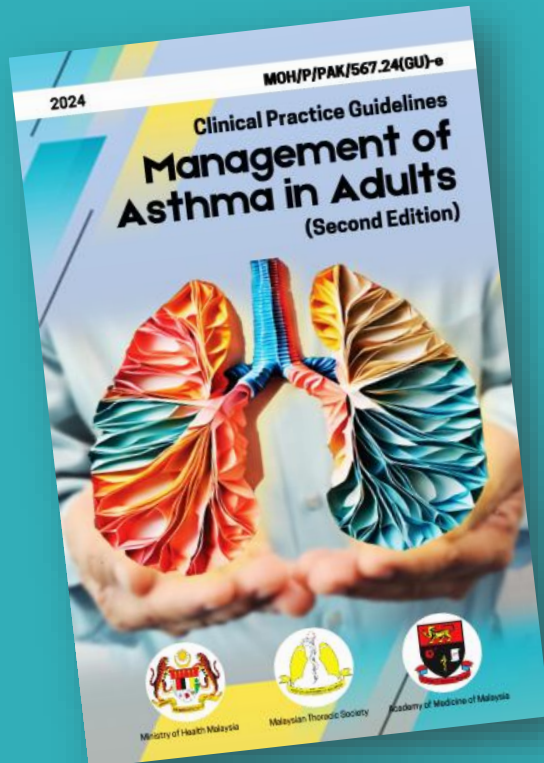


TRAINING OF CORE TRAINERS ON CPG MANAGEMENT OF ASTHMA IN ADULTS (SECOND EDITION)



LECTURE 5 *Asthma Exacerbation*

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Consultant Emergency Physician
Faculty of Medicine UKM



Learning Objectives

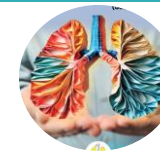
- Define asthma exacerbation and its key clinical features
- Assess the severity and classification criteria
- Differentiate between different categories to guide timely intervention
- Outline the management strategies in primary care and emergency department
- Identify the criteria for safe discharge and follow up planning

Definition



- Exacerbation: Progressive or sudden deterioration in baseline clinical status
- Key clinical features: increased shortness of breath, wheezing, coughing, chest tightness
- Exacerbations can be triggered by various factors
 - e.g. respiratory infection, environmental pollutants or stress.
- Prompt recognition and treatment are important

Assessment



Focus history

- Time of onset
- Trigger factors
- Severity of symptoms
- Risk factors for asthma-related death
- Allergies
- Current medications

Relevant physical examination

- Vital signs
- Evaluation of severity
- Evaluation of complication
e.g. pneumothorax
- Evaluation of differential diagnoses
e.g. heart failure.

Prompt initiation of treatment

- Based on severity

Assessment

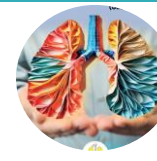


Table 8: Factors Associated with Increased Risk of Asthma-Related Deaths

Related to asthma exacerbation: <ul style="list-style-type: none">• previous exacerbations requiring mechanical ventilation and intubation^{2; 33}• frequency of hospitalisation or emergency visits in the past year ^{2; 33}
Related to asthma control: <ul style="list-style-type: none">• currently using or having recently stopped using oral corticosteroids²• not currently using ICS²• poor adherence to ICS-containing medications²• over-use of SABAs^{2; 33}• poor adherence to a written asthma action plan²• lack of a written asthma action plan²
Related to co-morbidity e.g. pneumonia, diabetes and arrhythmias ^{2; 33}
Others: <ul style="list-style-type: none">• Psychological, psychiatric and social conditions that cause difficult treatment adherence.^{2; 33}• Confirmed food allergy or anaphylaxis²

2. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention (2024 update). 2024

33. Plaza Moral V et al. GEMA 5.3. Spanish Guideline on the Management of Asthma. Open Respir Arch. 2023;5(4):100277.



Classification of Severity

- **Symptoms, signs** are used to **classify** asthma exacerbations into categories of **mild, moderate, severe and life-threatening**.
- Although PEF or FEV1 are useful and valid measures of airway calibre, it is not applicable to be used in acute asthma exacerbation.
- Treatment should be initiated immediately based on the severity of asthma exacerbation.



