Evidence-Based Medicine: Asthma in 2012

Sandra K. Willsie, D.O., MA, FACOI, FACP, FCCP

sandra.willsie@gmail.com
The case of MJ

- A 26 yr old female presents with a chief complaint of persistent dyspnea on exertion, cough and wheezing
  - Onset of symptoms: 2 years ago; worsening to date
    - Wakes up 2-3 times per week coughing and wheezing
    - Wheezing worsened with exercise, cold air
  - Dyspnea is worse with exertion (2 blocks)
  - Cough nonproductive of clear mucous;
  - Denies fever, hemoptysis, weight loss or night sweats
MJ

- **PMHX:** Pregnancy associated hypertension
- **PSHX:** S/P appendectomy;
- **Allergies:** Penicillin (hives)
- **Medications:** Hall’s eucalyptus cough drops;
- **SHX:** current nonsmoker; past 2 ppd for 10 years; no significant ETOH; no HIV risks. Hobbies: volleyball; running;
Remarkable Physical Examination:

- Vitals: BP 110/65  P 80 RR 14  T 98.3
- Occasional nonproductive cough
- Chest: slight hyperresonant, symmetrical expansion, midline trachea; no wheezing;
- CV: no murmur; split S2;
- Absence of clubbing
Diagnostic work-up?

- Chest X-Ray?
- Spirometry?
- Assessment of oxygenation?
- Anything else?
Chest roentgenogram: Mild Hyperinflation

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>% Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>2.70 L</td>
<td>88%</td>
</tr>
<tr>
<td>FEV1</td>
<td>1.75 L</td>
<td>73%</td>
</tr>
<tr>
<td>FEV1/FVC ratio</td>
<td>58%</td>
<td></td>
</tr>
</tbody>
</table>

Is the diagnosis clear? Any further evaluation needed?
Bronchodilator challenge is indicated

Postbronchodilator Results:

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>% Predicted</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>3.60 L</td>
<td>99%</td>
<td>33%</td>
</tr>
<tr>
<td>FEV1</td>
<td>2.75 L</td>
<td>93%</td>
<td>57%</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td></td>
<td>76%</td>
<td></td>
</tr>
</tbody>
</table>
WHAT IF???
Chest roentgenogram: Normal

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>% Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>3.60 L</td>
<td>99%</td>
</tr>
<tr>
<td>FEV1</td>
<td>2.75 L</td>
<td>93%</td>
</tr>
</tbody>
</table>

FEV1/FVC ratio 76%

Is the diagnosis clear? Any further evaluation needed?

Does this patient have Asthma??

(Methacholine, Exercise or Histamine challenge)
RELIEVER Medications

I can’t breathe and I need help NOW!!

QUICK ONSET: albuterol
CONTROLLER Medications

**DAILY,** whether you need it **OR not** medication

Examples: ICS; LM;
## Levels of Asthma Control

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Controlled</th>
<th>Partly controlled</th>
<th>Uncontrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime symptoms</td>
<td>NONE (twice or less per week)</td>
<td>MORE than twice per week</td>
<td>THREE or MORE features of PARTIALLY controlled ASTHMA</td>
</tr>
<tr>
<td>Limitation of activities</td>
<td>NONE</td>
<td>ANY</td>
<td></td>
</tr>
<tr>
<td>Nocturnal Symptoms or awakenings</td>
<td>NONE</td>
<td>ANY</td>
<td></td>
</tr>
<tr>
<td>Need for reliever/rescue inhaler</td>
<td>NONE (twice or less per week)</td>
<td>MORE than twice per week</td>
<td>(by definition, an exacerbation in any week = uncontrolled week)</td>
</tr>
<tr>
<td>Lung Function (PEF or FEV&lt;sub&gt;1&lt;/sub&gt;)</td>
<td>NORMAL</td>
<td>&lt;80% predicted or personal best (if known)</td>
<td></td>
</tr>
</tbody>
</table>
Questions for monitoring Asthma Care

**ASK the patient**
- Has your asthma awakened you at night?
- Have you needed more reliever medications than usual?
- Have you needed any urgent medical care?
- Has your peak flow been below your personal best?
- Are you participating in your usual physical activities?**

**Actions to consider**
- Assess compliance of patient
- Adjust medications and management plan as needed
  - Step up or step down
Is the patient using Inhalers, spacers or peak flow meters correctly?

**As the patient**

- SHOW me how you take your medicine

**Actions to consider**

- Demonstrate correct technique
- Have patient demonstrate correct technique for you
Is the patient taking the medications and avoiding risk factors according to their asthma management plan?

As the patient
• So that we may plan therapy, tell me how often you actually take your medicine
• What problems have you had following the management plan or taking your medicine?
• During the last month, have you ever stopped taking your medicine because you were feeling better?

