
Ashworth ML, Am Fam Phys 2016
Carpal Tunnel Syndrome
Treatment Options

Wrist splints ➤ may be beneficial in short term

**Corticosteroid injection** ➤ beneficial in the short to intermediate term and *superior to oral corticosteroids*

Surgical release ➤ beneficial over splinting at 6 months

*Surgical release to prevent progression of symptoms as opposed to “return to normal”*

Cochrane 2009
LeBlanc, Am Fam Phys 2011
Ashworth ML, Am Fam Phys 2016
6. A 41 yo female presents with medial left heel pain for 5 weeks. She describes pain as “burning” and worse with weight-bearing activity or prolonged standing and better with rest. On exam you note a normal gait, subtalar pronation, and no tenderness of the heel or ankle. Symptoms are aggravated by full passive dorsiflexion of the ankle. You conclude…

A. She has tarsal tunnel syndrome and provide an orthotic
B. She has a calcaneal stress fracture and order an MRI
C. She has heel pad syndrome and give her a heel cup
D. She has plantar fasciitis and provide a night splint
Plantar Fasciitis

- Heel pain is most common
- More likely to occur in obesity, limited ankle dorsiflexion, runners, and those who spend most of the day on their feet
- **Worse with first steps after prolonged rest or first steps in the morning**
- Tender at medial calcaneal tubercle
Plantar Fasciitis Management

1. *Initiate patient-directed therapies*
   Relative rest, ice massage, analgesics, stretching, weight loss

2. *Initiate physician-directed therapies*
   Physical therapy, stretching, deep myofascial massage
   **Night splint use for up to 3 weeks (B)**
   **OTC orthotics (B)**
   Corticosteroid injection (B) – for short term pain relief
   Autologous blood injection (B)
   Extracorporeal shock wave therapy can be used in recalcitrant plantar fasciitis (B)
   [Gollwitzer H et al. JBJS (Am) 2015]
Morton’s Neuroma

• Irritation or trauma to the intermetatarsal plantar nerve
• 3rd – 4th web space most common
•♀ (8-10x) >> ♂
• Burning pain in forefoot with toe numbness
• Palpable mass or click between metatarsals (Mulder’s sign)
• Treatment: shoes with wide toe box and low heels, orthotics, injection [80% improve with these measures]
Tarsal Tunnel Syndrome

- Entrapment of the posterior tibial n. posterior to the medial malleolus
- Provoked by subtalar pronation
- Can be mistaken for plantar fasciitis
  *But nontender medial calcaneal tubercle*
- Electrodiagnostics may be useful in diagnosis (C), but problems with false negatives
- Correct biomechanics and consider injection

Illustration courtesy of Steven Oh

DARE 2006
Answers

1. C
2. A
3. A
4. D
5. A
6. A
Supplemental Slides
A Comparison of the Effects of 2 Types of Massage and Usual Care on Chronic Low Back Pain: A Randomized, Controlled Trial

RCT comparing massage (structural n = 132, relaxation n = 136) to usual care (n = 133) for chronic LBP in 20-65 yo patients; weekly massage (50-70 min) x 10 weeks; benefits of massage persisted for 26 wks.

Predictors of Chronic LBP
Chou R. et al. JAMA 2010

• Prospective studies of patients with 8 weeks of LBP

• 20 studies evaluating 10,842 patients

• Predictors of worse outcomes at 1 year:

  High levels of maladaptive pain coping behaviors
  High baseline functional impairment
  Low general health status
  Psychiatric comorbidities
  Nonorganic signs
Hand Innervation

Print, Review & Know Your Hand Innervation

**Median** nerve = entrapment in the carpal tunnel ▶ palmar radial 3 ½ digits and pinch strength (thumb and index finger)

**Ulnar** nerve = entrapment at Guyon’s canal (volar wrist and ulnar to carpal tunnel) affects palmar 4th and 5th digit, abductor digiti minimi (cyclists, catchers, golfers); entrapment at cubital tunnel at medial elbow affects dorsal 4th and 5th digits. Claw hand.

**Radial** nerve = wrist extension (motor) and dorsal radial hand (sensory)
# Overuse Injury

## Contributing Factors

<table>
<thead>
<tr>
<th>Pediatric &amp; Adolescent [only]</th>
<th>Intrinsic Factors [peds and adults]</th>
<th>Extrinsic Factors [peds and adults]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility of growth cartilage</td>
<td>Prior injury</td>
<td>Training errors</td>
</tr>
<tr>
<td>Adolescent growth spurt</td>
<td>Inadequate conditioning</td>
<td>Equipment</td>
</tr>
<tr>
<td>Developmental level</td>
<td>Menstrual dysfunction</td>
<td>Psychological factors</td>
</tr>
</tbody>
</table>
Trigger Finger

• More common in 40-60 yo, women, diabetics, rheumatoid arthritis, and repetitive hand activities

• Pain with use, stiffness, triggering or finger being “stuck” after periods of immobility, tender lump in palm of hand

• Treat with splinting the finger in a neutral position, analgesics, corticosteroid injection (NNT = 3 for pain relief), or surgical release

• Dexamethasone may be preferred over triamcinolone with lower recurrence at 3 months
Trigger Finger

Corticosteroid injections are effective for pain relief with NNT = 3

56% recurrence at one year and associated with younger age, IDDM, involvement of multiple digits, and history of upper extremity tendinopathy

Corticosteroid injections are more effective in the digits of nondiabetic patients

Chronic Exertional Compartment Syndrome

Median age is **20 years**

**Recreational runners, elite athletes, military recruits at risk**

May account for 27% of cases of chronic anterior leg pain

95% involve the anterior & lateral compartments

**Risks include anabolic steroids, creatine use, eccentric exercise, biomechanics**
Chronic Exertional Compartment Syndrome

Symptoms: *pain onset occurs at same distance and intensity of exercise*; burning, aching, pressure sensation; *bilateral in 70-80%*

Symptoms resolve with 20-30 min rest

Diagnostic testing = measurement of pre- and postexercise intra-compartmental pressures

Definitive treatment = *fasciotomy*
Degenerative Meniscal Tears of the Knee

In patients with knee pain and a degenerative meniscal tear…

1. Do not recommend arthroscopic surgery
2. Surgical treatment is equivalent to nonsurgical treatment terms of outcomes

COPD, Lung Cancer, OSA, Sarcoidosis

Dana King, MD, MS, FAAFP
Professor and Chair, Family Medicine
West Virginia University School of Medicine
Morgantown, West Virginia
Disclosure Statement

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Explain the common approach(es) to diagnosis and treatment of COPD.
2. Summarize risk stratification and treatment in patients with a COPD exacerbation.
3. State the USPSTF recommendation on screening for lung cancer.
4. Describe the diagnosis and treatment of obstructive sleep apnea (OSA).
5. Summarize the risks associated with untreated OSA.
6. Discuss the clinical manifestations, evaluation and treatment of sarcoidosis.
Chronic Obstructive Pulmonary Disease (COPD) Facts

- 3rd leading cause of death in U.S.
- 16 million currently diagnosed (CDC), 56% are women
- NIH – COPD National Action plan to facilitate diagnosis and treatment for COPD – and Education
- Preventable, progressive and persistent! (not fully reversible)
- Over 150,000 deaths annually in U.S. (CDC)
- COPD health care costs $32 billion per year
COPD Pathophysiology

Irritation/toxin

Inflammation/oxidative stress/loss of elasticity

Air sacs destroyed, airways narrowed, fibrosis

Mucous hypersecretion, cough, dyspnea, recurrent infections
COPD Risk Factors

**Primary Risk Factor**
- 80% of lung cancer deaths are directly attributable to **smoking**
- Smokers **12-13 times more likely to die** from COPD than nonsmokers
- **38% of people with COPD** are current smokers and 37% are former smokers

**Other Risk Factors**
- Age (1 in 5 over age 45)
- **56% women, 44% men**
- Secondhand smoke
- Genetics
- Environmental or occupational pollutants
- Alpha-1 antitrypsin deficiency
- Socioeconomic status
## COPD Symptoms

<table>
<thead>
<tr>
<th>Hallmark Symptoms</th>
<th>Less Commonly Reported Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough (85%)</td>
<td>Fatigue</td>
</tr>
<tr>
<td><strong>Dyspnea</strong>, exertional (70%)</td>
<td>Edema</td>
</tr>
<tr>
<td>Increased sputum production (45%)</td>
<td>Chest tightness</td>
</tr>
<tr>
<td><strong>Wheezeing</strong> (40%)</td>
<td>Weight loss</td>
</tr>
<tr>
<td>Exercise intolerance</td>
<td>Increased nocturnal awakenings</td>
</tr>
<tr>
<td>Frequent respiratory infections</td>
<td>Decreased quality of life</td>
</tr>
</tbody>
</table>
Suspicion of COPD

- Screen **Smokers** who present with respiratory symptoms
  - Dyspnea
  - Chronic cough
  - Chronic sputum production
  - Recurrent lower respiratory infections

**USPSTF recommends against** screening **asymptomatic** patients regardless of risk factors (D)!
1. A 57 yo patient presents with progressive cough and sputum production over the past 10 years, worsening lately. Patient has smoked 1.5 ppd for 40 years, and often feels too short of breath to play with grandkids. Which of the following spirometry results would confirm your suspicion of severe COPD?

A. FEV1/FVC > 0.7, FEV1 50-79% predicted
B. FEV1/FVC > 0.7, FEV1 30-49% predicted
C. FEV1/FVC < 0.7, FEV1 30-49% predicted
D. FEV1/FVC < 0.7, FEV1 < 30% predicted
Strategy for Assessing COPD

- Assess airflow limitation using spirometry
- Assess symptoms
- Assess risk of exacerbations
- Assess comorbidities
COPD Diagnosis/Screening

• **Spirometry** is the key test – NEEDED to confirm diagnosis and differentiate from asthma and others.

• Key measures
  • **FEV1** – Volume of air expired in one second after a full inspiration
  • **FVC** – Maximum volume of air exhaled after a full inspiration
  • **FEV1/FVC < 0.70 ratio** – best spirometric criterion for COPD
Why Perform Spirometry?

- Measure airflow obstruction
- More definitive diagnosis of COPD
- Assess severity of airflow obstruction
- Monitor disease progression in COPD
- Response to therapy
- Assess prognosis (FEV$_1$)
- Distinguish between obstruction and restriction
- Assess bronchodilator response
**Spirometry Measures**: TLC, total lung capacity; V, tidal volume; IC, inspiratory capacity; FRC, functional residual capacity; ERV, expiratory reserve volume; VC, vital capacity; RV, residual volume.
Restrictive vs. Obstructive Disease

- In **obstructive lung disease** (asthma, COPD), the FEV1 is reduced due to an **obstruction** of air escaping from the lungs. Thus, the FEV1/FVC ratio will be reduced, usually to less than 0.7.

- In **restrictive lung disease**, the FEV1 and FVC are equally reduced due to fibrosis or other lung pathology (Interstitial lung disease, Sarcoidosis, end stage COPD, others).

- **COPD vs. Asthma** – both are **Obstructive**, but COPD is not reversible (or minimally)
# COPD Classification*

<table>
<thead>
<tr>
<th>Gold Stage</th>
<th>Spirometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Mild</td>
<td>FEV1 $\geq$ 80% predicted</td>
</tr>
<tr>
<td>2: Moderate</td>
<td>50% $\leq$ FEV1 &lt;80% predicted</td>
</tr>
<tr>
<td>3: Severe</td>
<td>30% $\leq$ FEV1 &lt;50% predicted</td>
</tr>
<tr>
<td>4: Very severe (or “end-stage”)</td>
<td>FEV1 &lt;30% predicted</td>
</tr>
</tbody>
</table>

*Based on post-bronchodilator FEV1/FVC $<0.7$
Strategy for Assessing COPD

- Assess airflow limitation using spirometry
- **Assess symptoms**
- Assess risk of exacerbations
- Assess comorbidities
COPD Symptoms and Airflow

- Patient perception of symptoms is highly variable
- Only 60% of patients with moderately severe COPD complain of any symptoms at all!
- For this reason, formal symptomatic assessment is required:
  - Modified Medical Research Council Dyspnea Scale (mMRC)
  - COPD Assessment Test (CAT) or
  - Clinical COPD Questionnaire (CCQ)
  - St. Georges Respiratory Questionnaire (SGRQ)
  - Chronic Respiratory Questionnaire (CRQ)
Modified Medical Research Council (mMRC) Dyspnea Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level of Dyspnea</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I only get breathless with strenuous exercise</td>
</tr>
<tr>
<td>1</td>
<td>I get short of breath when hurrying on level ground or walking up a slight hill</td>
</tr>
<tr>
<td>2</td>
<td>I walk slower than people of the same age because of breathlessness; or I have to stop to catch breath when walking at my own pace on level ground</td>
</tr>
<tr>
<td>3</td>
<td>I stop to catch breath after walking 100 m (328 ft) or after a few minutes on level ground</td>
</tr>
<tr>
<td>4</td>
<td>I am too breathless to leave the house or I am breathless when dressing or undressing</td>
</tr>
</tbody>
</table>
COPD Assessment Test (CAT™)

• Comprehensive patient-completed questionnaire assessing global impact of COPD (cough, sputum, dyspnea, chest tightness, limitation on activities, confidence leaving home and going out, sleep, energy level) on health status

• 8 questions on a 1-5 scale, max 40 points

• **10 or more** considered significant COPD symptoms

[http://www.catestonline.org/index.htm](http://www.catestonline.org/index.htm)
<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Hardly Ever</th>
<th>A Few Times</th>
<th>Several Times</th>
<th>Many Times</th>
<th>A Great Many Times</th>
<th>Almost All the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Short of breath while <strong>at rest</strong>?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. Short of breath while <strong>doing physical activities</strong>?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. Concerned about getting a cold or your breathing getting worse?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. Depressed (down) because of your breathing problems?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>In general, <strong>during the past 24 hours</strong>, how much of the time:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Did you <strong>cough</strong>?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Did you <strong>produce sputum or phlegm (chest mucus)</strong>?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
### CLINICAL COPD QUESTIONNAIRE

On average, **during the past 24 hours**, how limited were you in these activities **because of your breathing problems:**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not Limited at All</th>
<th>Very Slightly Limited</th>
<th>Slightly Limited</th>
<th>Moderately Limited</th>
<th>Very Limited</th>
<th>Extremely Limited</th>
<th>Totally Limited/Or Unable to Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. <strong>Strenuous physical activities</strong> (such as climbing stairs, hurrying, participating in sports)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8. <strong>Moderate physical activities</strong> (such as walking, housework, carrying things)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9. <strong>Daily activities at home</strong> (such as dressing, washing yourself)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10. <strong>Social activities</strong> (such as talking, being with children, visiting friends/relatives)?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

*American Academy of Family Physicians*
Strategy for Assessing COPD

• Assess symptoms
• Assess degree of airflow limitation using spirometry
• **Assess risk of exacerbations**
• Assess comorbidities
Assess Risk of Exacerbations

• Increased Risk
  • Two or more exacerbations within the last year
  • One or more hospitalizations for COPD exacerbation
Strategy for Assessing COPD

- Assess symptoms
- Assess degree of airflow limitation using spirometry
- Assess risk of exacerbations
- Assess comorbidities
# Common COPD Comorbidities

<table>
<thead>
<tr>
<th>Cardiovascular Disease</th>
<th>Other</th>
</tr>
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<tbody>
<tr>
<td>CHF</td>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Ischemia</td>
<td>Sleep Apnea</td>
</tr>
<tr>
<td>Arrhythmias (A. Fib risk tied with COPD)</td>
<td>Depression</td>
</tr>
<tr>
<td>PVD</td>
<td>Osteoporosis</td>
</tr>
<tr>
<td>HTN</td>
<td>Diabetes</td>
</tr>
</tbody>
</table>

- GERD (independent risk factor for exacerbations!)
Assess COPD Comorbidities

• Assess how the comorbid illness may impact COPD
• Many are under or misdiagnosed
  • CVD, right heart failure
  • Cough could be GERD
  • Fatigue or reduced activity could be depression
• Comorbid illnesses should not alter COPD treatment, and they should be treated per usual standards
COPD – Putting it All Together

- Assess airflow limitation using spirometry
- Assess symptoms
- Assess risk of exacerbations
- Assess comorbidities
- Strategy for Combined Assessment – GOLD
The GOLD refined ABCD assessment tool

**Diagnosis** = Assessment of airflow limitation

### Assessment of symptoms/risk of exacerbations

<table>
<thead>
<tr>
<th>Grade</th>
<th>FEV₁ (% pred.)</th>
<th>Exacerbation History</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≥80</td>
<td>≥2 or ≥1 leading to hospitalization</td>
</tr>
<tr>
<td>2</td>
<td>50-79</td>
<td>0 or 1 (not leading to hospital admission)</td>
</tr>
<tr>
<td>3</td>
<td>30-49</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>&lt;30</td>
<td></td>
</tr>
</tbody>
</table>

**FEV₁/FVC < 0.7**

- **A**
  - mMRC 0-1
  - CAT < 10
  - CCQ < 1

- **B**
  - mMRC 2+
  - CAT 10+
  - CCQ 1+

Global Strategy for Diagnosis, Management and Prevention of COPD

Combined Assessment of COPD

When assessing risk, choose the highest risk according to GOLD grade or exacerbation history. One or more hospitalizations for COPD exacerbations should be considered high risk.