Classification of Severity

Table 9: Classification of Severity of Asthma Exacerbation

Clinical Parameters	Mild	Moderate	Severe	Life-threatening
Level of consciousness	Alert	Alert	Alert/confused/drowsy	Confused/drowsy/coma
Speech	Normal	Speaks in phrases	Speaks in words	Unable to speak
Respiratory rate	Normal/	>20/min	>25/min	<12/min
Pulse rate	<100/min	100 – 120/min	>120/min	Bradycardia/cardiac arrest
Blood pressure	Normal	Normal	Normal/hypotension	Hypotension
Use of accessory muscles	Absent	Present	Very evident	Paradoxical chest movement/absent
Breath sounds	Wheezing	Wheezing	Wheezing	Silent chest
Oxygen saturation (SpO ₂)	≥95%	90 – 95%	<90%	<90%
PaO ₂	Normal	<80 mmHg	<60 mmHg	< 60 mmHg
PaCO ₂	Normal	<40 mmHg	<40 mmHg or normal	>45 mmHg

Note: Not all parameters need to be met to classify the severity. Classify using the most severe parameters.

Adapted: Plaza Moral V, Alobid I, Álvarez Rodríguez C, et al. GEMA 5.3. Spanish Guideline on the Management of Asthma. Open Respir Arch. 2023;5(4):100277.

