Management of Asthma Exacerbations: Key Points

- Early treatment is best. Important elements include:
  - A written action plan
    - Guides patient self-management of exacerbations at home
    - Especially important for patients with moderate-to-severe persistent asthma and any patient with a history of severe exacerbations
  - Recognition of early signs of worsening asthma
Management of Asthma Exacerbations: Key Points (continued)

- Appropriate intensification of therapy
- Prompt communication between patient and clinician about:
  - Serious deterioration in symptoms or peak flow, or
  - Decreased responsiveness to inhaled beta$_2$-agonists, or
  - Decreased duration of beta$_2$-agonist effect
Management of Asthma Exacerbations

- Inhaled beta₂-agonist to provide prompt relief of airflow obstruction
- Systemic corticosteroids to suppress and reverse airway inflammation
  - For moderate-to-severe exacerbations, or
  - For patients who fail to respond promptly and completely to an inhaled beta₂-agonist
Oxygen to relieve hypoxemia for moderate-to-severe exacerbations

Monitoring response to therapy with serial measurements of lung function
Risk Factors for Death From Asthma

- Past history of sudden severe exacerbations
- Prior intubation or admission to ICU for asthma
- Two or more hospitalizations for asthma in the past year
- Three or more ED visits for asthma in the past year
Risk Factors for Death From Asthma (continued)

- Hospitalization or an ED visit for asthma in the past month
- Use of >2 canisters per month of inhaled short-acting beta$_2$-agonist
- Current use of systemic corticosteroids or recent withdrawal from systemic corticosteroids
Risk Factors for Death From Asthma (continued)

- Difficulty perceiving airflow obstruction or its severity
- Comorbidity, as from cardiovascular diseases or chronic obstructive pulmonary disease
- Serious psychiatric disease or psychosocial problems
Risk Factors for Death From Asthma (continued)

- Low socioeconomic status and urban residence
- Illicit drug use
- Sensitivity to *Alternaria*
Home Management of Exacerbations: Written Action Plan

- Develop a written action plan with each patient, especially those with:
  - Moderate-to-severe persistent asthma or
  - History of severe exacerbations
**Asthma Action Plan for**

**Doctor’s Name**

**Hospital/Emergency Room Phone Number**

**Doctor’s Phone Number**

**GREEN ZONE: Doing Well**
- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,
- Peak flow: more than 90% of my best peak flow
- My best peak flow is: ________

**Take These Long-Term-Control Medicines Each Day** (include an anti-inflammatory)

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How much to take</th>
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**Before exercise**
- Yes [ ]

**YELLOW ZONE: Asthma is Getting Worse**
- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

- Or-
- Peak flow: ________ to ________
  (50% - 80% of my best peak flow)

**FIRST**
- Add: Quick-Relief Medicine – and keep taking your GREEN ZONE medicine

  (short-acting beta₂-agonist) [ ] 2 or [ ] 4 puffs, every 20 minutes for up to 1 hour

  Nebulizer, once

**SECOND**
- If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:
  - Take the quick-relief medicine every 4 hours for 1 to 2 days.
  - Double the dose of your inhaled steroid for ________ (7-10) days.

- Or-
- If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:
  - Take: ________ (short-acting beta₂-agonist) ________ mg. per day For ________ (3-10) days
  - Add: ________ (oral steroid)

  Nebulizer [ ] 2 or [ ] 4 puffs or [ ] 6 puffs or [ ] Oral steroid [ ] 4 or [ ] 6 puffs of your quick-relief medicine

  Call the doctor [ ] before/ [ ] within ________ hours after taking the oral steroid.

**RED ZONE: Medical Alert!**
- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

- Or-
- Peak flow: less than ________
  (50% of my best peak flow)

**Take this medicine:**

  (short-acting beta₂-agonist) [ ] 4 or [ ] 6 puffs of your quick-relief medicine

  Nebulizer [ ] 4 or [ ] 6 puffs or [ ] Oral steroid [ ] 4 or [ ] 6 puffs of your quick-relief medicine AND

Then call your doctor NOW.
- Go to the hospital or call for an ambulance if:
  - You are still in the red zone after 15 minutes AND
  - You have not reached your doctor.