Actions to consider
• Adjust plan to be more practical for patient
• Problem solve with the patient to overcome barriers with following the plan
Management Approach
Based on Control of Asthma

<table>
<thead>
<tr>
<th>LEVEL of CONTROL</th>
<th>TREATMENT ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled</td>
<td>Maintain and find lowest controlling step</td>
</tr>
<tr>
<td>Partly Controlled</td>
<td>Consider stepping up to gain control</td>
</tr>
<tr>
<td>Uncontrolled</td>
<td>Step up until controlled</td>
</tr>
<tr>
<td>Exacerbation</td>
<td>Treat as exacerbation</td>
</tr>
</tbody>
</table>
I can’t breathe and I need help NOW!!!

QUICK ONSET: albuterol
CONTROLLER Medications

**DAILY, whether you need it OR not medication**

Examples:
ICS; LM;
<table>
<thead>
<tr>
<th>Controller options</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>As needed rapid-acting $B_2$ agonist</td>
<td><strong>As needed rapid acting $B_2$ agonist</strong></td>
<td>Select one</td>
<td>Select one</td>
<td>To Step 3, select one or more</td>
<td>To Step 4, add either</td>
</tr>
<tr>
<td>Low-dose inhaled ICS</td>
<td>Low-dose ICS plus long-acting $B_2$ agonist (LABA)</td>
<td>Medium-or high-dose ICS plus LABA</td>
<td>Oral glucocorticosteroid (lowest dose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leukotriene modifier (LM)</td>
<td>Medium-or High-dose ICS</td>
<td>LM</td>
<td>Anti-IgE treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-dose ICS plus LM</td>
<td>Low-dose ICS plus SRT</td>
<td>Sustained released theophylline (SRT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-dose ICS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td><strong>Step 2</strong></td>
<td><strong>Step 3</strong></td>
<td><strong>Step 4</strong></td>
<td><strong>Step 5</strong></td>
<td></td>
</tr>
</tbody>
</table>

General Principles for ‘stepping up’ or ‘stepping down’

• **IF asthma is NOT CONTROLLED** on the current regimen, and the patient is compliant (review medication technique, avoidance of risk factors), **STEP up treatment**.
  • Generally, treatment should be seen in 1 month

• **IF asthma is partly controlled**, consider stepping up, depending upon whether or not more effective options are available

• **IF control is maintained for at least THREE MONTHS**, step down with a gradual, stepwise reduction in treatment
The importance of a written Asthma action plan

• Engages patients/parents in their own care
• Gives them a sense of ‘shared’ decision making
• Lessens calls after hours and emergency department visits
• Reduces morbidity
Written Action Plan
to maintain asthma control

Your Regular Treatment
1. Each day, take:
   a. ____________________  b. ____________________
2. Before exercise, take: ____________________

When to Increase Treatment: Assess your level of Asthma Control:

In the past week have you had:
Daytime asthma symptoms more than two times? No Yes
Activity or exercise limited by asthma? No Yes
Waking at night because of asthma? No Yes
The need to use your rescue medication more than 2X? No Yes
If you are monitoring peak flow, peak flow less than __? No Yes

IF you answered YES to three or more questions, your asthma is uncontrolled and you may need to STEP UP your treatment!!
HOW TO INCREASE TREATMENT

STEP UP your treatment as follows and assess improvement every day:
__________________________________________ (write in next treatment step here)

Maintain the above treatment for ___ days (specify number)

WHEN TO CALL your DOCTOR/CLINIC:

Call your doctor/clinic: _____________________________ (insert phone numbers)

IF you DON’T get better in ____ days, then
__________________________________________ (specify instruction, e.g. go to urgent care, call for an appointment, speak to nurse, etc)
Written Action Plan to maintain asthma control - 3

**EMERGENCY/SEVERE Loss of Asthma CONTROL:**

√ IF you have severe shortness of breath, can only speak in short sentences,

√ IF you are having a severe attack of asthma and are frightened

√ IF you need your reliever medication more than every 4 hours and are not improving.

1. Take 2 to 4 puffs of _______________ (reliever)
2. Swallow ___ mg of _______________ (oral steroid)
3. Seek medical help: Go to _______________________, address ____________, phone _____________ or call 911
4. Continue to use your ________________ (reliever medication) until you are able to get medical help.
Management of Asthma Exacerbations

- Episodes of progressive increase in shortness of breath, cough, wheezing, or chest tightness or some combination
  - Characterized by reduced pulmonary function
- Primary therapies include:
  - Rapid acting inhaled bronchodilators
  - Early introduction of systemic corticosteroids
  - Oxygen supplementation
- Mild exacerbations, defined as a reduction in PEF of <20%, nocturnal awakening and increased use of beta agonists can usually be treated in the community setting.
Management of Asthma Exacerbations