© 2014 Global Initiative for Chronic Obstructive Lung Disease
Next – COPD Management

- Assess (spirometry, exacerbations and symptoms)
- Tobacco cessation and Counseling
- Medication
- Encourage regular exercise
- Repeat spirometry to follow every 1 year or if sudden decline in status (NEW)
- Immunizations
  - Pneumococcal
  - Influenza (yearly)
  - Others
Goals of COPD Management

Reduce Symptoms
- Relieve dyspnea
- Improve exercise tolerance
- Improve health status

Reduce Risk
- Prevent disease progression
- Prevent and treat exacerbations
- Prolong life
2. Which of the following is the recommended first step in medication for assisting smoking cessation?

A. Nicotine patch
B. Bupropion
C. Varenicline
D. E-cigarettes
COPD Management – First Things First

Stop smoking!

- **ASK** about tobacco use at every visit
- **ADVISE** all users to stop
- **ASSESS** users' willingness to attempt to quit
- **ASSIST** users' efforts to quit with pharmacotherapies
- **ARRANGE** follow-up

*Tobacco cessation and O₂ therapy are the only interventions proven to prolong survival of patients with COPD!*
Tobacco Cessation

• Counseling proven effective even if brief
• Pharmacotherapies (may double chance of quitting!)
  • Start with **Nicotine replacement therapy** (NRT)
    • Patch, gum, lozenge, inhaler, nasal spray **all similar**
  • **Varenicline (Chantix)** – nicotine blockade
  • **Bupropion SR (Zyban)**
  • **E-cigarette** effectiveness and safety **unproven**

*Counseling and meds more effective together than either one alone*
3. A 65 yo with COPD is complaining of increased breathing difficulty for 2 months and using his short-acting bronchodilator 4 times a day. The next best step in therapy for him would be:

A. Prednisone 20 mg a day  
B. Tiotropium inhalation daily  
C. Azithromycin daily for 5 days  
D. Fluticasone inhalation daily
COPD Medication Options

- Beta-agonists (SABA, SAMA, SABA/SAMA combo or LABA)
- Anti-cholinergics (LAMA: long-acting muscarinic antagonists)
- Combination beta and anticholinergic (LAMA/LABA)
- Inhaled Corticosteroids (ICS)
- Combination beta-agonists and corticosteroids (LABA/ICS)
- Triple therapy (LAMA/LABA/ICS)
- Theophylline
- Phosphodiesterase-4 inhibitors
COPD Management Steps

- **Step #1** – SABA prn or long-acting beta agonist bronchodilators (LABA) regularly
- **Step #2** – Anticholinergics (LAMA), such as tiotropium or aclidinium, to control symptoms and reduce exacerbations
- **Step #3** – Combination therapy (LAMA/LABA [preferred] or LABA/ICS) improves efficacy and decreases the risk of side effects
- **Step #4** – Triple therapy (LAMA/LABA/ICS), separately or as a single inhaler.

*The choice of treatment depends on patient’s individual response in terms of symptom relief and side effects*
Available **LAMA/LABA** and **LAMA/LABA/ICS**

- **Glycopyrrolate/formoterol** (Bevespi Aero) – 2 puffs BID
- **Glycopyrrolate/indacaterol** (Utibron Neohaler) – 1 capsule BID
- **Tiotropium/olodaterol** (Stiolto Respimat) – 2 puffs daily
- **Umeclidinium/vilanterol** (Anoro Ellipta) – 1 puff daily

• One **TRIPLE- LAMA/LABA/ICS** – one puff daily – Trelegy Ellipta
• Approved for once daily maintenance treatment of COPD
Important Caveats

• **LAMAs** have a greater effect on exacerbation reduction *(SOR A)* and decreased hospitalizations compared with **LABAs** *(SOR B)*

• **Combined LAMA/LABA** increases FEV$_1$ and reduces symptoms compared to either alone *(SOR A)*

• **Combined LAMA/LABA** reduces exacerbations more than ICS/LABA *(SOR B)*; **Meds with ICS incr. risk of pneumonia 50%**

• **LAMA/LABA/ICS** *(Triple Inhaled Therapy)* improves lung function, reduces exacerbations more than ICS/LABA or LAMA/LABA *(SOR A)*
GOLD 2019 updates

• Regular treatment with inhaled corticosteroids (ICS) – Long-term therapy with inhaled corticosteroids (ICS) alone or oral corticosteroids: **not** recommended (SOR: A), due to pneumonia, thrush, hoarseness

• Theophylline has small bronchodilator effect in stable COPD (SOR:A)

• If exacerbations continue with LABA/ICS, w/severe to very severe airflow obstruction: consider adding PDE4 inhibitor (Roflumilast), which reduces exacerbations (SOR B)

• Black Box warning for LABA/ICS – has been removed
More GOLD 2019 updates

• Roflumilast (Daliresp) – most common adverse effects were nausea, abd. pain, weight loss, diarrhea, sleep disturbance; caution in moderate to severe liver impairment.

• Regular use of NAC and carbocysteine reduces the risk of exacerbations (SOR B)

• Long term azithromycin reduces exacerbations over one year (A), but is associated with bacterial resistance and hearing impairment (B)
COPD Management

• **Oxygen** *(SOR A)*
  - Indicated for $O_2$ saturation <88%
  - Unproven – except for resting hypoxemia
  - Does not help in exercise – induced desaturation

• **Pulmonary rehabilitation** *(SOR A)*
  - Includes exercise training, education, nutritional intervention, and psychosocial support
  - Indicated for **ALL** stages of disease in stable patients

• **Inhaler technique**
  - Extremely important for effectiveness
COPD Management

Helpful
• IV alpha-1 therapy may slow progression
• Opiates can help relieve breathlessness in end-stage
• Nutritional therapy

Not helpful
• No evidence for antitussives
• No evidence for vasodilators
COPD Management

- **Ventilatory support**
  - **CPAP** useful in those with OSA
- **Surgery**
  - Lung volume reduction for upper lobe emphysema
  - Bullectomy
  - Lung transplantation
  - Bronchoscopic interventions
Treatment Summary

1. Start with smoking cessation, SABA, SAMA/SABA
2. If symptoms persist, use LAMA or LAMA/LABA combination
3. If symptoms persist, consider ICS/LAMA/LABA if eos > 100
4. If eos < 100 cells/µL, consider roflumilast (Daliresp) or azithromycin
Follow-up Pharmacological Treatment

1. If response to initial treatment is appropriate, maintain it.
2. If not:
   - Consider the predominating treatable trait to target (dyspnea or exacerbations)
   - Use exacerbation pathway if both exacerbations and dyspnea need to be targeted
   - Place patient in box corresponding to current treatment & follow indications
   - Assess response, adjust and review
   - These recommendations do not depend on the ABCD assessment at diagnosis

**DYSPNEA**

- LABA or LAMA
  - **LABA + LAMA**
    - Consider switching inhaler device or molecules
    - Investigate (and treat) other causes of dyspnea
  - **LABA + ICS**
    - LABA + LAMA + ICS

**EXACERBATIONS**

- LABA or LAMA
  - LABA + LAMA
    - **LABA + ICS**
      - LABA + LAMA + ICS
      - Roflumilast
      - FEV₁ < 50% & chronic bronchitis
    - In former smokers
      - Azithromycin

Eos = blood eosinophil count (cells/μL)

*Consider if eos ≥ 300 or eos ≥ 100 AND ≥ 2 moderate exacerbations/1 hospitalization

**Consider de-escalation of ICS or switch if pneumonia, inappropriate original indication or lack of response to ICS
Acute COPD Exacerbations

- Acute worsening in symptoms requiring additional therapy
- Most common cause: URI (viral or bacterial)
- Assess severity
  - ABG
  - CXR
  - ECG
  - Labs (CBC, metabolic panel)
  - Spirometry not recommended
## Classification of COPD Exacerbations

<table>
<thead>
<tr>
<th>Severity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Can be controlled with short-acting bronchodilators (SABA)</td>
</tr>
<tr>
<td>Moderate</td>
<td>SABA plus antibiotics and/or oral corticosteroids</td>
</tr>
<tr>
<td>Severe</td>
<td>Requires hospitalization or evaluation in the emergency department</td>
</tr>
</tbody>
</table>

Acute COPD Exacerbations

• Indications for admission
  • Marked increased symptoms (dyspnea, tachypnea, confusion, drowsiness)
  • Acute respiratory failure
  • Failure to respond to initial management
  • Older age
  • Serious comorbidities
  • Insufficient home support
4. You see a 54 yo with moderate COPD who has increased cough, yellow sputum, and increasing dyspnea and wheezing. In addition to steroids, which one of the following would be most appropriate for you to prescribe at this time?

A. IM Mucinex  
B. Nebulized Magnesium  
C. Admission for CPAP  
D. Rx Augmentin for 5-7 days
**Oxygen**: titrate to target O2 saturation of 88-92%.

**Bronchodilators**: Short-acting inhaled beta$_2$-agonists with or without short-acting anticholinergics are preferred.

**Systemic Corticosteroids**: 40 mg prednisone per day for 5 days is recommended.

Acute COPD Exacerbations

- **Antibiotics recommended** in moderate or severe exacerbation of COPD with 3/3 symptoms (or 2/3 if purulent) (SOR B):
  - Increased dyspnea
  - Increased sputum volume
  - Increased sputum purulence
  - If mechanical ventilation (invasive or noninvasive)
  - Antibiotics recommended for 5-7 days
Acute COPD Exacerbations

• Antibiotics

Which bacteria to cover?
  • *S. pneumoniae*, *H. influenzae*, *M. catarrhalis*, *M. pneumoniae*

Which agent to use?
  • *LOCAL*; *Optimal national choice has not been determined*: amoxicillin, Augmentin, macrolides, cephalosporins, quinolones all have been used successfully
Acute COPD Exacerbations

• Not routinely recommended
  • Theophylline
  • Nitric oxide
  • Chest physiotherapy
  • Antitussives
  • Morphine
<table>
<thead>
<tr>
<th>Intervention class</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchodilators</td>
<td>LABAs</td>
</tr>
<tr>
<td></td>
<td>LAMAs</td>
</tr>
<tr>
<td></td>
<td>LABA + LAMA</td>
</tr>
<tr>
<td>Corticosteroid-containing regimens</td>
<td>LABA + ICS</td>
</tr>
<tr>
<td></td>
<td>LABA + LAMA + ICS</td>
</tr>
<tr>
<td>Anti-inflammatory (non-steroid)</td>
<td>Roflumilast</td>
</tr>
<tr>
<td>Anti-infectives</td>
<td>Vaccines</td>
</tr>
<tr>
<td></td>
<td>Long-term macrolides</td>
</tr>
<tr>
<td>Mucoregulators</td>
<td>N-acetylcysteine</td>
</tr>
<tr>
<td></td>
<td>Carbocysteine</td>
</tr>
<tr>
<td>Various others</td>
<td>Smoking cessation</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation</td>
</tr>
<tr>
<td></td>
<td>Lung volume reduction</td>
</tr>
</tbody>
</table>
5. An asymptomatic 60 yo sees you for a routine physical. Patient smoked 2 PPD x 20 yrs but quit 5 yrs ago. PE and labs are unremarkable. Which one of the following screening tests are currently recommended by the USPSTF at this time?

A. Prevnar 13
B. PSA
C. Low-dose chest CT
D. Abdominal ultrasound
Lung Cancer

- #1 cause of cancer deaths in men and women
- 13% of all new cancers, costs $36 billion
- 228,000 people new this year, 142,000 lung cancer deaths; >541,000 people in the US are living with lung cancer
- 80% are over 60 years of age
- The 5-year survival rate (18.6%) is lower than many other cancers: colon (64.5%), breast (89.6%), prostate (98.2%).

Amer. Lung Assoc. Facts 2019
Lung Cancer

Mortality

- Lung Cancer
- Prostate
- Breast
- Pancreas

Annual cases
Lung Cancer Causes

- 90% due to smoking
- Radon and asbestos 5-10%
- Air pollution 1-2% (higher in developing countries)
Lung Cancer

- The five-year survival rate for lung cancer is 54% for cases detected when the disease is still localized within the lungs.
- Only 16% of lung cancer cases are diagnosed at an early stage. Later stage 5-year survival rate is only 5%.
- Over half of people with lung cancer die within one year of being diagnosed.
Lung Cancer Pathology

- Small Cell – 20%
  - Central/mediastinal location
  - Aggressive
  - Early mets
  - Poor prognosis
  - Primary Tx: chemo

- Nonsmall Cell
  - Adenocarcinoma – 40%
    - Peripheral location
    - Often occur with underlying lung disease
  - Squamous Cell – 25%
  - Large Cell – 10%
  - Primary Tx: resection
Lung Cancer Screening

- **USPSTF recommendation (B)**: annual low-dose lung CT ages 55-80; only if 30 pack-year history or more
- Must be accompanied by stop-smoking advice
- Can stop screening after patient has quit smoking for 15 years or more
- Best done at experienced centers
- National Lung Screening Trial 2012
Obstructive Sleep Apnea (OSA)

- OSA is caused by a blockage of the airway, soft tissue in the rear of the throat collapses during sleep, leading to snoring, poor sleep, poor oxygenation, and apneic periods.
- It affects 10-15% of the population (22 million people)
- *Everyone with OSA snores, but not everyone who snores has OSA!*
- Risk factors include *Obesity* (most important risk!), *Sex* (male), and *Age* over 40, but sleep apnea can strike anyone at any age.
OSA Consequences

• High blood pressure
• CVD
• Sleep disturbance
• Memory problems
• Weight gain, impotence, headaches
• May lead to daytime sleepiness, job impairment, and motor vehicle crashes
OSA Symptoms

• Nocturnal
  • Snoring*
  • Apneas
  • Choking
  • Nocturia
  • Disrupted sleep

• Daytime
  • Nonrestorative sleep
  • Morning headache
  • Excessive Sleepiness*
  • Cognitive deficits
  • Significant other* complaints

*3 S’s of OSA
OSA High Suspicion

- **Epworth Sleepiness Scale**, 0-3 for each factor – Sitting, in a car, watching TV, etc.
- Scoring:
  - 0-10: Normal
  - 10-12: Borderline
  - 13-24: Abnormal

- **STOP-BANG Score** - snore, daytime sleepy, apnea, HTN, age >50, neck>40cm, BMI>35, male; ≥3 points is high risk
OSA Diagnosis

• **Sleep study** (polysomnography), whole night or a “split-night” study. If OSA is found, the patient is awakened and fitted with a PAP device and re-tested.

• The **apnea-hypopnea index (AHI)**. An **apnea** is not breathing for >10 seconds. **Hypopnea** is a constricted breath that lasts >10 seconds. The AHI is the number of apneas and hypopneas per hour.

• An AHI of 5-15 is mild; 15-30 is moderate; > 0 is severe OSA
American Academy of Sleep Medicine
Updated Recommendations

• Diagnose OSA in adults-- use in-hospital polysomnography or home sleep apnea testing. (Grade: Strong)
• If home test is negative, or inconclusive, hospital polysomnography should be performed. (Grade: Strong)
• Polysomnography, rather than home testing, should be used in patients with significant cardiorespiratory disease or CVA, respiratory muscle weakness, hypoventilation or chronic opioid use. (Grade: Strong)
• A split-night diagnostic protocol, rather than a full-night diagnostic protocol for polysomnography should be used for the diagnosis of OSA. (Grade: Weak)
OSA Treatment

• Weight loss (a factor in 70% of cases)
• Nasal decongestant
• Positional therapy (tennis ball behind the head)
• Surgery – multiple options, individual; uvulopalatopharyngoplasty, or UPPP
• Mandibular advancement device (sleeping appliance)
• Positive airway pressure device
OSA Treatment

- CPAP or BiPAP most effective per national report
- Indicated for Mod or Severe OSA (AHI >15), or Mild OSA (AHI 5-15) with comorbidities
- Reduces AHI
- Reduces blood pressure
- Improves daytime alertness
6. A 25 yo African-American female involved in an MVA is found to have bilat. hilar infiltrates on CXR. She is asymptomatic and has no h/o environmental exposures. Remainder of PE is unremarkable; PFT and PPD are negative. Transbronchial biopsy reveals a noncaseating granuloma. Which one of the following would be the most appropriate treatment?