**DANGER SIGNS**
- Trouble walking and talking due to shortness of breath
- Lips or fingernails are blue
  Take: [ ] 4 or [ ] 6 puffs of your quick-relief medicine AND
  Go to the hospital or call for an ambulance (________) NOW!
Home Management of Exacerbations: Written Action Plan (continued)

- The plan should include:
  - Signs, symptoms, and peak flow levels that indicate deteriorating asthma
  - How to adjust medications in response to deteriorating asthma
  - When to seek medical help
  - Emergency phone numbers
Home Management of Exacerbations: What To Teach Patients and Caretakers

- Recognize symptoms and signs of deterioration

- Monitor peak flow if patient has:
  - Moderate-to-severe persistent asthma or
  - History of severe exacerbations
Home Management of Exacerbations: What To Teach Patients and Caretakers

(continued)

- Seek medical help early if:
  - Exacerbation is severe
  - Therapy does not give rapid, sustained improvement
  - Condition worsens

- Keep necessary medications and equipment at home and take when traveling
Home Management of Exacerbations: Instructions to Patient

- Use inhaled short-acting beta$_2$-agonist:
  - Up to three treatments of 2 to 4 puffs by inhaler at 20-minute intervals

OR

- Single nebulizer treatment

- Assess symptoms and/or peak flow after 1 hour
Home Management of Exacerbations:
Good Response (Mild Exacerbation)

- Peak flow >80% predicted or personal best and/or
- No wheezing, shortness of breath, cough, or chest tightness and
- Response to beta$_2$-agonist sustained for 4 hours
Home Management of Exacerbations: Instructions for Good Response

- May continue 2 to 4 puffs beta\textsubscript{2}-agonist every 3 to 4 hours for 24 to 48 hours PRN

- For patients on inhaled corticosteroids, double dose for 7 to 10 days

- Contact clinician within 48 hours for instructions
Home Management of Exacerbations: Incomplete Response (Moderate Exacerbation)

- Peak flow 50% to 80% predicted or personal best or
- Persistent wheezing, shortness of breath, cough, or chest tightness
Home Management of Exacerbations:
Instructions for Incomplete Response

- Take 2 to 4 puffs beta$_2$-agonist every 2 to 4 hours for 24 to 48 hours PRN
- Add oral corticosteroid for 3 to 10 days, at least until symptoms and peak flow are stable
- Contact clinician urgently (same day) for instructions
Home Management of Exacerbations:
Poor Response (Severe Exacerbation)

- Peak flow <50% predicted or personal best, or
- Marked wheezing, shortness of breath, cough, or chest tightness, or
- Distress is severe and nonresponsive, or
- Response to beta\textsubscript{2}-agonist lasts <2 hours
Home Management of Exacerbations: Instructions for Poor Response

IMMEDIATELY

- Take up to three treatments of 4 to 6 puffs beta$_2$-agonist every 20 minutes PRN
- Start oral corticosteroid
- Contact clinician
- Go to emergency department or call ambulance or 9-1-1
Prehospital Ambulance Management

- Administer supplemental oxygen
- Administer inhaled beta$_2$-agonist
- If inhaled therapy is not available, use subcutaneous terbutaline or epinephrine
Emergency Department and Hospital Management
Emergency Department Functional Assessment

Measure FEV$_1$ or PEF:
- Upon presentation (begin treatment as soon as asthma exacerbation is recognized)
- After first beta$_2$-agonist dose
- After third beta$_2$-agonist dose
- At intervals depending on response to therapy
- Before discharge

Monitor SaO$_2$ in patients with severe distress or with FEV$_1$ or PEF <50% predicted
Emergency Department and Hospital Management:
Brief History
(after treatment is initiated)

- Time of onset and cause of exacerbation
- Severity of symptoms, especially compared to previous attacks
- All current medications and time of last dose
Emergency Department and Hospital Management: Brief History (after treatment is initiated) (continued)

- Prior hospitalizations and ED visits, especially in past year
- Prior episodes of respiratory failure or loss of consciousness due to asthma
- Existence of comorbidities
Emergency Department and Hospital Management: Brief Physical Exam

- Assess severity: Alertness, distress, accessory muscle use, tachycardia, tachypnea, pulsus paradoxus, cyanosis
- Identify complications (e.g., pneumonia, pneumothorax, pneumomediastinum)
- Identify diseases that affect asthma (otitis, rhinitis, sinusitis)
- Rule out upper-airway obstruction
Emergency Department and Hospital Management: Laboratory Assessment

- Consider ABG in patients with suspected hypoventilation, severe distress, or with FEV$_1$ or PEF <30% predicted after initial treatment
- CBC may be appropriate in patients with fever or purulent sputum
- Serum theophylline concentration
- Serum electrolytes, chest x-ray, ECG in special circumstances
Emergency Department and Hospital Management: Goals

- Correction of significant hypoxemia
- Rapid reversal of airflow obstruction
- Reduction of likelihood of recurrence
Emergency Department
and Hospital Management:
Initial Treatment

FEV$_1$ or PEF >50%

- Oxygen to achieve O$_2$ saturation $\geq$90%
- Inhaled beta$_2$-agonist by metered-dose inhaler or nebulizer, up to three treatments in first hour
- Oral corticosteroids if no immediate response or if patient recently took oral corticosteroids
- Repeat assessment (Sx, physical exam, PEF, O$_2$ saturation, other tests as needed)
FEV<sub>1</sub> or PEF <50%