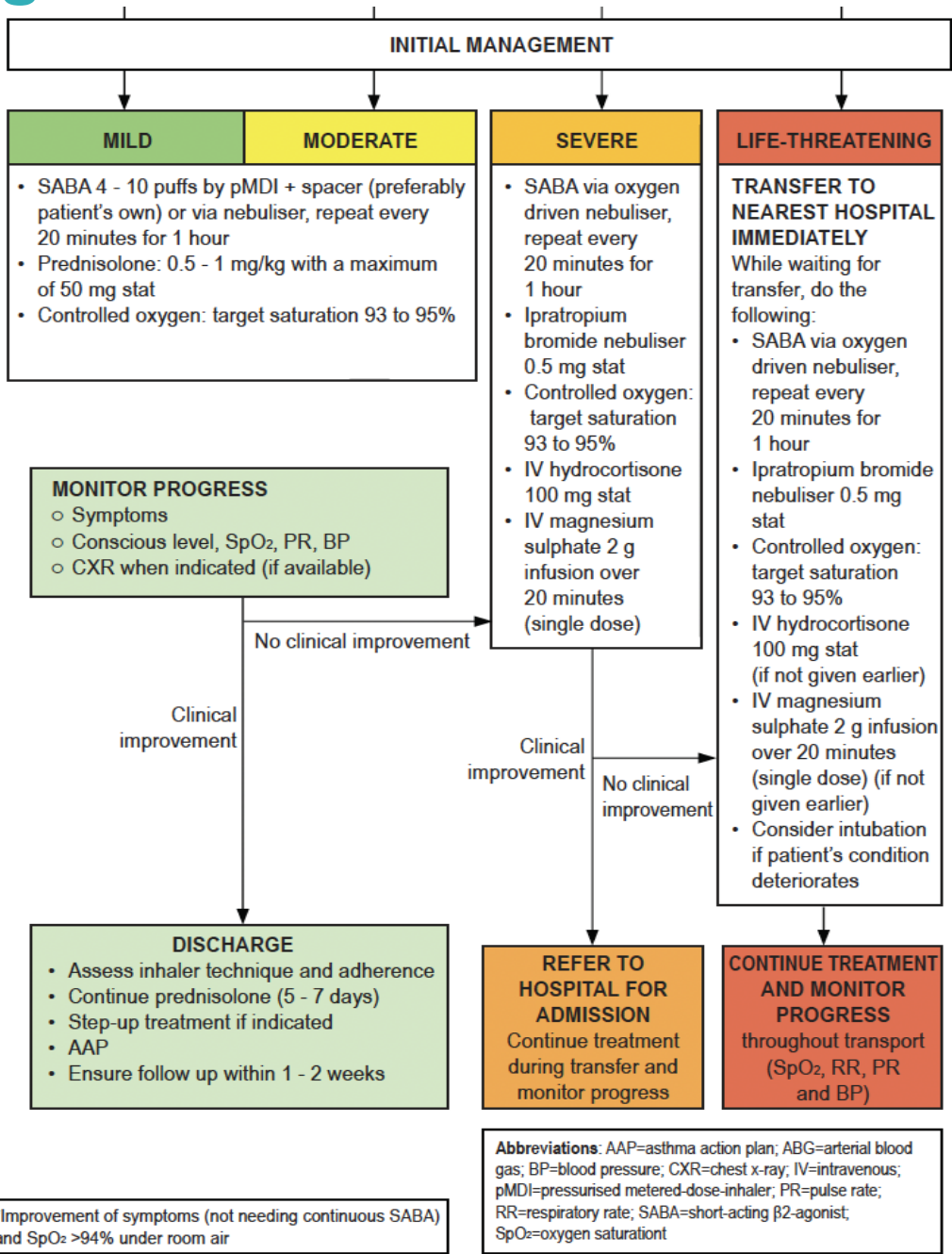
Recommendation 8

- Rapid clinical assessment of severity* should be performed for all asthma exacerbation.
- Treatment should be initiated immediately based on severity of asthma exacerbation|.