A. Observation
B. Inhaled long-acting beta-agonist
C. Inhaled corticosteroid
D. Systemic corticosteroids
Sarcoidosis

- An inflammatory auto-immune disease condition that most commonly (90%) impacts the lungs, but may involve other organs
- Cause unknown
- Characterized by noncaseating epithelioid granulomas
- Course often waxes and wanes; often incidental
- More common in African Americans women, usually starts age 20-40
Sarcoidosis Symptoms

- Often incidental/asymptomatic
- Shortness of breath, cough
- Reddish bumps or patches on the skin
- Enlarged lymph nodes in the chest, neck, axillae
- Fever, weight loss, fatigue, night sweats, general feeling of ill health
- Lofgren’s syndrome – acute form of sarcoid – erythema nodosum, fever, arthritis, self-limited
Sarcoidosis Diagnosis

- Noncaseating granulomas on lung tissue biopsy
- Typical signs and symptoms of sarcoidosis like picture
- Abnormal CXR or lung CT
Extra Pulmonary Manifestations

- 90% confined to lung, but may involve
  - **Eye** – acute anterior uveitis
  - **Skin** – cutaneous involvement, erythema nodosum
  - **Neurosarcoidosis** – may have intracranial lesions or peripheral neuropathy
  - **Cardiac** granulomas – cardiomyopathy
- Symptoms may resolve in 2-3 years, or may persist indefinitely
Sarcoidosis Treatment

- **Observation** for asymptomatic disease limited to hilar adenopathy
- Follow patients every 3 months in the first two years, then less often depending on severity per ATS guidelines
- Follow angiotensin-converting enzyme (ACE) levels in the blood to follow disease activity
- **Corticosteroids** are mainstay of treatment (start 20-40 mg a day, 5-10 mg a day maintenance) for severe disease
- Also used: methotrexate, azathioprine, chloroquine, etanercept (Enbrel), infliximab (Remicade) – consult Pulmonary
Wegener’s Granulomatosis

- Necrotizing granulomatous vasculitis affecting upper and lower respiratory tract with focal segmental glomerulonephritis
- Unknown cause; more common in young or middle age (esp. males)
- Early diagnosis can lead to full recovery; without treatment, Wegener’s can be fatal
- Sx: cough, chest pain, dyspnea, malaise, blood in the urine
- Dx: ESR; anti-neutrophil cytoplasmic bodies (ANCA); CBC, U/A
- **Corticosteroids** are mainstay of treatment, also azathioprine, methotrexate; rituximab approved by FDA
- Consult Pulmonary, Nephrology
Resources and References


• Sarcoidosis, and x-rays used: http://www.aafp.org/afp/2004/0715/p312.html

Thank you!
Answers

1. C
2. A
3. B
4. D
5. C
6. A
Behavioral Medicine I: Major Depression in Adults and Special Populations

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AAFP Board Review: Express
AAFP Board Review: *Supersonic Overdrive*
Disclosure Statement

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

All individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Most of what follows is true...
Learning Objectives

1. Recognize the differential diagnosis and clinical presentation of major depression in adults and in special populations (geriatric, pregnant, and postpartum).

2. List the pharmacotherapeutic options for treatment of these conditions.
1. Which of the following is true with regard to screening for depression?

A. Brief, 2-question screens for depression are equivalent to longer instruments
B. The Edinburgh Postnatal Depression Scale should not be routinely used at the first postpartum visit
C. There are few standardized scales that can be used for screening for depression
D. The USPSTF does not recommend screening adults and adolescents for depression
Depression Screening

• USPSTF guidelines recommend screening adults for depression.
• Can use following scales:
  - Zung Self-Rating Depression Scale
  - Beck Depression Inventory
  - PHQ-9
  - General Health Questionnaire, Center for Epidemiologic Studies Depression Scale
  - Quick Inventory of Depressive Symptomatology (QIDS)
  - Geriatric Depression Scale
• But …
Depression Screening

• A “yes” response to the following 2 questions may be as effective as using longer screening tools. (USPSTF, 2002)
  • Over the past 2 weeks, have you ever felt down, depressed, or hopeless?
  • Have you felt little interest or pleasure in doing things?
    • (This is a simplified PHQ-2)
Depression: Screening

- USPSTF found evidence is insufficient to recommend for or against routine screening of children (7-11 years old) for depression
- USPSTF recommends screening adolescents (12-18 years old) and adults for depression in clinical practices with systems in place for diagnosis, treatment, follow-up
- First postpartum evaluation should include screening for depression
  - Routine use of the Edinburgh Postnatal Depression Scale improves diagnosis rates
2. Which of the following is true about depression and Persistent Depressive Disorder (dysthymia)?

A. The depression associated with dysthymia is as severe as that of major depressive disorder (MDD)
B. Lifetime risk is equal for women and men
C. Depression is more common in medically ill patients
D. Dysthymic patients may have periods of “normal” mood that can last for ≥ 1 year
DSM-5 Diagnosis of Major Depression Requires 5 or More of the Following Sx (for > 2 weeks)

1) **Depressed mood**
2) **Loss of enjoyment** (anhedonia)
3) Weight or appetite change
4) Sleep changes
5) Psychomotor changes (restlessness or slowing)
6) Poor energy
7) Feelings of guilt
8) Poor concentration
9) Thoughts of death

• (NOTE: #1 or #2 must be present)
Major Depression
Diagnosis of Persistent Depressive Disorder (Dysthymia)

• Requires depressed mood for at least two years with no symptom-free period lasting longer than two months.
• Along with two or more of the following:
  - Appetite or sleep changes
  - Decreased energy or concentration
  - Thoughts of guilt or death
  - Psychomotor changes (restlessness or slowing)
  - Hopelessness
Dysthymia
Epidemiology of Depression

- Depression is **common**
- Lifetime risk greater for women (20%-25%) than for men (10%)
- Community prevalence is about 5%
- Prevalence is higher (15%) in the medically ill
3. Which of the following is true about treatments for depression?

A. If a patient does not respond to an SSRI within 2 weeks of starting it, a second antidepressant should be added

B. The medication of choice for depressed patients with seizures is bupropion

C. Memory loss caused by ECT is often short term & reversible

D. Antidepressants are contraindicated if the patient is breastfeeding
Etiologies of Depression – Drugs

- Narcotics
- Antineoplastic agents
- Sedative hypnotics
- Centrally acting antihypertensives
- Steroids
- Anxiolytics
- Alcohol
Medical Screening for Depression

- History & Physical (especially the neurological exam)
- CBC
- CMP
- TSH, Thyroid panel if TSH abnormal
- RPR
Features of Effective Clinical Management

- **Patient education** (the diagnosis, treatment options, duration of treatment and costs, side effects, goals of the treatment, recurrence and relapse, etc.)

- **Reassurance** (such as, “depression is a medical illness, not a character defect or weakness; recovery is the rule, not the exception; treatments are effective; an effective treatment can be found for nearly all patients,” etc.)

- **Regular monitoring** for symptoms and adverse effects

- **Adjustments** or changes in the treatment plan if response is lacking or suboptimal
Choice of Antidepressant

- All modern antidepressants are equally effective
- Patient preference
- Cost
- History of prior response to specific medication
- Response of first-degree relative to specific medication
- Use one antidepressant
4. Which class of antidepressant medication is generally avoided due to a potentially life-threatening side effect?

A. Selective Serotonin Reuptake Inhibitors (SSRIs)
B. Monoamine Oxidase Inhibitors (MAOIs)
C. Tricyclic Antidepressants
D. Serotonin-Norepinephrine Reuptake Inhibitors (SNRIs)
Treatment of Depression

- Usually begin with selective serotonin reuptake inhibitors (SSRIs)
- Once-a-day dosing
- No titration 80% of the time
- Few side effects (GI, sexual)
- Safe in overdose
Selective Serotonin Reuptake Inhibitors (SSRIs)

- Fluoxetine: 20 mg
- Sertraline: 50 mg
- Paroxetine: 20 mg
- Escitalopram: 10 mg
- Citalopram: 20 mg
- Fluvoxamine: 100 mg

- More activating
- More relaxing
Treatment of Depression

- After 4 weeks, if partial response to SSRI, increase dose or change to another SSRI
- If no response to SSRI, try switching to another category
Other Antidepressants

- Bupropion 150-450 mg
  - No sexual side effects, not with seizures
- Venlafaxine 75-225 mg
  - Mixed nor-epi & serotonin
- Desvenlafaxine 50-100 mg
  - Active metabolite of Venlafaxine
- Nefazodone 50-100 mg
  - No sexual side effects, sedating
- Mirtazapine 15-45 mg
  - At low doses, sedating, appetite increased
- Duloxetine 40-60 mg
  - May be useful if chronic pain is present
New Antidepressants

- Vilazodone 20-40 mg
  - Serotonin agonist and reuptake blocker
- Vortioxetine 10-20 mg
  - Serotonin agonist and reuptake blocker
- Levomilnacipran 20-40 mg
  - SNRI
Treatment (cont.)

- Can follow response to treatment with the **Quick Inventory of Depressive Symptomatology (QIDS)** scale
- If no response to any newer agents, or if chronic pain is a large issue in the depression, consider a tricyclic antidepressant
Tricyclic Antidepressants

- Desipramine 50-150 mg
  - Less sedation
  - Maximum dosage up to 300 mg/day

- Nortriptyline 50-100 mg
  - More sedation
  - Maximum dosage up to 125 mg/day

- Serum levels available
Monoamine Oxidase Inhibitors (MAOIs)

• Generally not used
• Dietary restrictions; if patients eat foods with tyramine, will get hypertensive crisis
• Problematic in acute medical crises or emergency room settings
• Oral drugs are phenelzine and tranylcypromine
• Transdermal patch – selegiline
Antidepressant Side Effects

- Tricyclics: anticholinergic effects, narrow-angle glaucoma, caution in bundle branch blocks, weight gain
- SSRIs: sexual dysfunction; hyponatremia
- SNRIs: mild anticholinergic, narrow-angle glaucoma, rare hepatic dysfunction
- Bupropion: seizure induction (0.4%)
Duration of Treatment

- For 1\textsuperscript{st} episodes of depression, treat for 6-9 months.
- For recurrent depression, treat for at least 2 years.
- If patient relapses after successful treatment, >90\% will respond to the same antidepressant.
Augmentation of Antidepressants

- Liothyronine 25-50 mcg q am
- Lithium carbonate 300-600 mg daily
- Response usually rapid, 7-9 days
- Bupropion (STAR*D study)
- Buspirone (STAR*D)
- Aripiprazole, quetiapine, lurasidone, brexpiprazole
Treatment of Depression

- If no response to multiple antidepressants, consider a trial of electroconvulsive therapy (ECT)
- ECT: most effective treatment in patients with severe resistance or psychotic depression
  - Safe; memory loss is short-term, reversible
- Transcranial Magnetic Stimulation (TMS) is an emerging outpatient treatment that can be effective in treatment-resistant cases
New Treatments for Depression

- **Transcranial Magnetic Stimulation (TMS)** - an emerging outpatient treatment that can be effective in treatment-resistant cases.
- **Esketamine** – nasal spray for treatment-resistant depression. Administered in REMS-certified office. Side effects include dissociation and increased blood pressure.
Geriatric Depression

• ECA study revealed 3% prevalence of depression in the elderly
• Other studies suggest 10-15% prevalence
• Coexistence of depression in the medically ill elderly ranges from 25%-50%
• 500 NC family physicians rated geriatric depression in the top 3 clinical challenges
Geriatric Depression

- Geriatric depression may be underdiagnosed by 50% in primary care settings
- 80% of depression is treated by primary care providers
- Often comorbid with generalized anxiety or dementia
Depressive Symptoms in the Young

- Sadness
- Loss of interest (anhedonia)
- Guilt
- Suicidal ideation
- These are the EMOTIONAL symptoms of depression
Depressive Symptoms in the Old

- Loss of interest
- Insomnia
- Suicidal ideation
- Physical complaints
- These are the **SOMATIC** (vegetative) symptoms of depression
Suicide in the Elderly

- 12% of the population is older than 65; they compose 25% of successful suicides
- Increased risks include being single, widowed, or a white male
- Older patients use more lethal means and are more successful – they don’t make gestures
Pseudodementia

- Also known as *reversible dementia of depression*
- Major depression in the elderly can present with prominent memory complaints
- Some controversy over this being called a “dementia” because no neurons are lost
- Resolves as depression is treated due to improvement in concentration
Psychotic Depression

- Elderly are slightly more likely to develop psychotic depression
- 3.6% of the depressed elderly in the community develop psychosis
- This increases to 20-45% of the elderly hospitalized for major depression
Psychotic Depression

- Usually has psychotic delusions; hallucinations not prominent
- Delusions either mood congruent or mood incongruent
- Mood congruent delusions usually nihilistic (rotting, diseased)
- Not responsive to antidepressants alone; requires addition of an antipsychotic for treatment, or ECT
Treatment of Geriatric Depression

- Usually begin with selective serotonin reuptake inhibitors (SSRIs)
- Once-a-day dosing
- No titration 80% of the time
- Few side effects (GI, sexual)
- Safe in overdose
Treatment of Geriatric Depression

- Patient must have an adequate trial of medication
- Ranges from 4-12(!) weeks, but if no response at all by 4 weeks, it is unlikely response will develop later
- If partial response at 4 weeks, maximize dose and continue
Other Antidepressants
Tolerated Well by the Elderly

• Bupropion 50-100 mg
• Venlafaxine 37.5 mg
• Desvenlafaxine 50 mg
• Nefazodone 25-50 mg
• Mirtazapine 7.5-15 mg
• Duloxetine 20-40 mg
Depression: Special Groups

• Pediatrics
  - Fluoxetine and escitalopram only ones FDA-approved (7-17 years)

• Lactation
  - Antidepressants are NOT contraindicated!
  - In most cases, infant blood concentrations of TCAs and SSRIs have been below the detection limit of commercial labs & well-tolerated
  - Fluoxetine: can check infant blood levels at 6 weeks
Antidepressants in the Pregnant Patient

• Relapse risk 5x higher if antidepressant is stopped
• SSRIs are first line
  - Little added risk of PPHN with SSRI use in late pregnancy (2015 study of 129K pregnancies)
  - 2015 CDC study of 27,000 pregnancies found 2X elevation of birth defect risks with fluoxetine and paroxetine in early pregnancy, and no associated risks with citalopram, escitalopram, or sertraline
Antidepressants in the Pregnant Patient

- TCAs also considered safe and effective
- SSRIs appear to have a more favorable side-effect profile than TCAs
- One small study supports the use of venlafaxine
  - Informed consent is key
5. Which of the following is true of postpartum depression?

A. The “baby blues” typically resolve spontaneously by the 6th to 8th postnatal week
B. Patients are predisposed by prior history of depression
C. Therapy is more effective than medications
D. It is not associated with perinatal stress
Postpartum Depression

- “Baby blues”
- Frequency range: 26 to 85%
- Characterized by mild depressive symptoms
- Lasts 1-2 weeks
- Treatment: supportive care
- Increases risk for postpartum major depression (PMD) later in the postpartum period, especially if symptoms were severe
Postpartum Depression

• Postpartum Major Depression (PMD)
• Appears most often within first 3 months after delivery
• Predisposing factors: history of severe depression, stress, negative experiences during perinatal period, insufficient social support
• Symptoms same as major depression plus excessive concern and fear about infant
• Need to rule out thyroid dysfunction
Postpartum Depression: Treatment

- Treatment is the same as that for major depression
- Brexanolone (Zulresso) recently approved for treatment. Requires 60-hour continuous inpatient IV infusion.
- Psychotherapy or pharmacotherapy may be used alone or in combination
  - No single modality has been shown to be superior
Postpartum Psychosis

- Postpartum psychosis: a medical emergency
- 0.2% occurrence
- Onset within the first month of delivery
- Manic in nature; bipolar disorder is a risk factor
- Inability to sleep, agitation, expansive or irritable mood, avoidance of the infant
- Delusions or hallucinations often involve the infant; auditory hallucinations "telling" mother to kill her infant are possible
- May require inpatient treatment with ECT, neuroleptic agents, and/or mood stabilizers
Key Points for the Exam

• Screening for depression:
  - Children = no
  - Adolescents and adults = yes, if systems in place to monitor
• Recovery from first MDD: can discontinue medications
• Adequate trial of antidepressant: 4-6 weeks
• ECT: memory loss short-term, reversible
• Lithium: mania without rapid cycling
• Lactation: antidepressants OK, lithium not
• Pregnancy: continue treatment to avoid relapse; SSRIs first-line therapy, but avoid paroxetine
Answers

1. A
2. C
3. C
4. B
5. B
Fractures and Fracture Care In Family Medicine

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Associate Professor
University of Minnesota
Minneapolis
Disclosures

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

The following individual(s) in a position to control content for this session have disclosed the following relevant financial relationships.

• **Joseph Garry, MD** – Stock/bond holdings: Merck Pharmaceuticals (corticosteroids, anti-resortive agents), Amgen (osteoporosis), and Bristol-Meyers Squibb (corticosteroids).

All other individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Know the Salter-Harris classification, most common types of pediatric fractures, and reduction technique for nursemaid’s elbow.
2. Cite the causes and management considerations for common adult fractures.
3. State the complications of splinting & casting [supplemental slides].
4. Cite the frequency and management of stress fractures [supplemental slides].
Fracture Imaging

• **X-ray is the preferred initial study**
  Generally 3 views; AP, lateral, oblique
  If high suspicion for fracture & negative initial films, protect extremity and repeat radiographs in 7-14 days

• **MRI w/o iv contrast is generally considered 2nd line**

• **CT w/o iv contrast is preferred for displaced intra-articular distal radial fractures and tibial plateau fractures**

• **US** can be used to diagnose fractures (user dependent)

Pediatric Fractures

• 15-30% of fractures involve the growth plate
  >30% occur in the long bones of the fingers
  1-10% of physis fractures result in growth deformity

If a fracture is suspected, radiographs are imperative

In general, displaced intraarticular fractures require surgical reduction and fixation
Pediatric Fractures

Type I
Mechanism + tenderness + normal XR = immobilization

Type II
Most common type = immobilization

Type III
Older children, surgical evaluation for ORIF

Type IV
Arrest growth, surgical treatment with ORIF

Type V
Arrest growth, casting or surgery, refer

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American Academy of Orthopaedic Surgeons,
Supracondylar Fracture

**Mech:** 5-7 year olds; fall on an outstretched hand (FOOSH)

**Exam:** refusal to move the elbow; tenderness, ecchymosis in the antecubital fossa. Evaluate *anterior interosseous* [“ok” sign], *radial* [wrist extension], median nerve function

**Mgmt:** *Nondisplaced* (type I) fractures in long arm cast x 3 weeks, repeat x-rays at 1 week; *any displacement* requires referral to orthopedics for closed (open) reduction and percutaneous pinning
Supracondylar Fracture

Anterior fat pad suggests an elbow fracture; posterior fat pad mandates initial treatment as a presumed fracture.
In acute pediatric elbow injuries, the inability to fully extend the elbow was associated with an elbow fracture in all cases.

