9. Acute Asthma Exacerbation Algorithm

This clinical pathway is intended to supplement, rather than substitute for, professional judgment and may be changed depending upon a patient's individual needs. Failure to comply with this pathway does not represent a breach of the standard of care.

Acute Asthmatic Attack

- Monitor, support ABCs
- Start Oxygen **IF** SPO_2 < 92%. Maintain $SPO_2 \geq 92\%$; Oxygen should be provided to all patients with severe asthma, even those with normal oxygenation.
- Perform brief, targeted history, physical exam (auscultation, use of accessory muscles, PR, RR)
- **Initiate treatment of underlying cause of exacerbation**
- Check **Peak Expiratory Flow (PEF)** as per **PEF Chart below** and **record predicted or best PEF (%) in patient's clinical notes. DO NOT measure PEF in patients with impending/actual respiratory arrest, drowsiness, confusion or silent chest. Start treatment immediately.**

Drowsiness, Confusion or Silent Chest?

- **Call ICU/Physician**
- **Consider intubation** (RSI with **Ketamine** if no C/I) and **ventilation** with 100% oxygen; anticipate cardiovascular collapse post-intubation
- Get **CXR**
- Nebulise***** with **Salbutamol + Ipratropium bromide (**doses below) **every 20 mins or 3 doses for 1 hour.** A combination of 4 mL volume fill with NS and 6 to 8L/min oxygen flow rate is recommended.
- Give **IV Hydrocortisone 2mg/kg (maximum 200mg) immediately**
- Give high-dose **IV Magnesium, 2gm in 5% Dextrose over a 20-min**

PEF > 50 % predicted or best

- Nebulise***** with **Salbutamol + Ipratropium bromide** (doses below) **every 20 mins or 3 doses for 1 hour.** A combination of 4 mL volume fill with NS and 6 to 8L/min oxygen flow rate is recommended.
- Give **Oral (**if patient can swallow) **or IV systemic corticosteroids** (dose below) **immediately**

PEF ≤ 50 % predicted or best

- Nebulise***** with **Salbutamol + Ipratropium bromide (**doses below) **every 20 mins or 3 doses for 1 hour.** A combination of 4 mL volume fill with NS and 6 to 8L/min oxygen flow rate is recommended.
- Give **IV Hydrocortisone 2mg/kg (maximum 200mg) immediately**
- Give high-dose **IV Magnesium, 2gm in 5% Dextrose over a 20-min**

Reassess Hourly (or after every 3 doses)
Symptoms, physical exam + BP, PR, RR, SpO_2, **PEF**

Continuing clinical deterioration

PEF < 60% of predicted or personal best

PEF 60-80% of predicted or personal best

- No Distress
- Physical Exam – Normal
- Response sustained 60minutes after last treatment

Discharge Home

- Continue treatment with inhaled SABA – 2 puffs QID for 3-5 days
- Give oral systemic corticosteroids: **Dexamethasone 0.6mg/kg or 12mg for adults as a single dose** or **Prednisone** (see dose in table below)
- Review medication including inhaler technique
- Consider therapy for underlying cause of exacerbation
- **Refer to Chest Physician for follow-up**

Medication	Dose	Comments
Inhaled SABA		
Salbutamol		
Nebulizer solution (0.63 mg/3 mL, 1.25mg/3mL, 2.5 mg/3 mL, 5.0 mg/mL)	5 mg every 20 min for 3 doses, then 2.5–10 mg every 1–4 h as needed, or 10–15 mg/h continuously	Only selective β-agonists are recommended. For optimal delivery, dilute aerosols to minimum of 3 mL at gas flow of 6–8 L/min. Use large-volume nebulizers for continuous administration. May mix with ipratropium nebulizer solution.
MDI (90µg/puff)	4–8 puffs every 20 min up to 4h, then every 1–4 h as needed	In mild to moderate exacerbations, MDI plus valved holding chamber is as effective as nebulized therapy with appropriate administration technique and coaching by trained personnel.
Systemic (Injected) β2-Agonists		
*** Adrenaline** 1:1,000 (1 mg/mL)	0.3–0.5 mg every 20 min for 3 doses SC	No proven advantage of systemic therapy over aerosol
Anticholinergics		
Ipratropium bromide		
Nebulizer solution (0.25mg/mL)	0.5 mg every 20 min for 3 doses, then as needed	May mix in same nebulizer with salbutamol. Should not be used as first-line therapy; should be added to SABA therapy for severe exacerbations. The addition of Ipratropium has not been shown to provide further benefit once the patient is hospitalized.
MDI (18 µg/puff)	8 puffs every 20 min as needed up to 3 h	Should use with valved holding chamber. Studies have examined Ipratropium bromide MDI for up to 3 h.
Ipratropium with salbutamol		
Nebulizer solution (Each 3-mL vial contains 0.5mg ipratropium bromide and 2.5 mg salbutamol.)	3 mL every 20 min for 3 doses, then as needed	May be used for up to 3 h in the initial management of severe exacerbations. The addition of ipratropium to salbutamol has not been shown to provide further benefit once the patient is hospitalized.
MDI (Each puff contains 18µg Ipratropium bromide and 90µg salbutamol.)	8 puffs every 20 min as needed up to 3 h	Should use with valved holding chamber.
Systemic Corticosteroids		
Prednisone	40–80 mg/d in 1 or 2 divided doses until PEF reaches 70% of predicted or personal best	For outpatient "burst," use 40–60 mg in single or 2 divided doses for a total of 5–10 d.
Hydrocortisone	200mg IV then 1mg/kg/dose IV QID	Only if patient cannot tolerate PO corticosteroids

ED = emergency department; ICS = inhaled corticosteroid; MDI = metered-dose inhaler; PEF = peak expiratory flow; SABA = short-acting β2-adrenergic agonist
Notes: There is no known advantage for higher doses of corticosteroids in severe asthma exacerbations, nor is there any advantage for intravenous administration over oral therapy provided gastrointestinal transit time or absorption is not impaired. The total course of systemic corticosteroids for an asthma exacerbation requiring an ED visit or hospitalization may last from 3 to 10 days. For corticosteroid courses of <1 week, there is no need to taper the dose. For slightly longer courses (e.g., up to 10 d), there probably is no need to taper, especially if patients are concurrently taking ICSs. ICSs can be started at any point in the treatment of an asthma exacerbation.