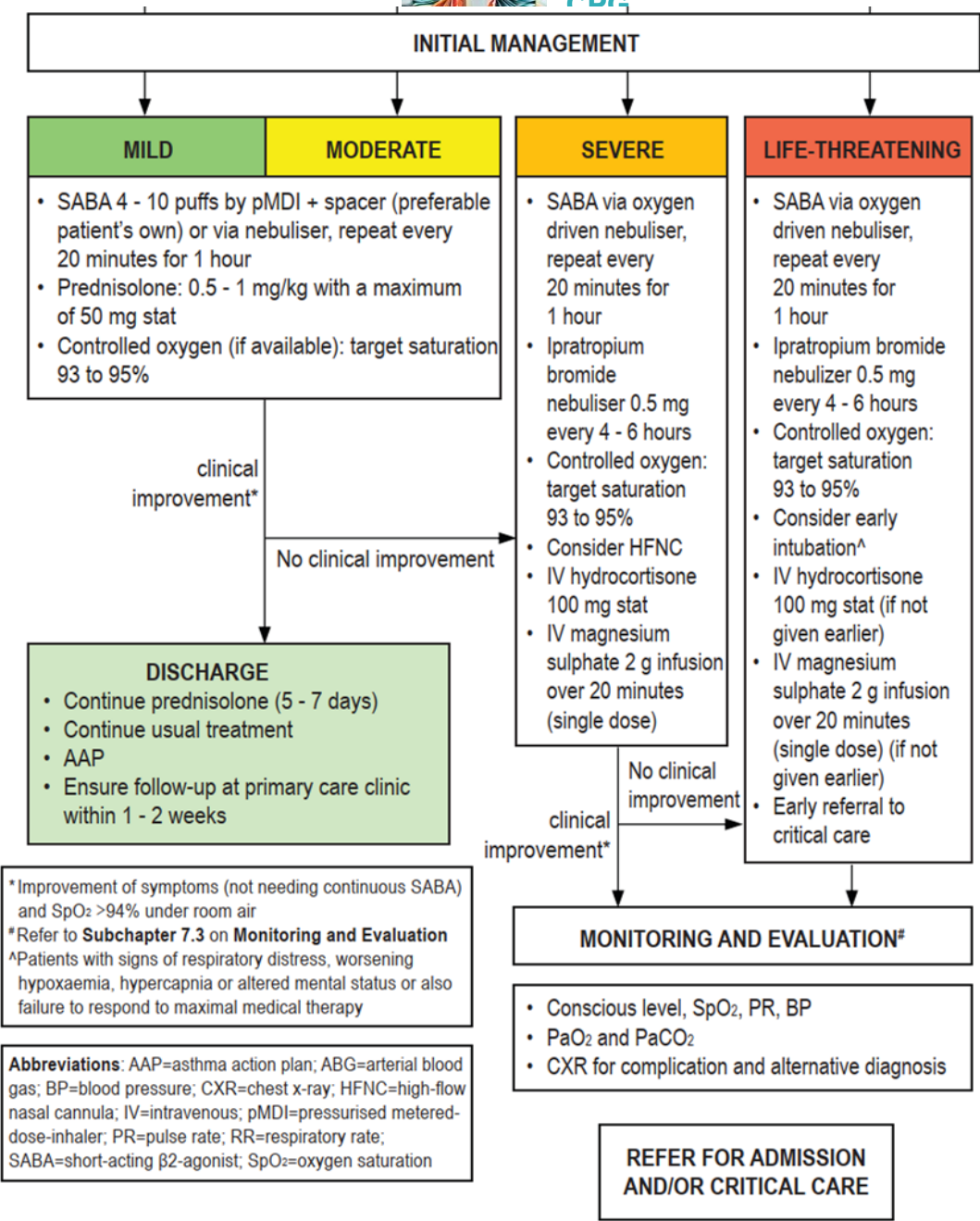
Management of Asthma Exacerbation



Primary care



Emergency Department





Treatment of Asthma Exacerbations

Oxygen therapy

- Patients who are having life-threatening asthma exacerbations with signs of respiratory distress, worsening hypoxaemia, hypercapnia, altered mental status, or failure to respond to maximal medical therapy should be considered for early intubation and referral to critical care.

Recommendation 9

- Oxygen saturation of $\geq 94\%$ should be maintained in all hypoxic asthma patients.
- In asthma exacerbation in emergency department, high flow nasal cannula should be considered over conventional oxygen therapy.



Treatment of Asthma Exacerbations

Oxygen therapy

- High flow nasal cannula (HFNC)
 - RCT : severe asthma exacerbation with respiratory failure
HFNC led to significantly higher pO_2 , lower HR and RR at 24 and 48 hours compared with conventional oxygen therapy (COT). **Overall clinical response was NS between the two groups.**⁵³
 - RCT: severe asthma exacerbation with hypoxaemia. **HFNC gave a higher comfort scale and reduction in dyspnoea than COT.**⁵⁴

53. Geng W, et al. Can Respir J. 2020;2020:2301712.

54. Ruangsomboon O, et al. Acad Emerg Med. 2021;28(5):530-41.



Treatment of Asthma Exacerbations

β_2 -Agonists

- The first-line treatment ²
- **Mild-moderate:** preferred method of delivery is via pMDI with spacer
- **Severe-life-threatening exacerbations:** continuous delivery of nebulised oxygen-driven β_2 -agonists.³

2. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention (2024 update). 2024

3. MoH, Malaysia. Clinical Practice Guidelines Management of Asthma in Adults. 2017.



Treatment of Asthma Exacerbations

β_2 -Agonists

- Oral SABA should not be used in asthma exacerbation due to their systemic side effects.³
- pMDI with spacer should not be used in life-threatening asthma.³
- There is no current evidence supporting the routine use of parenteral β_2 -agonists in patients with asthma exacerbation. It should only be reserved for ventilated patients or those with life-threatening asthma in critical care settings who do not respond to other treatments.^{2; 3; 26; 33}

Recommendation 10

- In asthma exacerbation, inhaled β_2 -agonist is the first-line treatment.
- Oral short-acting β_2 -agonist (SABA) should not be used in asthma exacerbation.



Treatment of Asthma Exacerbations

Ipratropium bromide

- Cochrane systematic review: combined inhaled therapy (ipratropium bromide + SABA) was more effective than SABA alone in adult patients with asthma exacerbation:⁵⁷
 - lower risk of hospitalisation (RR=0.72, 95% CI 0.59 to 0.87)
 - improved FEV1 (MD=0.25 L, 95% CI 0.02 to 0.48)
 - improved PEF (MD=36.58 L/min, 95% CI 23.07 to 50.09)
 - higher percent improvement in PEF (MD=24.88%, 95% CI 14.83 to 34.93)



Treatment of Asthma Exacerbations

Systemic corticosteroids

- Systemic corticosteroids reduce inflammation, hasten resolution of exacerbations and prevent subsequent relapses.
- Administered as early as possible
- Prednisolone:
 - 0.5 to 1 mg/kg of the ideal BW (max of 50 mg daily)
- IV Hydrocortisone
 - 200 mg in divided doses for 5-7 days
- Administration of corticosteroids by oral, IM or IV route provides similar results, but **oral route is less invasive and cheaper**



Treatment of Asthma Exacerbations

Inhaled corticosteroids

- Patient should continue maintenance inhaled corticosteroids when prescribed with systemic corticosteroids.³
- A cross-sectional study: additional budesonide inhalation suspension to a combination of LABA and IV systemic corticosteroids
 - reduced length of hospital stay (OR=2.99, 95% CI 1.11 to 8.06)
 - shortened recovery time from symptoms (OR=6.58, 95% CI 2.03 to 21.3).⁵⁹
- A meta-analysis:
 - NS difference between ICS vs systemic corticosteroids in admission to hospital.(The included evidence comprised of both ICS delivered through pMDI and nebuliser).⁶⁰
- **There is insufficient evidence to support the use of nebulised corticosteroids in asthma exacerbation.**