Buckle (Torus) Fracture

**Mech:** fall on outstretched arm
50% of pediatric wrist fractures

**Exam:** local swelling, tenderness

**Mgmt:** removable splint/brace for 3 weeks [Plint AC. et al. Pediatrics 2006]
Follow-up @ 3 weeks *is at the discretion of physician but not required*
Pediatric Ankle Injury
New Evidence

135 children ages 5-12 years with suspected Salter-Harris I distal fibular fracture & negative radiographs ► ankle MRI

80% had lateral ligament injuries without fracture

Fracture is not always the rule: Kids can sprain!

1. A 3 yo male is brought to your office by his mother to evaluate his left arm, which he stopped using earlier today after walking home with his mother from preschool. He cries when the elbow is manipulated and keeps his left arm at his side. Elbow radiographs are negative for fracture. **Using an evidence-based approach to your patient, what would be the best treatment?**

A. Apply traction to the left arm
B. Hyperpronation of the forearm
C. Apply a sling and reassurance
D. Flexion and supination of the forearm
Nursemaid’s Elbow
Radial Head Subluxation

• 2-3 yo most common
• Traction injury
• Elbow held in extension and pronation, or at side
• Radiographs recommended if concern for fracture or if initial reduction(s) fail

Hyperpronation required fewer attempts, was more successful initially, and often successful when supination/flexion failed (A).

Clavicle Fractures

- Most commonly fractured bone
- 85% occur in middle third. Surgical referral for skin tenting, NV compromise, significant displacement, overriding fragments by >2 cm
- Distal clavicle fractures Surgical repair if ligaments disrupted
- X-ray = AP and 15° cephalic tilt views
- Treat with sling (= figure 8)

2. A 44 yo female tripped and fell on the ice on an outstretched left hand [FOOSH]. She presents with this radiograph. **What is the most commonly injured nerve in this injury?**

A. Musculocutaneous nerve  
B. Median nerve  
C. Radial nerve  
D. Ulnar nerve
Distal Radial Fracture

- 16% of all fractures
- **Older age and osteoporosis are risks**
- FOOSH injury
- **Confirm median nerve function via sensation** [palmar radial 3 ½ digits] and “ok” sign

- Non-displaced fractures treated with casting
- 1-2 mm of articular incongruity raises the risk of OA, therefore **displaced intraarticular fracture = CT** without contrast


Slutsky DJ. Hand Clin 2005; ACR Appropriateness Criteria Hand & Wrist Trauma 2013
Hand Innervation

**Median nerve** = entrapment in the carpal tunnel, distal radial fracture ➤ palmar radial 3 ½ digits and pinch strength (thumb and index finger)

**Ulnar nerve** = entrapment at Guyon’s canal (volar wrist and ulnar to carpal tunnel) affects palmar 4th and 5th digit, abductor digiti minimi (cyclists, catchers, golfers); entrapment at cubital tunnel at medial elbow affects dorsal 4th and 5th digits. Claw hand.

**Radial nerve** = wrist extension (motor) and dorsal radial hand (sensory)
3. A 36 yo female presents to your office and reports that she fell on an outstretched left hand [FOOSH] 3 days ago and presents with left wrist pain, minor swelling, and this radiograph. **What is the best treatment option?**

A. Referral for surgical fixation
B. Volar wrist splint for 8 weeks
C. Short arm cast for 8 weeks
D. Thumb spica cast for 8 weeks
Scaphoid Fracture

• FOOSH injury
• Tenderness in the anatomical snuff box

Trauma + tenderness + normal x-rays = splint and repeat x-rays in 2 weeks.

• Complication = avascular necrosis

The more proximal the fracture, the longer it will take to heal, the longer the period of immobilization, and the higher the risk of non-union & AVN

<table>
<thead>
<tr>
<th>Modality</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>72%</td>
<td>99%</td>
</tr>
<tr>
<td>MRI</td>
<td>88%</td>
<td>100%</td>
</tr>
<tr>
<td>Bone scan</td>
<td>99%</td>
<td>86%</td>
</tr>
</tbody>
</table>

There is not a clear benefit to operative treatment of an acute nondisplaced scaphoid fracture (B).

Dias et al. JBJS, 2005

A displaced scaphoid fracture warrants surgical evaluation, because these are prone to nonunion ►►►► splint & refer.
Boxer’s Fracture

• Fracture of the neck of the [4th or] 5th metacarpal
  ~20% of all hand fractures

• Evaluation
  Radiographs to evaluate for angulation [>40° consider operative intervention]
  and/or shortening of the metacarpal
  Physical exam to evaluate for rotational abnormality [warrants operative intervention]

• Management
  Ulnar gutter or volar splint
  Short arm cast with 4th/5th digit spica
  Compression wrap may be equivalent to immobilization

Dunn JC et al. Orthopedics 2016
4. A 17 yo football player comes to clinic the morning after a game in which he injured the ring finger of his right hand. He grabbed the jersey of an opposing player as he tackled him and immediately felt pain in the distal aspect of the affected finger. On examination there is mild swelling of the finger and he cannot flex at the DIP joint. Radiographs show a small bony fragment at the volar surface of the proximal distal phalanx. **Which one of the following would be the most appropriate management?**

A. Referral to a hand surgeon  
B. Splinting the DIP joint in flexion for 8 weeks  
C. Splinting the DIP joint in extension for 8 weeks  
D. Splinting the PIP joint in extension for 6 weeks followed by night splinting x 4-6 weeks
5. A 33 yo male presents with a suspected dislocated finger. He was playing volleyball the previous day when he jammed his left 5\textsuperscript{th} finger. On examination the DIP joint of the left 5\textsuperscript{th} digit has full PROM but he cannot actively extend the distal phalanx. A radiograph of the digit is normal. \textbf{Which of the following is the most appropriate treatment?}

A. Immobilization of the DIPJ and PIPJ in extension for 6-8 weeks  
B. Immobilization of the DIPJ in 30\textdegree of flexion for 6-8 weeks  
C. Immobilization of the DIPJ in extension for 6-8 weeks  
D. Referral to a hand surgeon
Jersey Finger

- Avulsion of the flexor digitorum profundus from the distal phalanx [ring finger most common]

- Palmar digit swelling or pain with ecchymosis, which may also occur more proximally in palm if tendon has retracted

- Cannot actively flex the distal phalanx [FDP]

- Surgical correction within 10-12 days
Central slip injury to PIP joint with subluxation of the lateral bands

Causes: Jammed finger, dorsal laceration, rheumatoid arthritis

Presentation 7-21 days post-injury

Manage with splinting of PIP joint in extension for 6 weeks followed by night splinting x 4-6 weeks

Surgical correction for persistent deformity and functional impairment
Mallet Finger

• Forced flexion of an extended DIPJ results in **avulsion of the extensor digitorum tendon**

• Radiographs to evaluate for fracture

• **Splint DIP joint in full extension continuously for 8 wks**

• Surgical consult if >30% of the articular surface is involved in fracture
<table>
<thead>
<tr>
<th>FINGER INJURY</th>
<th>EXAM</th>
<th>MANAGEMENT</th>
<th>REFERRAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Slip Extensor Tendon (can cause boutonniere deformity)</td>
<td>TTP @ dorsal PIPJ; PIPJ may be in flexion &amp; DIPJ in hyperextension (boutonniere)</td>
<td>Splint PIPJ in full extension x 6 weeks</td>
<td>Fracture involving &gt;30% of articular surface</td>
</tr>
<tr>
<td>Collateral Ligament Injury (PIPJ)</td>
<td>TTP over the ligament; test for stability with PIPJ in 30° flexion with MCPJ flexed</td>
<td>Stable ligament = buddy tape digit for 2-4 weeks</td>
<td>Unstable ligament or injury in a child</td>
</tr>
<tr>
<td>Extensor Tendon Injury @ DIPJ (Mallet finger)</td>
<td>TTP over the dorsal DIPJ; unable to actively extend distal phalanx = flexion deformity</td>
<td>Splint DIPJ in full extension continuously for 6-8 weeks</td>
<td>If articular fracture involving &gt;30% of articular surface</td>
</tr>
<tr>
<td>FDP tendon injury (Jersey finger)</td>
<td>TTP @ volar distal phalanx; unable to actively flex distal phalanx</td>
<td>Splint joint and refer to surgery</td>
<td>Surgical referral is standard of care</td>
</tr>
<tr>
<td>Volar plate injury (PIPJ)</td>
<td>TTP @ volar plate (volar aspect of affected PIPJ)</td>
<td>Splint PIPJ in 30-40° flexion x 2 weeks and then progressively allow extension (in splint) over 2-4 weeks</td>
<td>Intra-articular fracture &gt;30% of articular surface</td>
</tr>
<tr>
<td>Dorsal PIPJ dislocation</td>
<td>Dorsal abnormality @ PIPJ; check distal neurovascular status</td>
<td>Reduce Treat volar plate injury</td>
<td>Unable to reduce; distal neurovascular impairment; articular fracture &gt;30%</td>
</tr>
<tr>
<td>Ulnar Collateral Ligament Injury to thumb (Skier's or Gamekeeper's thumb)</td>
<td>TTP @ UCL (ulnar aspect of thumb MCPJ); test for stability on stress testing with MCPJ flexed 30° and endpoint at &lt;35°</td>
<td>Stable UCL = thumb spica cast x 6 weeks</td>
<td>Fracture; Unstable UCL = refer to surgery for possible Stener lesion</td>
</tr>
</tbody>
</table>

TTP = tender to palpation; DIPJ = distal interphalangeal joint; PIPJ = proximal interphalangeal joint; MCPJ = metacarpal interphalangeal joint; UCL = ulnar collateral ligament
6. A 74 yo female patient with HTN, osteoporosis and arthritis is seen for routine follow-up. She notes an increase in her back pain about 2 months ago. She denies any trauma or associated symptoms. Her medications include an ARB, a bisphosphonate, a PPI, and an NSAID. Her exam is unchanged other than some mild diffuse low back tenderness. You obtain this radiograph.

Which statement is correct?

A. She has an increased mortality rate of 15% over those without this condition
B. She will need to be evaluated for multiple myeloma
C. This will require surgical management
D. 20% of these remain undiagnosed
Vertebral Compression Fracture

- **Prevalence**
  - 25% of postmenopausal women
  - 40% of women >80 years

- **Risks** = osteoporosis, female, ▲ age, Caucasian, dementia, ▲ risk of falls, ▼ body weight, ▼ Ca++ or vit D, smoking, use of corticosteroids, > 2 alcoholic drinks/day (♀)

- **Most common sites are T8-L1 and L4**

- **Two thirds of fractures not diagnosed**

- ♀ with VCF have a **15% higher mortality rate** (restrictive pulmonary disease or cancer)

Vertebral Compression Fracture
Management Options

• Early mobilization to maintain strength and function; analgesics (acetaminophen, calcitonin nasal spray x 4 weeks, lidocaine 5% patch, muscle relaxants, NSAIDs, narcotics)

• Obtain DXA to evaluate for osteoporosis in patients with VCF or hip fracture due to fall from standing height or minimal trauma [USPSTF: Grade B; screening women 65 and older for osteoporosis to prevent fracture] [USPSTF: Garde B; screening postmenopausal women <65 at risk for osteoporosis ► use risk assessment tool and if increased risk then DXA]

• Long-term treatment with bisphosphonates increases the risk of fracture in older women [recommended that treatment does not exceed 5 years]
7. Your 72 yo male presents with left hip pain after a fall earlier in the day as well as pain with ambulation. He elects to be non-weightbearing. You obtain this radiograph. What is your diagnosis?

A. Left hip arthritis
B. Left hip fracture
C. Pubic ramus fracture
D. Left iliac crest fracture
Hip Fracture

- Affected leg is shortened and externally rotated
- **258,000 hospital admissions** for hip fractures among people aged 65 and older (2010)
- More than **95% of hip fractures are caused by falling**, most often by falling sideways onto the hip

Natl Hospital Discharge Survey (NHDS), National Center for Health Statistics
Hip Fracture

• **20% one-year mortality** (Farahmand et al. Osteoporosis Inter. 2005)

• **33% of adults who lived independently before their hip fracture remain in an SNF for at least a year after their injury** (Leibson et al. J Amer Geriat Soc 2002)

• ADL independent prior to fracture ► **36% returned to pre-fracture independence**, **27% needed assistance for ADLs**, **37% died** (Tang et al. J Gen Int Med 2016)

• Return to ADL independence less likely if age ≥85 years, dementia, and multiple comorbidities (Tang et al. J Gen Int Med 2016)
8. Which of the following is NOT a factor in the Ottawa Ankle Rules?

A. Malleolar pain is a requirement to consider ankle radiographs
B. Discrete bony tenderness at the anterior distal fibula
C. Discrete bony tenderness of the navicular bone
D. Inability to weight bear 4 steps at time of exam
Malleolar Fractures

• Lateral malleolus most common

• Bimalleolar and trimalleolar fractures (lateral, medial, posterior malleoli) are generally unstable and should be referred

• Significant displacement or widening of the mortise should be referred for surgical evaluation
Ottawa Ankle Rules
“Should I Get X-Rays in the Setting of an Acute Ankle Injury?”

• **X-ray if...**
  
  Malleolar pain [ankle xray] OR pain in region of navicular or proximal 5\textsuperscript{th} metatarsal [foot xray]

  **AND**

  Inability to weight bear 4 steps at exam **OR**

  Discrete bone tenderness at shaded areas [*posterior* margin of the malleoli then ankle radiographs; navicular or base of the 5\textsuperscript{th} metatarsal then foot radiographs]

Stiell et al. JAMA, 1994

Ivins, Am Fam Physician, 2006 Nov 15
Malleolar Fractures
Nondisplaced or Minimally Displaced Fractures

• **Lateral or Medial**
  Boot or short leg walking cast
  Protected weight bearing for up to 6 weeks until nontender and radiographic healing

• **Posterior**
  Boot or short leg cast
  Nonweight bearing for 4-6 weeks followed by protected WB for 2-4 weeks

  **Refer** if >2 mm displacement or >25% articular surface involved
Proximal 5th Metatarsal Fractures

**Tuberosity fracture**
- Most common type
- Can be treated with splinting/casting and progressive WB as tolerated

**Jones’ fracture & proximal diaphyseal stress fracture**
- Occurs at the metaphyseal-diaphyseal junction
- High rate of nonunion
- 6 wks of protected NWB vs 4-6 wks of protected WB vs surgical fixation

Hatch et al. *Am Fam Phys* 2007;76(6)
Complications of Non-weightbearing

• Atrophy
  In otherwise healthy, young adults…
  3 weeks of immobilization = average strength deficit of 47%
  2 weeks post immobilization = average strength deficit of 11%
  Hortobagyi T. et al. J Physiol 2000

• Crutch Palsy
  Compression of the brachial plexus or radial nerve at the proximal humerus
  Complication of ill-fitted crutches
  Manifests as wrist or finger extensor weakness or sensory changes on the dorsum of the hand (radial nerve palsy)
Answers

1. B
2. B
3. D
4. A
5. C
6. A
7. B
8. B
Supplemental Slides
Toddler’s Fracture

Childhood Accidental Spiral Tibial (CAST) Fracture

Nondisplaced spiral fracture of the tibial shaft occurs in **ambulatory children 9 mo – 3 yrs**

**Mech:** twisting fall, rotational injury

**Exam:** local swelling, tenderness, refusal to bear weight

**Mgmt:** Long leg cast for 4 weeks; follow up with radiographs at 2 weeks. Avoid prolonged immobilization 2º stiffness
Lesser Toe Fractures

• Lesser toe fractures twice as common as the great toe
• Manage with buddy taping, firm soled shoe & ambulation as tolerated

Review of 339 toe fractures demonstrated that 95% involved less than 2 mm of displacement; all fractures were managed non-surgically; no poor outcomes


• Follow up radiographs at 1-2 weeks if displacement, intra-articular fracture, or initially reduced fracture

Referral for displaced intra-articular fx, nondisplaced intra-articular fx involving 25% of articular surface, fracture dislocation, angulation >20° in dorsal-plantar plane or >10° in medial-lateral plane, or >20° rotational deformity
Bracing & Casting

• Splinting or bracing is the preferred method of immobilization in the acute setting
  Allows for swelling
  Can be carefully removed or changed if underlying soft tissue injury

• Splinting with plaster (moldable) is generally preferred

• Casting is the mainstay of treatment for most fractures
  Principle is to immobilize the joint above and below the fracture
Complications of Splints & Casts

- Compartment syndrome
- Ischemia
- Thermal injury
- Pressure sores / skin breakdown
- Infection
- Dermatitis
- Joint stiffness
- Neurologic injury
- Cast saw burns
AC Joint Injury

- Mechanism = **fall directly on shoulder**
- **TTP** at AC joint and pain with cross chest adduction
- Stress radiographs *not* helpful
- Grades I-III managed nonoperatively; sling for comfort

Grade III nonoperative treatment = outcomes for surgical treatment (B)

AC Joint Injury

Types I – III can be treated non-operatively in a sling for comfort.

Types IV – VI should be referred to orthopedics for operative management.

