Objectives

- Describe how pharmacists and technicians in various setting can work within the National Institutes of Health (NIH) asthma guidelines to improve care
- Understand the four components of care in the asthma guidelines
- Describe some specific health maintenance issues related to asthma patients
- Identify other useful guidelines

Asthma Definition

“Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role: in particular, mast cells, eosinophils, neutrophils (especially in the sudden onset, fatal exacerbations, occupational asthma, and patients who smoke), T lymphocytes, macrophages, and epithelial cells. In susceptible individuals, this inflammations causes recurrent episodes of coughing (particularly at night or early in the morning), wheezing, breathlessness, and chest tightness. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment.”

Goals of Therapy

- Reduce impairment
  - Prevent chronic/troublesome symptoms
  - Coughing or shortness of breath – day/night/after exertion
  - Reduce SABA to ≤2 days/week – not including for exercise-induced bronchospasm (EIB)
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Goals of Therapy

- Reduce risk
  - Prevent recurrent exacerbations and minimize the need for emergency department (ED) visits and hospitalizations
  - Prevent loss of lung function in adults
  - Prevent reduced lung growth in children
  - Provide optimal pharmacotherapy with minimal or no adverse effects

Centers for Disease Control
<table>
<thead>
<tr>
<th>Components of Asthma Severity ≥ 12 y/o</th>
<th>Persistent</th>
<th>Intermittent</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent Impairment</td>
<td>Persistent</td>
<td>Intermittent</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>- Symptoms</td>
<td>≤ 2 days/week</td>
<td>&gt; 2 days/week but not daily</td>
<td>Daily</td>
<td>Throughout the day</td>
<td></td>
</tr>
<tr>
<td>- Intensity of symptoms</td>
<td>None</td>
<td>Minor</td>
<td>Moderate</td>
<td>Severe</td>
<td></td>
</tr>
<tr>
<td>- Frequency of symptoms</td>
<td>≤ 2 days/week</td>
<td>&gt; 2 days/week but not daily</td>
<td>Daily</td>
<td>Throughout the day</td>
<td></td>
</tr>
<tr>
<td>- Intermittent Impairment</td>
<td>Normal FEV1, predicted or peak flow personal best (PFB)</td>
<td>≥ 80%</td>
<td>60-80%</td>
<td>&lt; 60%</td>
<td></td>
</tr>
<tr>
<td>- Lung Function FEV1/PFV</td>
<td>Normal FEV1, predicted or peak flow personal best (PFB)</td>
<td>≥ 80%</td>
<td>60-80%</td>
<td>&lt; 60%</td>
<td></td>
</tr>
<tr>
<td>- Risk</td>
<td>0-2 weeks</td>
<td>&gt; 2 weeks</td>
<td>&gt; 4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Recommendation for follow-up</td>
<td>Step 1</td>
<td>Step 2</td>
<td>Step 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Follow-up</td>
<td>In 2-4 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly</td>
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</tbody>
</table>

### Four components of Asthma Care
1. Assessing and monitoring asthma severity and control
2. Education for a partnership in care
3. Control of environmental factors and comorbid conditions that affect asthma
4. Medications

### Assessing and monitoring asthma severity and control
- **Severity**
  - Intensity of disease
  - Most easily measured in patients not on long-term control
  - May be determined via amount of medication if on long-term medications

### Assessing and monitoring asthma severity and control
- **Control**
  - Degree to which manifestation of disease are minimized by therapeutic intervention
  - Degree to which goals are met
  - Responsiveness
  - Ease that asthma control is achieved

### Assessing and monitoring asthma severity and control
- **Severity/control include domains of current impairment and future risk**
- **Impairment**
  - Frequency/intensity of symptoms/limitations the patient is currently or has recently experienced
- **Future risk**
  - Likelihood of asthma exacerbations, decreased lung function (decrease lung growth in children), or risk of adverse effects from medication

### Assessing and monitoring asthma severity and control
- **Guideline emphasize distinction between impairment and risk**
  - Represents complicated aspects of asthma
  - Must consider each domain separately
  - Each domain may respond differently to treatment
  - Patients may have adequate control but be at high risk
Assessing and monitoring asthma severity and control

- Concepts of severity/control for asthma care
  - Asthma Severity – initial presentation (no long-term medications on board)
  - Asthma Control – subsequent visits
  - Asthma Severity after treatment – based on lowest medication dose to provide optimal care

Assessing and monitoring asthma severity and control

- Initial assessment of severity
  - Classify severity
  - Identify precipitating factors
  - Identify comorbid conditions that impede asthma management
  - Assess the patient’s/family’s knowledge and skills

Assessing and monitoring asthma severity and control

- Patient monitoring
  - Instruct patients to monitor their control
  - Either symptom based OR peak flow monitoring is acceptable per guidelines
  - Consider daily peak flows for patients that have moderate to severe persistent asthma, history of severe exacerbations, or poorly perceive worsening of symptoms

Assessing and monitoring asthma severity and control

- Assess medication technique, adherence and patient concerns at every visit
  - These should not be limited to a provider’s office visit
  - Is this happening during hospital admission?