59. Ito K, et al. Allergol Int. 2020;69(4):571-7.

60. Kearns N, et al. J Allergy Clin Immunol Pract. 2020;8(2):605-17.e6.



Treatment of Asthma Exacerbations

Recommendation 11

- Systemic corticosteroids should be given in all patients with asthma exacerbation.
 - These patients should continue their maintenance inhaled corticosteroids.



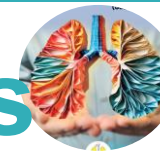
Magnesium sulphate

- **2 g infusion over 20 minutes** reduces hospital admissions in patients with FEV1 <25 – 30% predicted, and not responding to initial treatment.²
- Single dose of IV magnesium sulphate is safe and may improve lung function and reduce intubation rates in patients.²⁶
- **Nebulised magnesium sulphate is not recommended.**

2. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention (2024 update). 2024

26. SIGN & BTS. British guideline on the management of asthma. UK: SIGN-BTS; 2019.

Treatment of Asthma Exacerbations



Magnesium sulphate

Recommendation 12

- A single dose of 2 g intravenous magnesium sulphate infusion over 20 minutes should be considered in acute severe and life-threatening asthma.
- It reduces hospital admissions in patients with FEV1 <25 – 30% predicted, and not responding to initial treatment.²
- Single dose of IV magnesium sulphate is safe and may improve lung function and reduce intubation rates in patients.²⁶
- **Nebulised magnesium sulphate is not recommended.**

2. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention (2024 update). 2024

26. SIGN & BTS. British guideline on the management of asthma. UK: SIGN-BTS; 2019.



Treatment of Asthma Exacerbations

Aminophylline

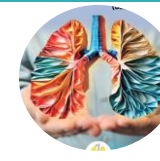
- IV aminophylline has limited effectiveness with adverse effects
- It should not be routinely used in asthma exacerbation.
- Consultation with a senior physician is advisable if its use is required.³

Monitoring and Evaluation



- The CPG DG opines that patients with severe or life-threatening asthma exacerbation should be monitored frequently to assess their response to treatment and ensure they do not deteriorate. Monitoring includes:
 - Vital signs - Monitor continuously or at least every 15 – 30 minutes, including SpO₂, respiratory rate, heart rate and blood pressure.
 - Mental status - Monitor for any signs of lethargy, restlessness or other changes indicating hypoxia or hypercapnia, or confusion.
 - Auscultation - Regularly check for changes in breath sounds, rhonchi or silent chest.
 - ABG - Monitor hypercapnia or hypoxaemia. A rising or normal PaCO₂ may indicate impending respiratory arrest.
- ABG only for patients with PEFR <50% , do not respond to initial treatment, deteriorating.

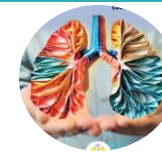
Monitoring and Evaluation



Recommendation 13

- Monitoring and evaluation of severity of asthma exacerbation should include mental status, vital signs and respiratory assessment.
- In severe and life-threatening asthma arterial blood gases should be done

Criteria for Admission



- All patients with progressive deterioration following initial treatment
- Patients with severe or life-threatening asthma should be admitted.²
- Other factors considered for admission are:
 - older age²
 - use of more than eight SABA puffs in previous 24 hours²
 - history of severe exacerbations (e.g. intubations, asthma admissions)²
 - history of unscheduled clinic and emergency department visits requiring use of OCS²
 - living alone/socially isolated³
 - psychological problems³
 - physical disability³
- Patients who are at risk of respiratory failure- early referral to the critical care team³

2. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention (2024 update). 2024

3. MoH, Malaysia. Clinical Practice Guidelines Management of Asthma in Adults. 2017.

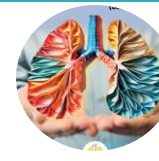
Discharge/ Admission



Recommendation 14

- All patients with severe, life-threatening asthma should be admitted.
- Early referral to critical care team should be considered for patients with asthma exacerbation who respond poorly to optimal treatment.
- Patients with asthma may be discharged with asthma action plan if they:
 - have resolution of symptoms after treatment and
 - are able to follow their prescribed treatment at home
- Following asthma exacerbation, all patients should be given a follow-up plan upon discharge.