Avascular Necrosis of the Hip

- Males > females
- 30-60 years of age
- Imaging
  - 1\textsuperscript{st} Radiographs (crescent sign)
  - 2\textsuperscript{nd} MRI without contrast

- Risk Factors
  - Joint trauma (dislocation)
  - Excessive alcohol
  - Hyperlipidemia
  - Steroids
  - Organ transplant
  - Diabetes, lupus, HIV, sickle cell
  - Radiation therapy
  - Gaucher’s disease
  - Bisphosphonates
  - Hemodialysis
  - Familial thrombophilia

ACR Appropriateness Criteria Chronic Hip Pain 2011
Pelvic Insufficiency Fracture

- Post-menopausal ♀ and ♂ > 75 yrs
- 2/3 occur in the absence of trauma
- Osteoporosis is 1⁰ risk

- Pelvic, hip or low back pain
- May refuse to ambulate
- Discrete tenderness on exam but not always easily elicited
- Delay (2 mo) in diagnosis is common

- MRI identifies 99%, CT 69%

Pelvic Insufficiency Fracture

• Check Hg (as can bleed with these)

• Consider hospital admission for pain control and stabilization for early mobilization

• Average LOS 14-45 days

• Walker for use in early ambulation

• Work-up for osteoporosis

Stress Fractures

Risk Factors
- Excessive exercise
- Runners > 25 miles/week
- Female Athlete Triad
- Low vitamin D
- Runners, soccer, dance
- Osteoporosis
- Medications
  - Aromatase inhibitors
  - GnRH agonists
  - Depot medroxyprogesterone
  - Anticonvulsants

Symptoms and Signs
- ▲ activity and limited rest
- Pain with ambulation (81%)
- Focal tenderness (65%-100%)
- Edema (18%-44%)

Browles SK, PSAP-VII, ACCP
Frequency of Stress Fractures

**ADULTS**
- Tibia (50%)
- Metatarsal (25%)
- Fibula (10%)

**PEDIATRICS**
- Tibia (50%)
- Metatarsal (25%)
- Fibula (20%)

- Upper extremities (least frequent)

- Femur
- Navicular
- 1st metatarsal
- Sesamoid
- Pelvis

1. Radiograph of the suspected area

2. If initial radiographs negative then repeat radiograph of the suspected area in 10-14 days

OR

3. MRI without contrast

OR

4. Bone scan

ACR Appropriateness Criteria Stress Fracture 2016
Tibial & Fibular Stress Fractures

- Common stress fractures
- Most common in walkers, runners, jumpers
- Gradual increase in activity related pain over weeks to months & can progress to presence of rest pain
- Discrete bone tenderness, ± focal swelling, + hop test.
Tibial & Fibular Stress Fractures

- Treatment is focused on pain relief & healing
- Cam walker or air stirrup splint
- Nonweight-bearing if painful in boot/splint
- Progress to protected WB
- Calcium & vitamin D
Tibial Stress Fractures

- Anterior mid-tibial stress fracture
- “Dreaded black line”
- 50% nonunion rate
- May require prolonged NWB and prolonged healing
Stress Fractures of the Foot

- 2nd and 3rd metatarsals most common
- Pain with activity and relieved by rest
- Radiographs
- Metatarsal shaft fractures can be treated with activity modification, firm soled footwear, and following symptoms for 6-8 weeks
Prevention and Rehabilitation of Stress Fractures

- Use of shock-absorbing inserts in footwear reduces the incidence in military personnel (B).

- Rehabilitation of a tibial stress fracture may be shortened by use of an air stirrup brace (B).

Cochrane 2005
Behavioral Medicine II: Bipolar and Anxiety Disorders

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Disclosure Statement

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“The 7 ages of man: Spills, Drills, Thrills, Bills, Ills, Pills, and Wills.”

• Richard Needham
Learning Objectives

1. Recognize the differential diagnosis and clinical presentation of bipolar disorders and anxiety disorders
2. List the treatment options for bipolar disorders and anxiety disorders
1. Which of the following is true about bipolar disorder?

A. “Kindling” is the acceleration of untreated mood swings
B. Bipolar disorder occurs more frequently in men than women
C. Bipolar Type II is characterized by depression alternating with mania
D. Mania is milder than hypomania, without gross lapses in impulse control or reality testing
Bipolar Disorder

- Is lifelong and chronic
- Mood becomes elevated or depressed without obvious trigger
- Affects 1 in 60 to 1 in 100 people
- Onset frequently in late teens/early 20s
- Onset of new manic episode after age 65 extremely rare (rule out medical causes)
Bipolar Illness

• 1\textsuperscript{st} degree relatives of bipolar patients are bipolar 50% of the time
• Sex distribution equal for Bipolar I
• Bipolar II more common in women
DSM-5 Diagnosis of Bipolar Disorder

• Requires a period of increased activity, with an abnormally elevated, expansive, or irritable mood

• Along with 3 or more of the following:
  • Grandiosity or euphoria
  • Decreased need for sleep
  • Pressure to keep talking
  • Flight of ideas or racing thoughts
  • Distractibility
  • Psychomotor agitation
  • Engaging in unrestrained buying sprees, sexual activity, substance use, etc.
Pitfalls of Diagnosis

• Only one manic episode required for diagnosis of bipolar (depressed episode not necessary)
• Ask patients presenting with depression about symptoms of mania
• Can use the *Mood Disorder Questionnaire (MDQ)* during depressed or manic phase to assist with diagnosis
Types of Bipolar Disorders

- Bipolar I—Full manic episodes (at least 1-week duration)
- Bipolar II—Hypomanic episodes (at least 4 days’ duration)
- Cyclothymia
- Unspecified Bipolar Disorder (was Bipolar Disorder NOS in DSM-IV)
Bipolar Disorders

- Bipolar I
- Bipolar II
Cyclothymia
2. Which is true about treating bipolar disorder?

A. Valproic acid is most effective for acute mania with rapid cycling
B. Women with bipolar disorder may continue on lithium if they become pregnant
C. Suicide is not a risk during manic episodes
D. Lithium is the most prescribed mood stabilizer
Need for Treatment

- Untreated mood swings tend to accelerate and become rapid cycling (known as “kindling”)
- To prevent suicide
- To prevent patient’s embarrassment and disruption of lives (many patients will remember manic actions)
Mood Stabilizers (Used for Bipolar I, II, & Cyclothymia)

• **Lithium**
  • Usual dose 300 mg 3 or 4 times a day
  • All mood stabilizers work in 9-10 days

• **Anticonvulsants**
  • Valproic acid
  • Carbamazepine
  • Lamotrigine
  • Oxcarbazepine
  • (NOT phenytoin, phenobarbital, or gabapentin)
3. A 36 yo woman, diagnosed with Bipolar I disorder, has been maintained on lithium 300 mg TID for 17 years. Which of the following is the most likely irreversible side effect from her treatment?

A. Polyuria
B. Renal insufficiency
C. Hypothyroidism
D. Fine resting tremor
Lithium

- Is a salt, not a drug with a complex structure
- Is excreted by kidney unchanged by body
- Works in 80% of Bipolar I cases
- May prevent depressive swings, but not as effective for treating them; may need to add antidepressant
Side Effects of Lithium

• Fine tremor
• Contraindicated in pregnancy
  - (Ebstein’s anomaly in 1st trimester)
• Increased urination
• If toxic:
  - Nausea & vomiting
  - Diarrhea
  - Ataxia
  - Coma & death
Lithium

- Lithium is less effective in:
  - Rapid cycling bipolar illness
  - Poorly compliant patients
- Rapid discontinuation can cause relapse
- Lithium is dialyzable if patient is toxic
Lithium Levels

• Must check 5 days after starting or changing dose
• Seek to maintain 0.8-1.0 mEq/L levels to prevent relapse (acute mania may require levels of 1.2)
Lithium Monitoring

• Long-term effects on thyroid (reversible) and kidney (irreversible). Check prior to starting and every 6-12 months.

• Avoid dehydration and potassium-wasting diuretics, careful with NSAIDs (ibuprofen, naproxen, etc.)

• EKG for patients over age 40 (can rarely cause junctional rhythm)
Valproic Acid

- Is most frequently prescribed mood stabilizer
- May be more effective for rapid cycling bipolar disorders (> 4 swings per year)
- Loading dose is 10 mg per pound per day
  - Ex: 150 lb. man = 1500 mg per day = 500 mg 3 times/day
- Usually start at 1/2 to 2/3 daily dose as outpatient
Side Effects of Valproic Acid

- GI upset—take with food
- Liver dyscrasias—check liver panels
- Occasional sedation
- Usually well-tolerated
- Levels available—therapeutic levels between 50-100 mcg/mL
Carbamazepine

- May also be more effective for rapid cycling bipolar disorders
- Starting dose 100-200 mg 3 times a day
- May cause blood dyscrasias—must check blood counts
- Levels available—want levels between 8-12 mcg/mL
Other Anticonvulsants

- Less proven, but may be effective if previous meds fail:
  - Oxcarbazepine
  - Topiramate—usually used with another mood stabilizer
  - ?Gabapentin?—poor evidence
Bipolar Disorder: Treatment

• Lamotrigine
  – Bipolar depression
  – Rash in 5%; may progress to Stevens-Johnson syndrome

• Atypical antipsychotics
  – Olanzapine, quetiapine, risperidone, ziprasidone, aripiprazole, asenapine, lurasidone, cariprazine
  – Antidepressant effects; also effective in mania
  – Can use lower doses for bipolar than psychosis
  – Weight gain, lipid/glucose abnormalities
Anxiety Disorders

- Panic disorder
- Agoraphobia
- Specific phobia
- Social anxiety disorder
- Generalized anxiety disorder
4. A 23 yo female patient presents with panic attacks 2 to 3 times a week. She should be treated with:

A. Quetiapine
B. Buspirone
C. Propranolol
D. Fluoxetine
Panic Disorder

- Can occur with or without agoraphobia
- Agoraphobia is now a separate diagnosis in DSM-5
- Is a discrete, unprovoked psychophysiological event
- Almost always (90%) comorbid with another illness
- Female: male ratio is 2:1
Symptoms of Panic Attacks

• Sudden onset and escalation of extreme anxiety, fear, and apprehension

• Accompanied by somatic complaints such as feeling dizzy, lightheaded, faint, tremulous, short of breath, and sweating

• Patients often state, “I am about to die,” or “I am going crazy.”

• 25% will have **nocturnal** attacks
Treatment of Panic Disorder

• SSRIs
  - Best tolerated
  - Good response reported with all SSRIs

• Venlafaxine

• Tricyclics (imipramine & desipramine)
  - Patients sensitive to activating effects
  - Start with “geriatric” doses, 10-25 mg
Treatment of Panic Disorder

• MAOIs
  - May be more effective than tricyclics
  - 3rd or 4th line due to dietary restrictions and risk of hypertensive crisis

• Buspirone is not effective

• Should treat for at least 12 months

• Psychotherapy helpful if agoraphobia does not respond to drug treatment of actual panic attacks
Specific Phobia

- 11% lifetime prevalence
- Some phobias common and culturally or family related
- Little comorbidity
- Often don’t seek help
- Treated with cognitive behavioral therapy and graded desensitization
Social Anxiety Disorder

- Known as Social Phobia in DSM-IV
- Fear of “performance” situations
  - Speeches and presentations
  - Meeting new people
  - Eating in crowded places
- May affect 2% of the population
Treatment of Social Anxiety Disorder

• SSRIs surprisingly effective
• Phenelzine (MAOI)
• Buspirone not effective
• Beta blockers reduce tremors, sweating, etc., but do not help subjective anxiety
5. In RCTs, drug vs. placebo, which of the following treatments has failed to demonstrate benefit in the treatment of generalized anxiety disorder?

A. Antidepressants
B. Benzodiazepines
C. Beta blockers
D. Cognitive therapy
Generalized Anxiety Disorder (GAD)

- Involves excess anxiety and worry for more than 6 months
- Accompanied by at least 3 physical symptoms: restlessness, fatigue, poor concentration, muscular tension, irritable bowel symptoms, sleep disturbance, etc.
- GAD-7 Scale can be used for screening
Generalized Anxiety Disorder (GAD)

- Female:Male ratio is 2:1
- GAD patients say they have been anxious all of their lives and that they “worry about everything”
- Many GAD patients are shy, compliant, perfectionist, and are concerned with their own failures and imperfections.
Generalized Anxiety Disorder (GAD)

- Major differential diagnosis involves major depression, frequently comorbid
- Is chronic; 50% still diagnosed GAD at 5-year follow-up
Treatment of GAD

• Must individualize treatment
• SSRIs effective for generalized anxiety
• Venlafaxine also useful
• Benzodiazepines useful for immediate relief, or if above meds fail
• Beta blockers do not relieve generalized anxiety
Other Treatments for GAD

• Buspirone may be effective, especially if used as a 1st agent
  - Not a controlled substance, does not prevent ETOH or BZD withdrawal
  - Delayed action, 1-2 weeks
  - Daily bid dosing, not prn
Key Points for the Exam

• Strong genetic component in bipolar disorder
• Lithium contraindicated in 1st trimester
• Anticonvulsants used most often for bipolar treatment
• Panic attacks respond to SSRIs, SNRIs, and tricyclics
Answers

1. A
2. A
3. B
4. D
5. C
Supplementary Slides
Personality Disorders

• Pattern of behavior that causes problems
• Behavior is rigid and lifelong
• Patient experiences little anxiety (ego-syntonic)
• Seldom seek treatment for personality disorder
• Etiology unclear
  – Maladaptive patterns are the result of dysfunctional early environments that prevent the evolution of adaptive patterns
  – Some evidence points to a genetic basis
  – Diagnosis should not be made until age 18 years and personality development is complete
Personality Disorders: Cluster A (Odd, Eccentric)

- Paranoid—suspicious
- Schizoid—loner
- Schizotypal—odd loner
- General principles
  - Uncomfortable in interpersonal situations, emotionally distant, hard to engage
  - Do not respond appropriately to cues
  - May not come in due to fear of personal contact
- Respect patient's need for personal distance
  - Convey info in a clear, straightforward fashion
  - Do not directly challenge *strange* ideas about health
Personality Disorders: Cluster B (Dramatic, Emotional, Erratic)

- Antisocial: breaks rules, feels no guilt
- Borderline: suicidal gestures, unstable relationships, splitting
- Histrionic: dramatic, somatic complaints
- Narcissistic: insensitive to others’ feelings
- General tendencies
  - Demanding, manipulative, unstable
  - Personally inappropriate; cross boundaries
- Physicians must be aware of their own emotions
  - Avoid familiarity; set clear limits
  - Schedule regular visits
Personality Disorders: Cluster C (Anxious, Fearful)

- Avoidant—shy
- Dependent—stays in harmful relationships
- Obsessive/compulsive (not OCD)—perfectionistic, isolation of affect
- General principles:
  - Underlying anxiety may significantly interfere with the doctor-patient relationship
  - Provide reassurance; validate concerns; encourage participation, symptom reporting
  - Schedule regular visits
  - Set reasonable limits on time, expectations
Personality Disorders: Treatment Options

• Psychotherapy: core treatment
  – Psychodynamic
  – Interpersonal
  – Cognitive
  – Group
  – Dialectical (skill-based, coping)

• Medication: symptomatic
  – Antidepressants: SSRIs, nefazodone, mirtazapine; avoid TCA/MAOIs (OD risk)
  – Anticonvulsants (divalproex)
  – Antipsychotics (atypical)
Schizophrenia

• Rates are equal in males and females
  – Onset in the teens and 20s
  – 2% prevalence
  – 10% lifetime suicide risk
• Requires 6-month history of impaired functioning
  – Work, education, self-care
• Characterized by disorganized thought (bizarre speech, behavior), loose associations
  – *Word salad*—words do not relate
Schizophrenia

- Symptoms can be positive (e.g., hallucinations) or negative (e.g., social withdrawal)
- Social/family interventions improve outcomes
- Treatment: dopamine D$_2$ blockers (2nd generation antipsychotics)
  - Noncompliance rates are high and equivalent across medication classes
  - Delays in treatment worsen long-term outcomes
<table>
<thead>
<tr>
<th>2nd Generation Antipsychotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clozapine 100-900 mg/day</td>
</tr>
<tr>
<td>Olanzapine 2.5-20 mg/day</td>
</tr>
<tr>
<td>Quetiapine 25-1000 mg/day</td>
</tr>
<tr>
<td>Risperidone 1-6 mg/day</td>
</tr>
<tr>
<td>Ziprasidone 20-200 mg/day</td>
</tr>
<tr>
<td>Paliperidone 3-12 mg/day</td>
</tr>
<tr>
<td>Aripiprazole 10-30 mg/day</td>
</tr>
<tr>
<td>Iloperidone 12-24 mg/day</td>
</tr>
<tr>
<td>Lurasidone 40-80 mg/day</td>
</tr>
<tr>
<td>Asenapine 10-20 mg/day</td>
</tr>
<tr>
<td>Brexpiprazole 0.5-4 mg/day</td>
</tr>
<tr>
<td>Cariprazine 1.5-6 mg/day</td>
</tr>
</tbody>
</table>
2nd Generation Antipsychotics

- Have low $D_2$ receptor binding and blockade, plus serotonin receptor blockade
- Fewer extrapyramidal side effects
- Less increase in prolactin
- Reduced risk of tardive dyskinesia
- Increased risk of weight gain
- Increased risk of metabolic syndromes; monitor glucose & lipids
Key Points for the Exam

• Personality disorders: psychotherapy first-line treatment
• Seldom seek treatment for personality disorders; are “ego-syntonic”
• 2nd generation antipsychotics (atypicals) reduce the risk of TD and EPS; increase risk of metabolic syndrome
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The following individual(s) in a position to control content for this session have disclosed the following relevant financial relationships.