- **Patients who should be told to seek urgent care early in the course of an exacerbation:**
  - History of near-fatal asthma requiring intubation/mechanical ventilation
  - Previous hospitalization/ED visit in the past year
  - Those currently on or who have recently stopped po steroids
  - Patients who are over-dependent upon beta agonists (use more than one MDI/month)
  - History of psychiatric disease or psychosocial problems including use of sedatives
  - History of poor adherence with medications and/or written asthma action plan
## Severity of Asthma Exacerbations

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Imminent respiratory arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathlessness</td>
<td>Walking</td>
<td>Talking</td>
<td>At rest</td>
<td></td>
</tr>
<tr>
<td>Talks in</td>
<td>Sentences</td>
<td>Phrases</td>
<td>Words</td>
<td></td>
</tr>
<tr>
<td>Alertness</td>
<td>May be agitated</td>
<td>Usually agitated</td>
<td>Usually agitated</td>
<td>Often drowsy or confused</td>
</tr>
<tr>
<td>Accessory muscle use</td>
<td>Usually not</td>
<td>Usually</td>
<td>Usually</td>
<td>Paradoxical thoracoabdom. movements</td>
</tr>
<tr>
<td>Wheeze</td>
<td>Moderate, often end-exp only</td>
<td>Loud</td>
<td>Usually Loud</td>
<td>Often absent</td>
</tr>
<tr>
<td>Pulse</td>
<td>&lt;100</td>
<td>100-120</td>
<td>&gt;120</td>
<td>Bradycardia</td>
</tr>
</tbody>
</table>
# Severity of Asthma Exacerbations

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Imminent respiratory arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pulsus paradoxus</strong></td>
<td>Absent</td>
<td>May be present 10-25 mm Hg</td>
<td>Often present &gt;25 mm Hg (adult)</td>
<td>Absence suggests respiratory muscle fatigue</td>
</tr>
<tr>
<td><strong>Peak expiratory flow</strong></td>
<td>&gt;80%</td>
<td>60-80%</td>
<td>&lt;60% predicted or &lt;100 L/min or response to beta agonists lasts &lt;2 hours</td>
<td></td>
</tr>
<tr>
<td><strong>PaO₂</strong></td>
<td>Normal; testing usually not done; &lt;45 mm Hg</td>
<td>&gt;60 mm Hg</td>
<td>&lt; 60 mm Hg; possible cyanosis</td>
<td></td>
</tr>
<tr>
<td><strong>PaCO₂</strong></td>
<td>&lt;45 mm Hg</td>
<td>&lt;45 mm Hg</td>
<td>&gt;45 mm Hg</td>
<td></td>
</tr>
<tr>
<td><strong>SaO₂</strong></td>
<td>&gt;95%</td>
<td>91-95%</td>
<td>&lt;90%</td>
<td></td>
</tr>
</tbody>
</table>
Treatment of Acute Exacerbation in Emergency Setting

- Assess patient and determine severity
- Administer appropriate therapy and monitor accordingly (vitals; oxygen saturation; clinical examination)
  - **Quick onset beta agonist treatments**
    - 2-4 puffs q 20 minutes for first hour; if respond, can switch to:
      - MILD: 2-4 puffs q 3-4 hours
      - MOD: 6-10 puffs q 1-2 hours
    - IF fail to respond, transfer to acute care setting
  - **Glucocorticosteroids**
    - 0.5-1.0 mg of prednisolone/kg or equivalent
IF Severe episode: manage in the ICU

Treat with:

- **Oxygen:** keep oxygen saturation >90% (adults)
- Inhaled beta agonist + anticholinergic** (lower hospitalization rates)
- Intravenous glucocorticosteroids
- Consider intravenous theophylline (minimal role)
- Consider systemic beta agonists
- POSSIBLE intubation and mechanical ventilation
Treatment of Acute Exacerbation in Emergency Setting

• No evidence to support use of the following in acute asthma exacerbations:
  
  • IV magnesium
  • Helium-oxygen mixture
  • Leukotriene modifiers
  • SEDATIVES
Asthma related PEARL--Pregnancy

- Any woman with asthma who is contemplating pregnancy should have her asthma UNDER EXCELLENT control prior to becoming pregnant.

- If a well-controlled asthmatic becomes pregnant, there is no reason to STOP or change her asthma medications because of the pregnancy.

- IF a pregnant asthmatic has never used an inhaled corticosteroid, and needs an inhaled corticosteroid, then the ICS of choice is budesonide.
A few words about Bronchial Thermoplasty

- FDA approved technique to scar large airways and thus reduce airway instability:
  - Three sessions of airway treatment utilizing a localized radiofrequency pulse.
  - Treatment can be associated with asthma exacerbations has resulted in a subsequent decrease in exacerbations
  - There are NO significant effects on lung function or asthma symptoms
  - ONLY for adults
  - MUST be referred to special center (Barnes-Jewish is the closest center—Mario Castro, M.D.)
GINA: Pocket Guide