Retail Role

- Refills
  - Ask patients about control; if poor find out why
  - Check albuterol refills
    - Frequent refills would indicate poor control
    - Few refills: good control or poor compliance; compare with ICS refill history
  - Are meds helping (responsiveness)
  - Is the patient/family happy with control
  - Guideline control versus patient’s perception (risk)

Retail Role

- New prescription
  - New diagnosis??
  - Ask about how they feel about this
  - Expectations of care
  - Educate on what asthma is and why giving meds
  - Have the patient use the medications in front of you (new and refills)
Hospital Role

- Admission
  - Medication reconciliation
  - Surgery patient – do they need steroids during surgery
- Discharge
  - Counsel patient
  - Guideline risk versus patient perception
  - Go talk to the patient!!

Retail Role

- Counsel on medication technique
  - All new patients and ask occasionally on refills
  - Have the demonstrate in front of you
  - Do they really understand the difference between a controller and rescue inhaler
  - Spacers, etc.
  - Do they understand the asthma action plan (if they have one)
  - Smoking history
  - Develop relationship with providers

Education for partnership in care

- Develop active partnership with patient and family
  - Open communication that considers cultural and ethnic factors, language, and health care literacy needs
  - Identify and address patient/family concerns about asthma and asthma treatment
  - Review response to treatment at each visit

- Integrate asthma self-management into all aspects of asthma care
  - Requires repetition and reinforcement
  - “Involves all members of the health care team, including physicians, nurses, pharmacists….”
  - “Evidence also supports education provided in patients’ homes, pharmacies…”

- Encourage patient to use the asthma action plan
  - Plans recommended for:
    - Moderate to severe persistent asthma
    - History of severe exacerbations
    - Poorly controlled asthma
    - Patient perception does not meet actual control

Hospital Role

- Smoking history – refer while in house if possible
- Difference between controller and rescue medication
- Leaves with good plan for action
- Develop relationship with hospitalists
Control of Environment Factors and Comorbid Conditions that affect asthma

- Evaluate potential role of allergens and irritants

Home environment

- Heating (coal or wood vs gas or electric)
- Roaches or mold present

<table>
<thead>
<tr>
<th>Trigger Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass pollen</td>
</tr>
<tr>
<td>Tree pollen</td>
</tr>
<tr>
<td>Smoke (cigs)</td>
</tr>
<tr>
<td>Exhaust</td>
</tr>
<tr>
<td>Illness</td>
</tr>
<tr>
<td>Cold air</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Emotions</td>
</tr>
<tr>
<td>Paint fumes</td>
</tr>
<tr>
<td>Cleaners</td>
</tr>
<tr>
<td>Exercise</td>
</tr>
<tr>
<td>Air pollution</td>
</tr>
<tr>
<td>Perfumes</td>
</tr>
<tr>
<td>Flowers</td>
</tr>
</tbody>
</table>

- Advise patients to reduce allergen and pollutant or irritant exposure

Indoor air - cleaning devices do not substitute for more effective dust/mite/cockroach control
- These devices have not been shown to improve symptoms or lung function
- Humidifiers and swamp coolers are not generally recommended in patients with mold or dust mite sensitivities

- Consider influenza vaccine

  - Recommended by Centers for Disease Control because asthmatics are at risk for complications from influenza
  - Should not be expected to reduce severity or frequency of asthma exacerbations during influenza season

Control of Environment Factors and Comorbid Conditions that affect asthma

- Dietary factors

  - Inconclusive role in asthma
  - Exception may be patients with sulfite sensitivities
    - Shrimp, dried fruit, processed potatoes, beer, wine
  - Patients with asthma and food allergy are at higher risk for fatal anaphylactic reactions
    - Recommend EpiPen if appropriate

Retail and Hospital Role

- Review immunization history
- Ask if patient knows what his/her triggers are; discuss trigger avoidance
- Cleaning filters/humidifiers
- Per medication list, are other disease states complicating asthma control

Comorbid conditions

- Don’t underestimate the impact of comorbid conditions
  - Gastroesophageal reflux disease (GERD)
  - Obesity
  - Allergies/allergic rhinitis
  - Depression
  - Stress
  - Smoking
**Medications**

- Two general classes
  - Long term control medications (Controllers)
  - Quick relief medications (Rescue)
- We know this but does the patient???