• Joseph Garry, MD – Stock/bond holdings: Merck Pharmaceuticals (corticosteriods, anti-resportive agents), Amgen (osteoporosis), and Bristol-Meyers Squibb (corticosteriods).

All other individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Cite the clinical recommendations related to the preparticipation exam
2. Review key factors related to medical conditions in athletes (Cardiac, Marfan’s, EIB, Mono, Heat illness, Concussion, and Eating Disorders)
3. Cite sports-related injury rates and characteristics among high school athletes
4. Review sports-related musculoskeletal injuries, specifically anterior shoulder dislocation, FAI, ACL injury, and ankle sprain
Objectives of the PPE

Primary Objectives
1. Screen for conditions that may be life-threatening or disabling
2. Screen for conditions that may predispose to injury or illness

Secondary Objectives
1. Determine general health
2. Serve as an entry point to the healthcare system for adolescents
3. Provide an opportunity to initiate discussion on health-related topics [AMA Recommendation]
Conditions Resulting in Restriction PPE

Percent based on 26,899 evaluations (10 studies)

- Medical: 53%
- MSK: 47%
- CV: 20%

Percentage
PPE Screening

• *Elevated BP is the most common CV abnormality* identified during the PPE

Lombardo et al. Clin Cornerstone 2001
Clinical Recommendations

Preparticipation Exam

1. Should occur 6 weeks prior to participation

2. Should include questioning regarding exertional symptoms, presence of heart murmur, symptoms of Marfan’s, FH of premature cardiac conditions or CSD Maron BJ et al. Circulation 2007 via the 14-point AHA checklist Maron BJ et al. Circulation 2014

3. Athletes with BP$_S$<160 and BP$_D$<100 should not be restricted from participation McCambridge TM et al. Pediatrics 2010

4. Athletes with well-controlled asthma, asymptomatic at rest or with exertion, can safely participate Hong G et al. Clin Rev Allergy Immunol 2005

5. Screening blood & urine tests are not recommended for asymptomatic athletes
The 14-Element Cardiovascular Screening Checklist for Congenital and Genetic Heart Disease:

**Personal history:**
1. Chest pain/discomfort/tightness/pressure related to exertion
2. Unexplained syncope/near-syncope
3. Excessive exertional and unexplained dyspnea/fatigue or palpitations, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure
6. Prior restriction from participation in sports
7. Prior testing for the heart, ordered by a physician

**Family history:**
8. Premature death (sudden and unexpected, or otherwise) before age 50 attributable to heart disease in ≥1 relative
9. Disability from heart disease in close relative <50 y of age
10. Hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of certain cardiac conditions in family members

**Physical examination:**
11. Heart murmur
12. Femoral pulses to exclude aortic coarctation
13. Physical stigmata of Marfan syndrome
14. Brachial artery blood pressure (sitting position)

EKG screening in the PPE is **NOT** recommended (AAFP, ACSM, AHA/ACC)

*But what is recommended is to…*
Screen athletes with 14-point AHA/ACC questionnaire

If a positive response, then *may* consider EKG

1. Examination findings of a 17 yo male athlete with near syncope and suspicion for hypertrophic cardiomyopathy would include the following finding:

A. A machinery-like murmur at the left upper sternal border
B. A holosystolic murmur at the left sternal border with thrill
C. A crescendo-decrescendo systolic murmur at the left sternal border, decreases with Valsalva
D. A crescendo-decrescendo systolic murmur at the left sternal border, increases with Valsalva
## Distribution of Cardiovascular Causes of Sudden Death in Young Competitive Athletes (Age < 35 Years)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertrophic cardiomyopathy</td>
<td>36%</td>
</tr>
<tr>
<td>Coronary artery anomalies</td>
<td>17%</td>
</tr>
<tr>
<td>Indeterminate LVH, possible HCM</td>
<td>8%</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>6%</td>
</tr>
<tr>
<td>Arrhythmogenic right ventricular dysplasia</td>
<td>4%</td>
</tr>
<tr>
<td>Mitral valve prolapse</td>
<td>4%</td>
</tr>
<tr>
<td>Tunneled LAD</td>
<td>3%</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>3%</td>
</tr>
<tr>
<td>Aortic stenosis</td>
<td>3%</td>
</tr>
<tr>
<td>Ion channelopathies</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
<tr>
<td>Dilated cardiomyopathy</td>
<td>2%</td>
</tr>
<tr>
<td>Aortic rupture</td>
<td>2%</td>
</tr>
<tr>
<td>Other congenital heart disease</td>
<td>2%</td>
</tr>
<tr>
<td>Sarcoidosis</td>
<td>1%</td>
</tr>
</tbody>
</table>

Harmon KG et al. *Circ arrhythm Electrophysiol* 2014
Hypertrophic Cardiomyopathy

- Inherited as an autosomal dominant trait with variable penetrance
- Harsh crescendo-decrescendo systolic murmur at the left upper sternal border; increases with Valsalva
- EKG
  75-95% will have abnormal 12-lead EKG
  No characteristic pattern
- Imaging
  Diagnosis is best made with echocardiogram or cardiac MRI
- Management
  Beta-blockers preferred as first line
Commotio Cordis

- **Blunt chest wall trauma** [think of a line drive in baseball] over the cardiac silhouette during a vulnerable period of the cardiac cycle producing arrhythmia (Vtach degrades to Vfib)
- Most common in those ages $\leq 16$ years
- **Increased survival with early defibrillation** ($< 3$ minutes)
- **Chest protectors not shown to prevent** commotio cordis
Marfan Syndrome

Autosomal-dominant connective tissue disease

**Stigmata**: arachnodactyly, high arched palate, hyperextensible joints, anterior chest deformity, scoliosis, arm span > height, myopia

**Complications**: *Cardiac* (ascending aortic dilatation, aortic dissection, MVP, dysrhythmias), *Pulmonary* (sp. pneumothorax), *Ocular* (lens dislocation)

High-suspicion physical exam, then echocardiogram (95% abnormalities), slit lamp exam (60% lens subluxation)

Exercise-Induced Bronchospasm

- Change in FEV₁ from baseline to lowest level within 30 min post exercise of > 10%
  - FEV₁ 10-24% (mild)
  - FEV₁ 25-50% (moderate)
  - FEV₁ > 50% (severe)

- Manage with warm-up exercise, SABA 15 min prior to exercise; if SABA needed daily, then add daily inhaled corticosteroid, leukotriene receptor antagonist, or mast cell stabilizer

- LABA not recommended

Parsons et al. Am J Respir Crit Care Med 2013
Infectious Mononucleosis

- Hoagland’s criteria
  50% lymphocytes (10% atypical) in presence of fever, pharyngitis, adenopathy and confirmed by serological testing

- **Risk of splenic rupture is 0.1-0.5% and highest in first 3 weeks**

- Physical exam for splenomegaly has poor sensitivity and specificity

- At 21 days post-diagnosis, may resume light aerobic activity and progress as tolerated if no organomegaly present

*Full return to play when fully asymptomatic and post 21 days*

2. You are the team physician at an early preseason practice when a 17 yo male stumbles off the field late in practice. He is an overweight lineman, appears fatigued, and is sweating profusely. He is clumsy and mumbling incoherently. The trainer takes an oral temperature that is 102.1⁰ F. The defining characteristic distinguishing between heat exhaustion and heat stroke is which of the following?

A. Absence of sweating
B. Mental status changes
C. Urine output < 25 mL/kg/hour
D. An oral temperature > 102.0⁰ F
Heat Illness

<table>
<thead>
<tr>
<th>Heat cramps</th>
<th>Heat syncope</th>
<th>Heat exhaustion</th>
<th>Heat stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fatigue</td>
<td>CNS dysfunction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hyperthermia T&lt;104°</td>
<td>Hyperthermia T ≥104°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No CNS involvement</td>
<td></td>
</tr>
</tbody>
</table>

Rectal Temp

- Spectrum disorder, usually involves dehydration, **profuse sweating**
- **Risk factors include:** dehydration, clothing/equipment, poor fitness, obesity, alcohol, stimulants/antidepressants/diuretics/antihistamines, lack of acclimation, sickle cell trait
- **Manage with removing from exercise, cooling, hydration**
  - Ice water immersion preferred
- Complications: CNS changes, rhabdomyolysis, arrhythmia
3. Which of the following statements is true regarding sports-related concussion?

A. Return to sports can occur prior to return to baseline academics
B. Physical rest is recommended until all symptoms of SRC have resolved
C. Physical rest is recommended during the first 24-48 hours post-concussion
D. The overall duration of SRC symptoms is the same in children, adolescents and young adults
Sports-Related Concussion [SRC]

“SRC is a traumatic brain injury induced by biomechanical forces.”

- Risks include **sport** (football, rugby, hockey, soccer), **competition** exposure, **female** athlete, history of **prior SRC**, **player-to-player contact**
- **Most common symptoms** = **headache**, dizziness, confusion or foggy or disoriented
- LOC occurs in 8-9% of SRC; more common in subsequent SRC
- Neuroimaging has limited use in evaluation of SRC [avoid CT in peds (AAP Choosing Wisely)]

Sports-Related Concussion
Most Current Update

- SCAT(5) is best instrument for sideline evaluation of athlete
- Child-SCAT(5) is developed for ages 5-12 years
- No same-day return to play for an athlete with SRC
- Neuropsychological testing is an adjunct tool for management

SRC Management
Most Current Update

• Physical & cognitive rest in the acute phase (24-48⁰) post injury
  ► Followed by light activity that remains below symptom threshold

• Return to academic baseline prior to return to play in athletics; when the athlete can tolerate 30-45 min of cognitive activity without symptom exacerbation then he/she can return to school

• Graded program of exertion prior to medical clearance and return to play

Evolution of SRC

80-90% of all athletes have resolution by 7-10 d post injury
Rate of recovery will vary as affected by numerous factors; prolonged by younger age, female gender, post-concussive migraine, increased severity of symptoms on day 1, increased number/duration/severity of prior SRC
Children 5-12 years of age can take up to 4 weeks to recover

Balance returns to baseline at 3-7 days

Cognitive function returns to baseline at 5-7 days on average among NCAA football players

SRC Management
Return to Activity

Time [days]

GAME PLAY
- Full contact*
- Noncontact drills
- Sport-specific exercise

Return to school full time
Return to school part time
Return to learning

Light aerobic activity

Daily activities at home that do not aggravate symptoms
School activities

SRC Symptoms

Eating Disorders

- Athletes have a higher prevalence of ED than non-athletes
  - 18-20% of female athletes
  - Up to 8% of male athletes
- Employ a team approach to management (MD/DO, dietician, mental health)
- Common comorbidities include depression, anxiety, OCD, substance abuse disorder

Anterior Shoulder Dislocation

- 70% of shoulder dislocations are anterior
- 90% of anterior dislocations are traumatic

Shoulder instability in the young athlete is the likely result of a dislocation

- Early reduction on the field ➤ pain reduction and ease of reduction
- Immobilization of the shoulder in abduction and ER reduces the risk of redislocation [Heidari K et al. J Shoulder Elbow Surg 2014]
Femoral Acetabular Impingement

- Symptoms = pain in the anterolateral groin, "C" sign
- Exam = reproduction of pain with hip flexion/adduction/ internal rotation [FAdIR] most sensitive exam maneuver
- FAI is felt to predispose one to hip osteoarthritis
- Management ► NSAID, a course of physical therapy, may consider a diagnostic/therapeutic injection, occasionally surgical intervention
4. You have been invited to present a grand rounds lecture on “Sports Injuries in High School Athletes.” Which of the following statements would you include in your talk?

A. Football has the highest injury rate
B. Injury rates are higher in practice as opposed to competition
C. The knee is the most commonly injured body part in high school athletics
D. The anterior cruciate ligament [ACL] is the most commonly reported knee injury in high school athletics
National High School
Sports-Related Injury Surveillance Study 2017-2018

Injury Rate/100,000 Athletic Exposures

- Baseball: 84
- BSKB-M: 148
- Softball: 130
- Volleyball: 119
- BSKB-W: 214
- Soccer-M: 187
- Wrestling: 223
- Soccer-W: 259
- All Sports: 232
- Football: 408
National High School Sports-Related Injury Surveillance Study 2017-2018

Injury Rate/1000 Athlete Exposures

- Football
- Soccer-M
- Soccer-W
- Volleyball
- BSKB-M
- BSKB-W
- Wrestling
- Baseball
- Softball

[Bar chart showing injury rates for various sports with categories of competition and practice.]
## Most Commonly Injured Body Region (%)

National High School Sports-Related Injury Surveillance Survey 2017-2018

<table>
<thead>
<tr>
<th>Body Region</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head/Face</td>
<td>21.4</td>
</tr>
<tr>
<td>Ankle</td>
<td>17.8</td>
</tr>
<tr>
<td>Knee</td>
<td>14.1</td>
</tr>
<tr>
<td>Hip/Thigh</td>
<td>10.4</td>
</tr>
<tr>
<td>Hand/Wrist</td>
<td>9.1</td>
</tr>
<tr>
<td>Shoulder</td>
<td>6.8</td>
</tr>
<tr>
<td>Trunk</td>
<td>4.3</td>
</tr>
<tr>
<td>Low Leg</td>
<td>4.0</td>
</tr>
<tr>
<td>Foot</td>
<td>3.6</td>
</tr>
<tr>
<td>Arm/Elbow</td>
<td>3.4</td>
</tr>
</tbody>
</table>
# Most Commonly Injured Knee Structure

Percent of All Injuries (%)

National High School Sports-Related Injury Surveillance Survey 2017-2018

<table>
<thead>
<tr>
<th>Structure</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCL</td>
<td>29.2</td>
<td>16.9</td>
<td>24.8</td>
</tr>
<tr>
<td>Patella</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patellar tendon</td>
<td>18.6</td>
<td>30.5</td>
<td>22.9</td>
</tr>
<tr>
<td>Meniscus</td>
<td>18.3</td>
<td>23.1</td>
<td>20.0</td>
</tr>
<tr>
<td>ACL</td>
<td>17.3</td>
<td>20.9</td>
<td>18.2</td>
</tr>
<tr>
<td>LCL</td>
<td>7.3</td>
<td>7.8</td>
<td>7.5</td>
</tr>
<tr>
<td>PCL</td>
<td>1.8</td>
<td>0.8</td>
<td>1.4</td>
</tr>
</tbody>
</table>
5. Which physical exam test is the most sensitive maneuver for the corresponding knee injury?

A. Thessaly test – meniscal tear
B. Anterior drawer test – posterior cruciate ligament
C. McMurray test – meniscal tear
D. Valgus stress test – lateral collateral ligament
Best Physical Exam Maneuvers for Knee Injuries

• Anterior cruciate ligament – Lachman test
• Posterior cruciate ligament – Posterior Drawer test
• Medial collateral ligament – Valgus Stress test
• Meniscal Tear – Thessaly maneuver (single- or double-legged)
6. Which one of the following statements is true regarding ACL injuries?

