**FIGURE 5–6. MANAGEMENT OF ASTHMA EXACERBATIONS: EMERGENCY DEPARTMENT AND HOSPITAL-BASED CARE**

### Initial Assessment (see figures 5–1, 5–3)
- Brief history, physical examination (auscultation, use of accessory muscles, heart rate, respiratory rate), PEF or FEV₁, oxygen saturation, and other tests as indicated.

#### FEV₁ or PEF ≥40% (Mild-to-Moderate)
- Oxygen to achieve SaO₂ ≥90%
- Inhaled SABA by nebulizer or MDI with valved holding chamber, up to 3 doses in first hour
- Oral systemic corticosteroids if no immediate response or if patient recently took oral systemic corticosteroids

#### FEV₁ or PEF <40% (Severe)
- Oxygen to achieve SaO₂ ≥90%
- High-dose inhaled SABA plus ipratropium by nebulizer or MDI plus valved holding chamber, every 20 minutes or continuously for 1 hour
- Oral systemic corticosteroids

### Impending or Actual Respiratory Arrest
- Intubation and mechanical ventilation with 100% oxygen
- Nebulized SABA and ipratropium
- Intravenous corticosteroids
- Consider adjunct therapies

### Repeat Assessment
- Symptoms, physical examination, PEF, O₂ saturation, other tests as needed

### Moderate Exacerbation
- FEV₁ or PEF 40–69% predicted/personal best
- Physical exam: moderate symptoms
- Inhaled SABA every 60 minutes
- Oral systemic corticosteroids
- Continue treatment 1–3 hours, provided there is improvement; make admit decision in <4 hours

### Severe Exacerbation
- FEV₁ or PEF <40% predicted/personal best
- Physical exam: severe symptoms at rest, accessory muscle use, chest retraction
- History: high-risk patient
- No improvement after initial treatment
- Oxygen
- Nebulized SABA + ipratropium, hourly or continuous
- Oral systemic corticosteroids
- Consider adjunct therapies

### Incomplete Response
- FEV₁ or PEF 40–69%
- Mild-to-moderate symptoms
- Continue treatment 60 minutes, provided there is improvement; make admit decision in <4 hours

### Poor Response
- FEV₁ or PEF <40%
- PCO₂ ≥42 mm Hg
- Physical exam: symptoms severe, drowsiness, confusion
- Individualized decision re: hospitalization (see text)

### Discharge Home
- FEV₁ or PEF ≥70%
- No distress
- Physical exam: normal
- Continue treatment with inhaled SABA.
- Continue course of oral systemic corticosteroid.
- Consider initiation of an ICS.
- Patient education:
  - Review medications, including inhaler technique.
  - Review/initiate action plan.
  - Recommend close medical followup.

### Admit to Hospital Ward
- FEV₁ or PEF <40%
- Continue treatment 60 minutes, provided there is improvement; make admit decision in <4 hours
- Oxygen
- Inhaled SABA
- Systemic (oral or intravenous) corticosteroid
- Consider adjunct therapies
- Monitor vital signs, FEV₁ or PEF, SaO₂

### Admit to Hospital Intensive Care
- Oxygen
- Inhaled SABA hourly or continuously
- Intravenous corticosteroid
- Consider adjunct therapies
- Possible intubation and mechanical ventilation

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

### Incomplete Response
- FEV₁ or PEF 40–69%
- Mild-to-moderate symptoms
- Continue treatment 60 minutes, provided there is improvement; make admit decision in <4 hours

### Poor Response
- FEV₁ or PEF <40%
- PCO₂ ≥42 mm Hg
- Physical exam: symptoms severe, drowsiness, confusion
- Individualized decision re: hospitalization (see text)

### Discharge Home
- Continue treatment with inhaled SABAs.
- Continue course of oral systemic corticosteroid.
- Continue on ICS. For those not on long-term control therapy, consider initiation of an ICS.
- Patient education (e.g., review medications, including inhaler technique and, whenever possible, environmental control measures; review/initiate action plan; recommend close medical followup).
- Before discharge, schedule followup appointment with primary care provider and/or asthma specialist in 1–4 weeks.

Key:
- FEV₁, forced expiratory volume in 1 second;
- ICS, inhaled corticosteroid;
- MDI, metered dose inhaler;
- PCO₂, partial pressure carbon dioxide;
- PEF, peak expiratory flow;
- SABA, short-acting beta₂-agonist;
- SaO₂, oxygen saturation