**Rescue Medications**

- Anticholinergics (short acting)
  - Ipratropium
  - Used in emergency settings for exacerbations
  - Not for chronic management
  - Possibly replace SABA if not tolerated

**Rescue Medications**

- Short acting beta agonists (SABA)
  - Albuterol, levalbuterol
  - Rescue medication of choice
  - Chronic or scheduled use not recommended
  - Use > 2 days/week could indicate poor/loss of control

**Inhaled Corticosteroids (ICS)**

- Preferred long-term control therapy in all age groups
- Most benefit in patients with mild or moderate asthma occur with low to medium doses of ICS
- Increased dose equals increased risk of adverse effects

<table>
<thead>
<tr>
<th>Drug</th>
<th>Receptor Affinity *</th>
<th>Lung Delivery (%)</th>
<th>Protein Binding (%)</th>
<th>Oral Bioavailability (%)</th>
<th>Systemic Clearance (L/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone/17-monopropionate</td>
<td>0.4/13.5</td>
<td>50-60</td>
<td>87</td>
<td>20/40</td>
<td>150/120</td>
</tr>
<tr>
<td>Budesonide</td>
<td>9.4</td>
<td>15-30 (DPI)</td>
<td>88</td>
<td>11</td>
<td>84</td>
</tr>
<tr>
<td>Ciclesonide/desciclesonide</td>
<td>0.12/12</td>
<td>50</td>
<td>99/99</td>
<td>&lt;1/&lt;1</td>
<td>192/228</td>
</tr>
<tr>
<td>Flunisolide</td>
<td>1.8</td>
<td>68</td>
<td>80</td>
<td>20</td>
<td>96</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>18</td>
<td>20 (DPI)</td>
<td>90</td>
<td>52</td>
<td>66</td>
</tr>
<tr>
<td>Mometasone</td>
<td>23</td>
<td>11</td>
<td>99</td>
<td>&lt;1</td>
<td>53</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>3.6</td>
<td>22</td>
<td>71</td>
<td>23</td>
<td>45-69</td>
</tr>
</tbody>
</table>

* Compared to dexamethasone

ICS Selection

- Theoretical superiority doesn’t necessarily mean clinical improvement
  - Cochrane Review compared ciclesonide to budesonide and fluticasone over 3 months in patients 4-17 years of age
  - No difference in asthma symptoms, use of rescue medication or adverse events noted
  - Select the medication that the patient will use

Kramer, et al. 2013

ICS safety issues

- Generally well tolerated
- For mild to moderate asthma most benefits occur at low to medium doses
- Higher doses may have benefit in reducing exacerbations
- Adverse effects increase with dose

ICS safety issues

- High doses for prolonged time periods (> 1 year) have less adverse effects than systemic steroids
- High dose ICS (> 1 year) + frequent systemic steroid bursts may be associated with:
  - Cataracts
  - Reduced bone density (consider calcium + D)

ICS safety issues with

- Reduce potential for side effects
  - Use a spacer
  - Rinse mouth
  - Use lowest dose possible
  - Consider adding a LABA instead of increasing dose

Controllers

- Leukotriene modifiers
  - Receptor antagonists – montelukast and zafirlukast
  - 5-lipoxygenase inhibitor – zileuton
- Adjunctive therapy for 12 years and older
- Great add for patients with seasonal allergies

ICS safety issues with

- Childhood Growth
  - Risk versus benefit favors use
  - Poorly controlled asthma reduces growth rate before puberty
  - Short term growth evaluation may not be predictive of final adult height
  - Dose dependent
Controllers
- Long acting beta-agonists (LABA)
  - 12 hour duration
  - NOT to be used as monotherapy
  - Must be combined with ICS
  - Preferred adjunctive therapy with ICS
  - Frequent/chronic use before exercise is discouraged
    - Masks poorly controlled, severe asthma

Pharmacist Role
- Does patient understand difference between rescue and controller
- Is the correct does prescribed by provider
  - Mometasone/formoterol 2 puffs twice daily (not 1 puff twice daily)
- Correct dose for age
- No LABA alone
- Patient can correctly use inhalers

Health Maintenance Issues
- Influenza
- Pneumococcal vaccination
  - Asthma patients 19-64 years of age; PPSV23
  - >65 years of age: PCV 13 then PPSV23 1 year later (and at least 5 years since most recent PPSV23)

Health Maintenance Issues
- Calcium
  - Women
    - 50 years of age and younger: 1000mg/day
    - Over 50 years of age: 1200mg/day
  - Men
    - 70 years of age and younger: 1000mg/day
    - Over 70 years of age: 1200mg/day

National Osteoporosis Foundation and American Society for Preventative Cardiology statement 10/2016
- Lack of evidence linking calcium with or without vitamin D to cardiovascular risks

Health Maintenance Issues
- Vitamin D
  - Women and men
    - 50 years of age and younger: 400-800 units per day
    - > 50 years of age: 800-1000 units per day

Other Guidelines
- Global Initiative for Asthma (GINA) 2017 Highlights
  - Similar in many ways (with updated information)
  - Stepwise approach somewhat different
  - Low dose ICS/formoterol as a rescue if patient is on low dose budesonide/formoterol or low dose beclometasone/formoterol
  - Initial treatment is defined by symptoms w/o defining severity as intermittent, mild, moderate, severe
  - Asthma severity is defined AFTER treatment assigned
  - Tiotropium an option
Other Guidelines

- Asthma COPD Overlap Syndrome (ACOS)
  - Overlap of the two diseases gaining recognition
  - Defines practice guidelines for treating this condition
  - Very useful tables

References