A. Prevention programs are ineffective at reducing ACL injury
B. Bracing is effective in the secondary prevention of ACL injury
C. In high school sports, football has the highest rate of ACL injury
D. Surgical repair of an ACL tear results in lower rates of knee osteoarthritis
ACL Tears

- 70% are noncontact injuries
  In HS sports, football has highest rate; in collegiate sports, ♀ soccer

Female athletes at higher risk

- Neuromuscular training reduces risk of injury in female athletes

Surgical repair is treatment of choice for instability

- Knee bracing is ineffective for the 1° or 2° prevention of ACL injuries
- Development of OA is similar whether ACL repaired or not

7. A 26 yo male suffers an inversion ankle injury and ambulates to the ED for evaluation. You find lateral ankle swelling and tenderness over the anterior distal fibula. **The next best course of action includes**…

A. Avoidance of the use of ankle bracing after his injury resolves  
B. Recommendation for early range of motion for the ankle  
C. Avoidance of use of NSAIDs  
D. Radiographs of the ankle
Ankle Sprain

- Lateral sprains most common (80%)
- Initial treatment with rest, ice, elevation, protection

Early range of motion improves recovery (A)

BMJ. [www.clinicalevidence.com](http://www.clinicalevidence.com)
Dettori et al. Mil Med, 1994
Wolf Michael et al, Am Fam Physician. 2001 Jan
Ankle Sprains
Clinical Recommendations

- **NSAIDs** reduce pain post-injury and may reduce time for return to play

- **Ankle bracing is effective** for both the 1º and 2º prevention of ankle sprains

- Graded exercise programs and *proprioceptive training* are recommended to reduce the risk of ankle sprains

Kaminski TW et al. J Athl Train 2013
AFP 2006; 74(10)
Ottawa Ankle Rules

- **X-ray if...**
  - Malleolar pain [ankle x-ray] or pain in region of navicular or proximal 5th metatarsal [foot x-ray]
  - **AND**
  - Inability to weight-bear 4 steps at exam **OR**
  - Discrete bone tenderness at any site noted (striped areas)

Stiell et al. JAMA, 1994 (A)
Ivins, Am Fam Physician.2006 Nov 15
Impingement Neuropathies

• **Handlebar neuropathy**
  Cyclists; entrapment of the *ulnar nerve at Guyon’s canal*, paresthesias in the palmar 5th and ulnar aspect of the 4th digits of affected hand(s)

• **Ulnar neuropathy (cubital tunnel)**
  Throwers and pitchers; irritation or subluxation of the *ulnar nerve at the cubital tunnel*, paresthesias/pain in the ulnar forearm and dorsal aspect of 5th and ulnar aspect of the 4th digits of the throwing arm

• **Saddle neuropathy**
  Cyclists; entrapment of the *pudendal nerve* due to a narrow seat

• **Peroneal neuropathy**
  Contact sports due to trauma to lateral aspect of knee/foreleg or proximal fibular fracture or compression from a tight cast/brace; foot drop
Answers

1. D
2. B
3. C
4. A
5. A
6. C
7. B
Supplemental Slides
Skin Infections

• Infections spread by direct physical contact or via fomites

• **Risk factors include** previous history of infection, close contact, poor personal hygiene, body shaving, overuse of antibiotics, sharing of fomites (towels, equipment)

• **Withhold athletes** with bacterial, viral, or fungal infections from practice or competition **until adequately treated** (= noninfectious)

• **Covering lesions alone isn’t appropriate as primary treatment**

  Treating MRSA carriers to prevent spread is controversial
Female Athlete Triad or Relative Energy Deficiency in Sport
Spectrum Disorder

- Low energy availability
- Menstrual irregularity
- Osteoporosis

- New name = Relative Energy Deficiency in Sport [RED-S]

- Multidisciplinary treatment team (MD/DO, RD, PhD)

Source: Female Athlete Triad Coalition. www.femaleathletetriad.org
Female Athlete Triad
Spectrum Disorder

• **A level statements**
  • Menstrual irregularity and low BMD increase risk of stress fracture
  • Disordered eating, ED, amenorrhea occur more frequently in sports that emphasize leanness

• **B level statements**
  • Functional hypothalamic amenorrhea is a diagnosis of exclusion

• **C level statements**
  • Screening should occur at PPE or annual exam
  • Athletes with 1 component of the FAT should be assessed for others
  • Athletes with disordered eating should be referred to mental health
  • DXA if stress fracture & 6 months of amenorrhea/oligomenorrhea/disordered eating or ED
  • In functional hypothalamic amenorrhea, BMD increases with weight increase more so than with OCP/HRT supplementation

## Acute Knee Injury
### Historical Findings

<table>
<thead>
<tr>
<th></th>
<th>Meniscal Tear</th>
<th>ACL Tear</th>
<th>PCL Tear</th>
<th>Patellar Dislocation</th>
<th>Patellar Tendon Tear</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanism</strong></td>
<td>Twisting on fixed foot</td>
<td>Noncontact (70%), hyperextension, deceleration, rotatory force</td>
<td>Fall on flexed knee, dashboard injury</td>
<td>Flexion with valgus moment, direct force</td>
<td>Violent quad contraction</td>
</tr>
<tr>
<td><strong>Onset of swelling</strong></td>
<td>Delayed</td>
<td>Acute</td>
<td>Delayed or absent</td>
<td>Acute or delayed</td>
<td>Acute</td>
</tr>
<tr>
<td><strong>Location of pain</strong></td>
<td>Joint line</td>
<td>Posterior knee</td>
<td>Anterior and medial knee</td>
<td>Anterior knee</td>
<td></td>
</tr>
<tr>
<td><strong>Ability to continue activity</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>+/-</td>
<td>No</td>
</tr>
<tr>
<td><strong>Clicking or locking</strong></td>
<td>+ if bucket handle or displaced meniscus</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Instability</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>+/-</td>
<td>Unable to WB</td>
</tr>
</tbody>
</table>
Extensor Mechanism Rupture

**Quadriceps Tendon**
- *Most common form*
- **Age > 40**
- Acute injury
- Extensor lag
- Indentation at superior patella and low-riding patella on radiographs
- Surgical correction

**Patellar Tendon**
- *Least common form*
- **Age < 40**
- Acute injury
- Extensor lag
- High-riding patella on exam or radiographs
- Surgical correction
Knee Pearls

No difference in any outcomes at 12 months between partial meniscectomy and sham surgery for degenerative meniscal tears in the absence of OA [Sihvonen R et al. NEJM 2013]

10 yr observational study demonstrated no difference in outcomes [meniscal tear, OA, activity level] for those with ACL tears who were treated surgically or non-surgically [Meuffels DE et al. Br J Sports Med 2009]

RCT of 121 young adults randomized to ACL reconstruction vs rehab with potential for late reconstruction [Frobell RB et al. NEJM 2010]

- No significant difference in outcomes
- Delayed reconstruction allowed for 61% of subjects to avoid surgery without compromising results
Behavioral Medicine III: ADHD, Autism Spectrum Disorders, OCD

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Disclosure Statement

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest. If conflicts are identified, they are resolved prior to confirmation of participation. Only participants who have no conflict of interest or who agree to an identified resolution process prior to their participation were involved in this CME activity.

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“Just read part of an incredible synopsis of an article about Attention Deficit something or other.”

C. O’Brian
Learning Objectives

1. Recognize the characteristics of ADHD and autism spectrum disorders in the child and adult.

2. Cite the management of these conditions with the following:
   a. Behavioral therapy
   b. Pharmacotherapy

3. Recognize the clinical presentation of obsessive compulsive disorder

4. List the treatment options for obsessive compulsive disorder
1. An 11 yo boy is diagnosed with ADHD. The most common psychiatric comorbidity would be:

A. Oppositional defiant disorder (ODD)
B. Conduct disorder
C. Bipolar disorder
D. Learning disability
2. Which of the following would be consistent with a diagnosis of ADHD?

A. Hyperactive-impulsive or inattentive symptoms causing impairment before 12 years of age
B. Impairment from symptoms is observed only at school, and not at home
C. Hyperactivity occurs in isolated episodes
D. Six or more criteria present for 3 months
Attention-Deficit/Hyperactivity Disorder (ADHD)

- Affects 5-8% of school-aged children
- Persists into adulthood (3-4% of adults)
- Specify:
  - Predominantly inattentive (DSM-5, 314.00)
  - Predominantly hyperactive/impulsive (DSM-5, 314.01)
  - Combined (DSM-5, 314.01)
Diagnosis of ADHD

• Six or more symptoms present (five for adults)
• Causes impairment in 2 or more settings:
  - School, work, or home/personal life
  - Frequently comorbid with other childhood disorders
Inattentive Symptoms

- Makes careless mistakes
- Difficulty sustaining attention
- Does not listen
- Fails to finish tasks
- Poor organization

- Loses important belongings
- Distractible
- Forgetful
- Avoids jobs that require sustained mental effort
Hyperactive Symptoms

- Fidgets
- Difficulty sitting still
- Constantly restless
- Constantly driven
- Talks excessively
- Interrupts conversations
- Can’t wait turn
3. A 27 yo male is diagnosed with ADHD. Which of the following will be most likely true in his case?

A. He is unlikely to have his symptoms confirmed by his spouse, coworkers, or employer
B. He is more likely to be inattentive than hyperactive
C. He will have a lower chance of substance abuse than his age-matched peers
D. He is unlikely to have children with ADHD
Adult ADHD

• Strong genetic basis
  - 70% heritability (among highest for mental health disorders)
• Is more likely to be inattentive type (hyperactive type is picked up in childhood)
• Can be comorbid with impulse disorders (gambling, substance abuse)
Adult Symptoms of ADHD

• Poor job performance
• Frequent changing of jobs
• Career/academic underachievement
• Poor daily management
  - Paying bills, completing chores
• Chronic stress from failures
• Relationship difficulties from inattention and forgetfulness
Diagnosis of ADHD

- Meets DSM-5 criteria
- Various checklists
  - Conners Comprehensive Behavior Rating Scales
  - Vanderbilt Rating Scale
  - Wender Utah Rating Scale (for adults)
  - Brown ADD Rating Scales
- Formal psychological testing for ADHD
- Therapeutic trials don’t work
Differential Diagnosis & Comorbidity

• Newer estimates of comorbidity rates:
  • Non-comorbid ADHD: 30%
  • ODD: 60% males, 30% females
  • Conduct disorder: boys > girls
  • Depression: 30-40%
  • Bipolar disorder: 20%
  • Anxiety: up to 25%
  • Learning disabilities: up to 30%
4. Research has shown that the optimal treatment approach for children with ADHD is:

A. Medication alone
B. Medication plus behavior modification
C. Behavior modification alone
D. Changing the child’s nutritional habits
Treating ADHD: Evidence-Based Medicine

- The optimal treatment approach for children with ADHD is medication with behavior modification.

- Multimodal Treatment Study of Children with ADHD: 600 children, ages 7-9 years
  - Randomly assigned to 4 groups (medication, behavior modification, combined, neither)
  - Combined approach superior in all areas
  - Medication alone was superior to behavior modification alone
Stimulants

• Greater than 80% response rate
• Stimulants improve ADHD by:
  − Blocking reuptake of dopamine and norepinephrine at the presynaptic neuron
  − Amphetamines directly release catecholamines
  − Inhibiting monoamine oxidase
• Goal is to decrease inattention, impulsivity, hyperactivity
• FDA indication for ADHD
Use of Stimulants for ADHD

• Schedule II controlled substance
• Also used for narcolepsy
• Need psychological evaluation to confirm ADHD and rule out learning disorder prior to use
• Side effects include insomnia, weight loss, and tics
Treatment of ADHD: Stimulants – Methylphenidate

- Short-acting methylphenidate
  - Methylphenidate
  - Ritalin
  - Focalin

- Long-acting methylphenidate
  - Concerta
  - Ritalin LA
  - Metadate

- Transdermal form available
ADHD Stimulants – Amphetamines

• Short-acting amphetamine
  - Dextroamphetamine
  - Adderall (mixture of amphetamine salts)

• Long-acting amphetamine
  - Dexedrine Spansule
  - Adderall XR
  - Lisdexamfetamine (Vyvanse)
Side Effects of Stimulants

- Anorexia
- Insomnia
- Weight loss, probably no effect on growth
- Irritability, dysphoria, “withdrawal”
- Headaches
- Abdominal pain
- Tics (4% incidence per year is baseline for this population)
5. A 13 yo female with a history of anorexia nervosa is diagnosed with ADHD, inattentive type. What is the most reasonable FDA-approved treatment option?

A. Methylphenidate
B. Bupropion
C. Amphetamine/dextroamphetamine
D. Atomoxetine
Nonstimulant Drugs for ADHD

- Bupropion (*not* with seizures)
- Atomoxetine
  - Not a controlled substance
  - Is a norepinephrine reuptake inhibitor
  - Good for patients who find stimulants too activating, or patients with substance abuse history
  - FDA indication for ADHD
Nonstimulant Drugs for ADHD

- Alpha 2 agonists
  - Clonidine
  - Guanfacine
  - Imipramine
Nonpharmacologic Treatment for ADHD

- Schedule - Keep same routine
- Organize home and office items
- Use notebook organizers
- For adults, the book *Driven to Distraction*
- For children, clear and consistent guidance, rewards for following rules and successes
6. What are the current recommendations regarding adverse cardiac outcomes with ADHD medications?

A. Laboratory testing prior to starting medication is at the physician’s discretion

B. All patients should have an EKG performed prior to starting medication for ADHD

C. Patients with family histories of sudden cardiac death do not need to have an echocardiography performed prior to starting ADHD medication

D. The risk of sudden cardiac death is equal in children treated with stimulants and in the general population
Cardiac Recommendations

• AAP did not support the AHA recommendation that EKG be performed in ALL patients in advance of ADHD medication use
• Risk of sudden cardiac death in patients on ADHD medication is greater than in the general population
• Testing (EKG, echo) should be performed:
  - Family history of sudden cardiac death
  - Patient report of chest pain, shortness of breath, syncope/dizziness before/after medication use
  - Abnormal examination findings (initial and f/u)
  - Laboratory testing is at physician’s discretion
Differentiating Bipolar Disorder and ADHD

- Get a good history, including family history
- ADHD is known to be developmental, and symptoms can be seen in infancy
- ADHD is known to be continuous, not episodic
- Mood symptoms can be secondary to frustration from ADHD, with short-lived tantrums
- Grandiosity needs to be seen in the context of development
Differentiating Bipolar Disorder and ADHD

- Bipolar disorder is more common after the age of 12
- Bipolar disorder is usually episodic
- Relatives of children with ADHD rarely have bipolar disorder
- Relatives of children with bipolar disorder frequently have bipolar disorder
- Bipolar disorder is not a label to use casually, especially when criteria are not clear in children
Autism Spectrum Disorders

- Neurological disorders usually evident by age 3 years
- Difficulty in talking, playing with other children, and relating to others, including family
- Characterized by severe and pervasive impairment in several areas of development:
  - Social interaction skills
  - Communication skills
  - Stereotyped behavior, interests, and activities
Autism Spectrum Disorders

- In DSM-5, four separate diagnoses are combined into a single condition known as Autism Spectrum Disorders.
- They previously were:
  - Autistic Disorder
  - Asperger’s Disorder
  - Childhood Disintegrative Disorder
  - Rett Syndrome
Autism Spectrum Disorders

• Autistic disorder (early infantile or childhood autism)
  - 4 times more common in boys than in girls
  - Moderate to severe range of communication, socialization, and behavior problems
  - Most also have intellectual disability
Autism Spectrum Disorders

• Rett syndrome (primarily females)
  - Development is normal in the first 6-18 months
  - Regression or loss of abilities
  - Meaningless gestures or movements
Autism Spectrum Disorders

• Childhood disintegrative disorder (rare)
  - Regression in multiple areas of function following a period of at least 2 years of normal development
  - Onset by age 10 years
Autism Spectrum Disorders

• Asperger’s Syndrome
  - Later onset than autistic disorder
  - Lack of social skills (poor eye contact, anxiety)
  - Difficulty understanding subtleties used in conversation
  - Difficulty with social relationships
  - Poor coordination
  - Poor concentration
  - Restricted range of interests
  - Average to above-average intelligence/language skills
  - Incorrectly referred to as high-functioning autism
Obsessive Compulsive Disorder (OCD)

- **Obsessions**—Recurring, unwanted thoughts
- **Compulsions**—Repetitive behaviors that reduce anxiety caused by obsessive thoughts
Obsessive Compulsive Disorder (OCD)

- Occurs in 1% of adults
- Obsessive thoughts produce anxiety, leading to repetitive actions (compulsions) that reduce anxiety
- Patients are aware that these are irrational, but if stopped will lead to incapacitating anxiety
OCD Comorbidities

- 1/3 of patients will have major depression
- 2/3 of patients will have history of depression at some time
- 6% will be delusional and have no insight
Biology of OCD

- Strong genetic component (twin studies)
- Involves serotonin system of the brain (since only serotonergic drugs are effective)
# Common Symptoms

**Obsessions**
- Contamination 48%
- Doubt 47%
- Symmetry 45%
- Fear of aggression 36%
- Somatic obsessions 35%
- Sexual obsessions 22%

**Compulsions**
- Checking 62%
- Washing 46%
- Need to confess thoughts or guilt 41%
- Need for symmetry 40%
- Counting 30%

- (Hoardings is now a separate disorder in DSM-5)
Treatment of OCD

• Use high-dose SSRIs first
• If SSRIs fail, use clomipramine (tricyclic)
• 50% symptom relief is a good medication response
• Behavioral and cognitive therapies may help
• 90% of patients relapse if treatment is stopped
Treatment of OCD

• High-dose SSRIs
  - Fluvoxamine 300 mg/day
  - Paroxetine 60 mg/day
  - Sertraline 200 mg/day
  - Fluoxetine 80 mg/day

• Clomipramine (tricyclic)
  - 300 mg/day
Treatment of OCD

- Drugs can take up to 10 weeks to fully maximize effects
- Behavioral treatments focus on thought-stopping and flooding (repeating the obsessive thought to desensitize)
Key Points for the Exam

• ODD: most common ADHD comorbidity
• ADHD has to be present in more than 1 setting
• Medication plus behavior modification: best ADHD treatment
• ADHD adults are primarily inattentive
• Asperger’s is not high-functioning autism
• OCD requires continued treatment, usually with high-dose serotonergic agents
Answers

1. A
2. A
3. B
4. B
5. D
6. A
Supplementary Slides
Oppositional Defiant Disorder (ODD)

- Pattern of negativism, hostility, defiance
- Angry/irritable mood:
  - Often loses temper
  - Touchy & easily annoyed
  - Angry & resentful
- Argumentative/defiant
  - Often argues with adults
  - Deliberately annoys
  - Blames others
  - Actively defies rules
- Vindictiveness
  - Spiteful and vindictive, holds grudges
Treatment of ODD

- There is no medication for ODD
- There is medication for comorbid conditions that may exacerbate ODD
- Parent training, behavioral interventions
Conduct Disorder

• A repetitive and persistent pattern of behavior in which the basic rights of others or major societal norms are violated for at least 6 months.
Conduct Disorder

- Aggression to people and animals
- Destruction of property
- Deceitfulness or theft
- Serious violations of rules
- The disturbance causes clinically significant impairment
- Difficult to treat
  - May require off-label mood stabilizers
  - May require inpatient treatment, if severe
Disruptive Mood Dysregulation Disorder (DMDD)

- New diagnosis in DSM-5
- Non-episodic temper outbursts > 3x a week
- Persistently irritable or angry mood in all settings
- Diagnosis only made between the ages of 6 and 18
- No symptoms of mania or hypomania
Disruptive Mood Dysregulation Disorder (DMDD)

- No treatment guidelines yet
  - Mood stabilizers sometimes helpful
  - Treat comorbid conditions (ADHD, etc.)
  - Behavioral and family interventions have been used
Specific Learning Disorder

- Significant discrepancy between school level, chronological age, intelligence, and academic performance or achievement
- This discrepancy significantly interferes with academic and/or social functioning
- Treatment: educational modifications
- Medication: only if a comorbidity exists that requires medication use
Common Learning Disorder Deficits

- Developmental speech/language disorders
  - Articulation, receptive/expressive language
- Academic skills disorders
  - Dyslexia (reading), dyscalculia (math), dysgraphia (writing)
- Nonverbal learning disability
  - Visual-spatial, visual-motor, sensory, motor
- Central auditory processing deficit
  - Distorted or incomplete auditory messages
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Pediatric Orthopedics: A Clinical Review

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Disclosures

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The following individual(s) in a position to control content for this session have disclosed the following relevant financial relationships.