- Oxygen to achieve O<sub>2</sub> saturation is ≥90%
- Inhaled high-dose beta<sub>2</sub>-agonist and anticholinergic by nebulization every 20 minutes or continuously for 1 hour
- Oral corticosteroid
- Repeat assessment (Sx, physical exam, PEF, O<sub>2</sub> saturation, other tests as needed)
Impending or Actual Respiratory Arrest

- Intubation and mechanical ventilation with 100% O₂
- Nebulized beta₂-agonist and anticholinergic
- Intravenous corticosteroid
- Admit to hospital intensive care
Emergency Department and Hospital Management: Treatment After Repeat Assessment

- FEV$_1$ or PEF 50% to 80% predicted or personal best
- Physical exam: moderate symptoms

- Inhaled short-acting beta$_2$-agonist every 60 minutes
- Systemic corticosteroid
- Continue treatment 1 to 3 hours, provided there is improvement
Emergency Department and Hospital Management: Treatment After Repeat Assessment (continued)

- FEV$_1$ or PEF <50% predicted or personal best
- Physical exam: severe symptoms at rest, accessory muscle use, chest retraction
- History: high-risk patient
- No improvement after initial treatment

- Oxygen
- Inhaled short-acting beta$_2$-agonist hourly or continuously + inhaled anticholinergic
- Systemic corticosteroid
Emergency Department and Hospital Management: Good Response

- FEV₁ or PEF ≥70%
- Response sustained 60 minutes after last treatment
- No distress
- Physical exam: normal

- Discharge Home
Emergency Department and Hospital Management: Incomplete Response

- FEV₁ or PEF ≥50% but <70%
- Mild-to-moderate symptoms

- Individualized decision re: hospitalization
Emergency Department and Hospital Management: Poor Response

- FEV\textsubscript{1} or PEF <50%
- PCO\textsubscript{2} ≥42 mm Hg
- Physical exam: symptoms severe, drowsiness, confusion

• Admit to hospital intensive care
Admit to Hospital Intensive Care

- Inhaled beta$_2$-agonist hourly or continuously + inhaled anticholinergic
- IV corticosteroid
- Oxygen
- Possible intubation and mechanical ventilation

- Admit to hospital ward
Emergency Department and Hospital Management: Hospitalization

Consider:
- Duration and severity of airflow obstruction
- Course and severity of prior attacks
- Medication use
- Access to care
- Home conditions and support
- Comorbidities
Emergency Department and Hospital Management: Hospitalization

Admit to Hospital Ward

- Inhaled beta$_2$-agonist + inhaled anticholinergic
- Systemic corticosteroid
- Oxygen
- Monitor FEV$_1$ or PEF, O$_2$ saturation
Emergency Department and Hospital Management

Not generally recommended:
- Methylxanthines
- Antibiotics (except for patients with pneumonia, bacterial sinusitis)
- “Aggressive” hydration
- Chest physical therapy

Not recommended:
- Mucolytics
- Sedation
Emergency Department Discharge Criteria

- If FEV$_1$ or PEF $\geq$ 70% predicted and symptoms are minimal, discharge
- If FEV$_1$ or PEF $\geq$ 50% but < 70% predicted and symptoms are mild, decision is individualized
- If response is prompt, observe for 30 to 60 minutes before discharging
Emergency Department and Hospital Discharge Actions

- Prescribe sufficient medication and instructions for use
  - Short acting beta$_2$-agonist
  - Patients given systemic corticosteroids—continue oral corticosteroids for 3 to 10 days

- Schedule followup or referral visit within 3 to 5 days
  - Consider referral to specialist if patient has history of life-threatening exacerbations or multiple hospitalizations
Instruct in simple action plan:
- How to recognize signs and symptoms of deterioration
- When to increase medications in response to deterioration

Consider providing peak flow meter

When possible, teach correct inhaler use and trigger avoidance
Hospital Discharge Actions

- Prior to discharge, adjust medication to an oral and/or inhaled regimen
  - This is generally done when:
    - Patient is minimally symptomatic
    - Patient has little wheezing on chest examination
    - PEF or FEV$_1$ $\geq$70% predicted or personal best
  - Observe patient for 24 hours after adjustment
Hospital Discharge Actions (continued)

Discharge medications should include:

- Short-acting beta$_2$-agonist
- Sufficient oral corticosteroid to complete course of therapy or to continue therapy until followup appointment
- If inhaled corticosteroids are prescribed, start before course of oral corticosteroids is completed
Management of Asthma Exacerbations: Special Considerations for Infants

- Infants are at greater risk of respiratory failure.
- Assessment depends on physical examination rather than objective measurements.
- Use oral corticosteroids early in the episode.
- Antibiotics are generally not required. Acute wheezing generally results from viral infections and may be accompanied by fever.
Management of Asthma Exacerbations: Signs of Serious Distress in Infants

- Use of accessory muscles, paradoxical breathing, cyanosis, and a respiratory rate >60
- Oxygen saturation <91%
- Lack of response to beta$_2$-agonist