• Joseph Garry, MD – Stock/bond holdings: Merck Pharmaceuticals (corticosteroids, anti-inflammatory agents), Amgen (osteoporosis), and Bristol-Meyers Squibb (corticosteroids).

All other individuals in a position to control content for this session have indicated they have no relevant financial relationships to disclose.
Learning Objectives

1. Know the key factors of common pediatric orthopedic problems
2. Cite the causes of intoeing
3. Cite the common hip conditions in the pediatric and adolescent population
4. Know the common apophysitides affecting children
5. Describe the musculoskeletal complications of obesity in this population
6. Describe benign nocturnal limb pains of childhood
Orthopedic Milestones

REFERENCE

• 6 months - when prone, weight on hands. Sits with support. Holds bottle.
• 9 months - pulls to standing. Uses opposition of thumb to finger to pick up small object.
• 12 months - walks independently or with hand support. Begins to throw objects to floor.
• 2 years - climbs steps, kicks ball, turns doorknob.
• 3 years - stands on 1 foot for a few seconds. Climbs stairs, 1 foot/step.
pGALS

pediatric Gait Arms Legs Spine

- 2 min MSK examination
- Screening exam for school-aged children
- High sensitivity with few false negatives

Foster et al. Arthritis & Rheumatism, 2006
Foster et al. Pediatr Rheumatol 2013
1. Which of the following statements is true regarding congenital pediatric musculoskeletal conditions?

A. Duchenne muscular dystrophy is more common in males
B. Polydactyly is the most common congenital hand deformity
C. Developmental dysplasia of the hip most commonly affects the right hip
D. Erb’s palsy most commonly presents as the ability to move the shoulder, but not move the hand
Duchenne Muscular Dystrophy

- Most common fatal disease affecting children
- 1:3500 live male births
- Dystrophin abnormality
- Age 6-7 years, boys start falling, early fatigue, and will develop calf pseudohypertrophy
- Muscle weakness starts in lower extremities
- Late pulmonary and cardiac involvement
Erb’s Palsy

• Brachial plexus injury
  • [Neuropraxia=stretch, Neuroma=stretch with scarring, Rupture, Avulsion]
  • Symptoms of weakness, loss of sensation, partial or complete paralysis
• Most commonly ► unable to move the shoulder but able to move fingers
• Daily physical therapy
• Serial exams and, if no improvement, then consider MRI and consultation

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American Academy of Orthopaedic Surgeons,
Congenital Hand Deformities

Syndactyly

Polydactyly
# Congenital Hand Deformities

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Syndactyly</strong></td>
<td><strong>Polydactyly</strong></td>
</tr>
<tr>
<td>Most common congenital hand deformity</td>
<td>Visible at birth</td>
</tr>
<tr>
<td><em>Webbed fingers</em></td>
<td>Obtain x-rays</td>
</tr>
<tr>
<td>Simple = soft tissue</td>
<td>Ulnar digit is usually ligated</td>
</tr>
<tr>
<td>Complex = bone, nerve, tendon, nail</td>
<td>Radial or Middle digits treated surgically at 1-2 years</td>
</tr>
</tbody>
</table>
Developmental Dysplasia of the Hip

- **Left hip** most common
- Risk higher among **girls; first-born; breech position; FHx; oligohydramnios**
- **Ortolani’s and Barlow’s maneuvers**
  “Clunk” is positive (not “click”)  
- Refer early or for persistent findings at 2 months
- **Pavlik harness** (hips in flexion and abduction) for diagnosis from birth - 6 months  
  [Spica casting for diagnosis from 6 mo - 2 years]

**The USPSTF no longer carries any recommendation for screening of developmental dysplasia of the hip**
Club Foot

- Males > females
- ~80% detected by US at 24 weeks’ gestation
- Management includes **serial casting** [Ponseti method]
- Surgical correction occurs at 9-12 months, if needed
2. Which of the following statements is true regarding bone tumors in the pediatric & adolescent population?

A. Ewing’s sarcoma is the most common malignant bone tumor in this population
B. Osteochondroma is the most common benign bone tumor in this population
C. Osteosarcoma most commonly arises in the spine or pelvis
D. Non-ossifying fibromas resolve with skeletal maturity
## Malignant Bone Tumors

<table>
<thead>
<tr>
<th>Osteosarcoma</th>
<th>Ewing’s Sarcoma</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Most common childhood bone cancer</strong></td>
<td><strong>2nd most common childhood bone cancer</strong></td>
</tr>
<tr>
<td>@ physis of long bones (knee &amp; shoulder)</td>
<td>@ long bones most commonly</td>
</tr>
<tr>
<td>10-30 yo, 50% occur in those ≤ 19 years</td>
<td>Onset in teenage years</td>
</tr>
<tr>
<td>Chemo/surgery/chemo</td>
<td>Chemo/surgery/radiation</td>
</tr>
</tbody>
</table>
Benign Bone Tumors

**Nonossifying Fibroma**
- Most common benign bone tumor in children
- $2\,\text{♂} : 1\,\text{♀}$
- Incidental finding
- Most commonly in the distal femur or distal tibia
- Resolves with skeletal maturity

**Osteochondroma**
- 2$\text{nd}$ most common benign bone tumor in children
- Develops during childhood/adolescence
- Solitary or multiple
- Grows as child grows
- Most diagnosed at 10-30 years
- Monitor & treat symptomatically
3. A 6 yo female is brought to your office for evaluation. She was born at 39 3/7 weeks by NSVD without complication. She has met all orthopedic developmental milestones. Her mother notes that she has been more clumsy at recess, occasionally falling when running. On examination you note that her patellae point inward, her feet point inward, and there is no joint or limb tenderness or swelling; her neurological exam is normal. **What is the most likely diagnosis?**

A. External tibial torsion  
B. Internal tibial torsion  
C. Femoral anteversion  
D. Femoral retroversion
Intoeing

• **Metatarsus adductus**
  Most common congenital foot deformity
  85-90% resolve by one year of age

• **Internal tibial torsion**
  Most common cause of intoeing
  Walks with patella facing forward and feet intoeing
  90% resolve by age 8
  PT, orthotics, splints are *not* effective

Figures © Texas Scottish Rite Hospital for Children
Intoeing

- **Femoral anteversion**
  - Both knees and feet point inward
  - Tendency to sit in a “W” position
  - Most noticeable at age 4-6 yrs
  - 80% improve by age 9-10 yrs
  - Surgery at age 9-10 if more severe

Figure © of Texas Scottish Rite Hospital for Children
4. A 12 yo male is brought into your office for evaluation of a limp that has been present for 3 days. There was no trauma or injury. He has not been ill, had no recent immunizations, and has been afebrile. Examination demonstrates T 98.6° F, P 74, BMI is at the 94th percentile, antalgic gait, and limited and painful ROM in the left hip. What is your presumptive diagnosis?

A. Legg-Calve-Perthes  
B. Transient synovitis of the hip  
C. Slipped capital femoral epiphysis  
D. Osteochondritis dissecans of the knee
5. A 7 yo female is brought to the ED with right hip pain and a new limp. Onset has been abrupt in the last 12 hours. No known trauma or injury. She is otherwise well and no recent illness or immunizations. On examination you note a T 39.2⁰ C, with normal respirations, pulse, and BP. The right hip appears normal, is painful with ROM, and she limps with ambulation. Hip radiographs are normal. Which of the following is most useful in determining your treatment plan?

A. CBC alone
B. CBC and ESR
C. Aspiration of the hip joint
D. CBC, ESR and CRP
<table>
<thead>
<tr>
<th></th>
<th><strong>Transient Synovitis</strong>*</th>
<th><strong>Slipped Capital Femoral Epiphysis</strong></th>
<th><strong>Legg-Calvé-Perthes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>4-11 years</td>
<td>11-16 years</td>
<td>4-8 years</td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td>If febrile, consider septic hip; Transient synovitis usually afebrile or low-grade temp elevation</td>
<td>Male, African-American, obesity</td>
<td>Perinatal HIV infection, LBW, +FH, low SES</td>
</tr>
<tr>
<td><strong>Antalgic Gait</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, and may be intermittent</td>
</tr>
<tr>
<td><strong>ROM</strong></td>
<td>Limited and painful</td>
<td>Limited and painful</td>
<td>▼ Abduction and IR</td>
</tr>
<tr>
<td><strong>X-rays</strong></td>
<td>Yes, to rule out bony process</td>
<td>Yes, for diagnosis</td>
<td>Yes, for diagnosis and may need to repeat</td>
</tr>
<tr>
<td><strong>Caution</strong></td>
<td>Need to consider septic hip; NWB and CRP&gt;20 (74% prob septic hip); WB and CRP&lt;20 (&lt;1% probability of septic hip). T&gt;38.1, CRP&gt;2, ESR&gt;40, WBC&gt;12k, NWB – all increase risk of septic hip</td>
<td>Acute SCFE risk of AVN is 30%</td>
<td>Insidious onset, pain can radiate to thigh and knee, poor prognosis if age &gt; 6</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td>Ibuprofen to shorten course</td>
<td>Surgical referral – immediate if acute</td>
<td>Early pediatric orthopedic referral</td>
</tr>
</tbody>
</table>

*most common
Slipped Capital Femoral Epiphysis
Flattening and early fragmentation of the femoral epiphysis
Transient Synovitis vs Septic Hip

Patient presents with fever, hip pain, and limp. Temp, x-ray, CBC, labs recommended. In order to evaluate for septic hip -- x-ray negative and...

1) T > 38.1
2) CRP > 2.0
3) ESR > 40
4) WBC > 12
5) Non-Weight Bearing

As more factors become positive, then risk of septic hip rises.

As concern for septic hip rises, then hip ultrasound if effusion present, then aspiration and culture.

Kocher et al. JBJS 1999
6. A 12 yo male is brought in for evaluation of his right elbow pain. He is a pitcher on his middle school baseball team. Onset was insidious, occurred about 3 weeks into his baseball season, and is aggravated by throwing and relieved by rest. He has noted decreased velocity and accuracy of his pitches. On exam you note tenderness at the right medial epicondyle. You conclude the following…

A. This is a lateral epicondylar stress fracture
B. This is an apophysitis
C. This is golfer’s elbow
D. This is tennis elbow
Traction Apophysitis

- Insidious onset that results from **overuse** of the [tendon and] surrounding ossification centers

- **Boys 10-14 years of age** most commonly affected
- Often occurs at or after growth spurt
- Physical activity **required**

  - Principles of rehabilitation include **ice** (pain), **stretching** (developmental inflexibility), and **modification to activity** (relative rest)
Traction Apophysitis

• This is a *clinical diagnosis* and *radiographs are not needed* in the appropriate clinical setting
• Progressive medial elbow pain, ▼ throwing accuracy/speed/distance
• Refrain from throwing for 3-6 weeks until pain-free & nontender, then progressive return-to-throwing program with focus on proper throwing mechanics
• *Major League Baseball preventive measures* = 4 months rest per year, no radar guns, and avoid playing pitcher and catcher
7. An 11 yo male is brought to your office for evaluation of bilateral posterior heel pain that has occurred for the past few months. He plays basketball and soccer several times a week, and the pain begins several minutes into each of these activities. There is no pain at rest or with walking. He has not noticed any numbness, tingling, or weakness. On examination you find no swelling or tenderness of the heel or Achilles tendon. Reflexes, strength, and range of motion at the ankle are intact, but he does have bilateral posterior heel pain when you passively and fully dorsiflex the ankles. **Which one of the following is the most likely diagnosis?**

A. Plantar fasciitis  
B. Sever’s disease  
C. Heel pad syndrome  
D. Achilles tendinopathy
# Apophysitis

<table>
<thead>
<tr>
<th>Site</th>
<th>Name</th>
<th>Attachment</th>
<th>Age</th>
<th>Symptoms</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medial epicondyle</td>
<td>Little league</td>
<td>Wrist flexors</td>
<td>9-14</td>
<td>Medial elbow pain with throwing</td>
<td>Rest from throwing, then rehab</td>
</tr>
<tr>
<td>ASIS (ant sup iliac spine)</td>
<td>Sartorius</td>
<td></td>
<td>10-14</td>
<td>Anterior hip pain</td>
<td>Rest, ice, stretch, activity modification</td>
</tr>
<tr>
<td>AIIS (ant inf iliac spine)</td>
<td>Rectus femoris</td>
<td></td>
<td>10-14</td>
<td>Anterior hip pain</td>
<td>Add quad and hamstring stretching &amp; strengthening</td>
</tr>
<tr>
<td>Ischial tuberosity</td>
<td></td>
<td></td>
<td></td>
<td>Posterior thigh pain</td>
<td>Add heel lift or heel cup initially; heel cord stretching to prevent recurrence</td>
</tr>
<tr>
<td>Tibial tuberosity</td>
<td>Osgood-Schlatter’s</td>
<td>Patellar tendon</td>
<td>10-14</td>
<td>Anterior knee pain, 30% bilateral</td>
<td>Add heel lift, post op shoe, recovery averages 38 days</td>
</tr>
<tr>
<td>Calcaneus</td>
<td>Sever’s</td>
<td>Achilles</td>
<td>8-12</td>
<td>Posterior heel pain, 60% bilateral</td>
<td>Add heel lift, post op shoe, recovery averages 38 days</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt; metatarsal</td>
<td>Iselin’s</td>
<td>Peroneus brevis</td>
<td></td>
<td>Prox 5&lt;sup&gt;th&lt;/sup&gt; MT pain</td>
<td>Add heel lift, post op shoe, recovery averages 38 days</td>
</tr>
</tbody>
</table>
Caution

Overhead athletes with open growth plates at risk:
Swimming
Baseball
Volleyball
Tennis
Gymnastics

Think of this as a stress fracture of the proximal humeral physis
8. Pediatric obesity is associated with each of the following except…

A. Flat feet
B. Impaired mobility
C. Longer fracture healing times
D. Decreased risk of herniated lumbar disc
Skeletal Impact of Obesity
Pediatric & Adolescent

- Fracture
- Delayed fracture healing
- Surgical complications of fracture repair
- SCFE
- Blount’s disease
- Flat feet
- Low back pain and herniated disc disease
- Arthritis
- Impaired mobility
Benign Nocturnal Limb Pains of Childhood
“Growing Pains”

- Affects 35% of 4-6 yo (can persist to age 19)
- Bilateral and affects lower extremities
- Deep cramping pain that often awakens from sleep
- Resolves by morning
- NO LIMP
- Aggravated by heavy exercise during the day

**Management**: Reassurance, heat, massage, warm baths, exercise to non-aggravating levels, mild analgesics
Answers

1. A
2. D
3. C
4. C
5. D
6. B
7. B
8. D
Supplemental Slides
Pelvic Avulsion Fractures

- More common in sports that require sprinting, jumping, rapid pivoting
- Forceful muscle contraction separates the apophysis, resulting in fracture
- ASIS – sartorius
- AIIS – rectus femoris [shown in radiograph]
- Ischial tuberosity – hamstring
- Manage with rest (crutches) just as a fracture
Osteochondritis Dissecans of the Knee

- ♂ > ♀, average age 10-20 years, bilateral in 30-40%
- 85% occur in the medial epicondyle & 70% at the lateral aspect of the medial epicondyle (LAME)
- Radiographs as initial test (tunnel or notch view)
- MRI can demonstrate degree of involvement
- Girls < 11 & boys < 13 usually do well surgery if fragment intact
Pediatric ACL Injury

If recurrent knee instability due to ACL tear ► early repair reduces risk of additional injury [ >12 weeks from date of injury led to ▲medial meniscal tears, ▲articular cartilage injury]

ACL repair can be done via physeal sparing or traditional reconstruction techniques [risk of limb shortening or angular deformity = 2%]

Osgood-Schlatter

Prolotherapy

• RCT of conservative care vs double-blind injection of 1% lidocaine with or w/o 12.5% dextrose monthly x 3

• 65 knees

• ♀ 9-15 yo, ♂ 10-17 yo

• Prolotherapy resulted in maintaining unaltered sport (21/21 dextrose, 20/22 lidocaine, 13/22 conservative); fewer symptoms; and asymptomatic state at one year

Topol GA. et al. Pediatrics 2011
Idiopathic Scoliosis

- **Females** more commonly affected
- Prevalence of 0.5-3%
- *Infantile idiopathic scoliosis [0-2 yrs]* is most likely to spontaneously resolve
- *Juvenile idiopathic scoliosis [3-9 yrs]* may be considered the most malignant form of scoliosis due to high rates of progression
- *Adolescent idiopathic scoliosis [10-18 yrs]* is most common
Adolescent Idiopathic Scoliosis

• Observe if Cobb angle < 30° and perform serial radiographs q 6 months until physeal closure
  
  Brace for Cobb angles of 30-40°
  Surgery for Cobb angles > 40°

• USPSTF [screening] **Grade I** [insufficient evidence]