Discharge plan



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1

Arrange for follow up
appointment

2

Discuss medication adherence

3

Educate on inhaler technique

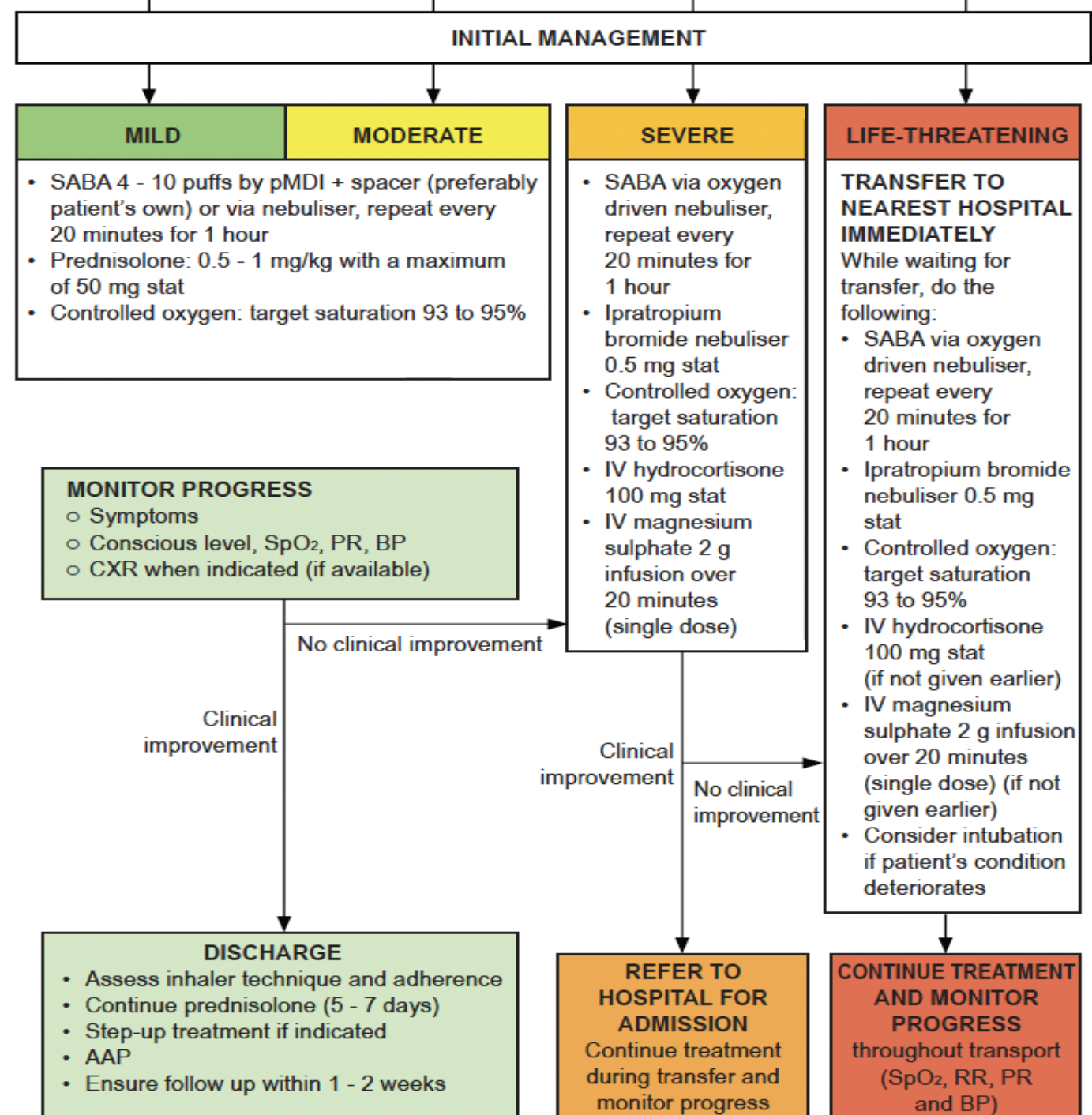
4

Provide an asthma action plan

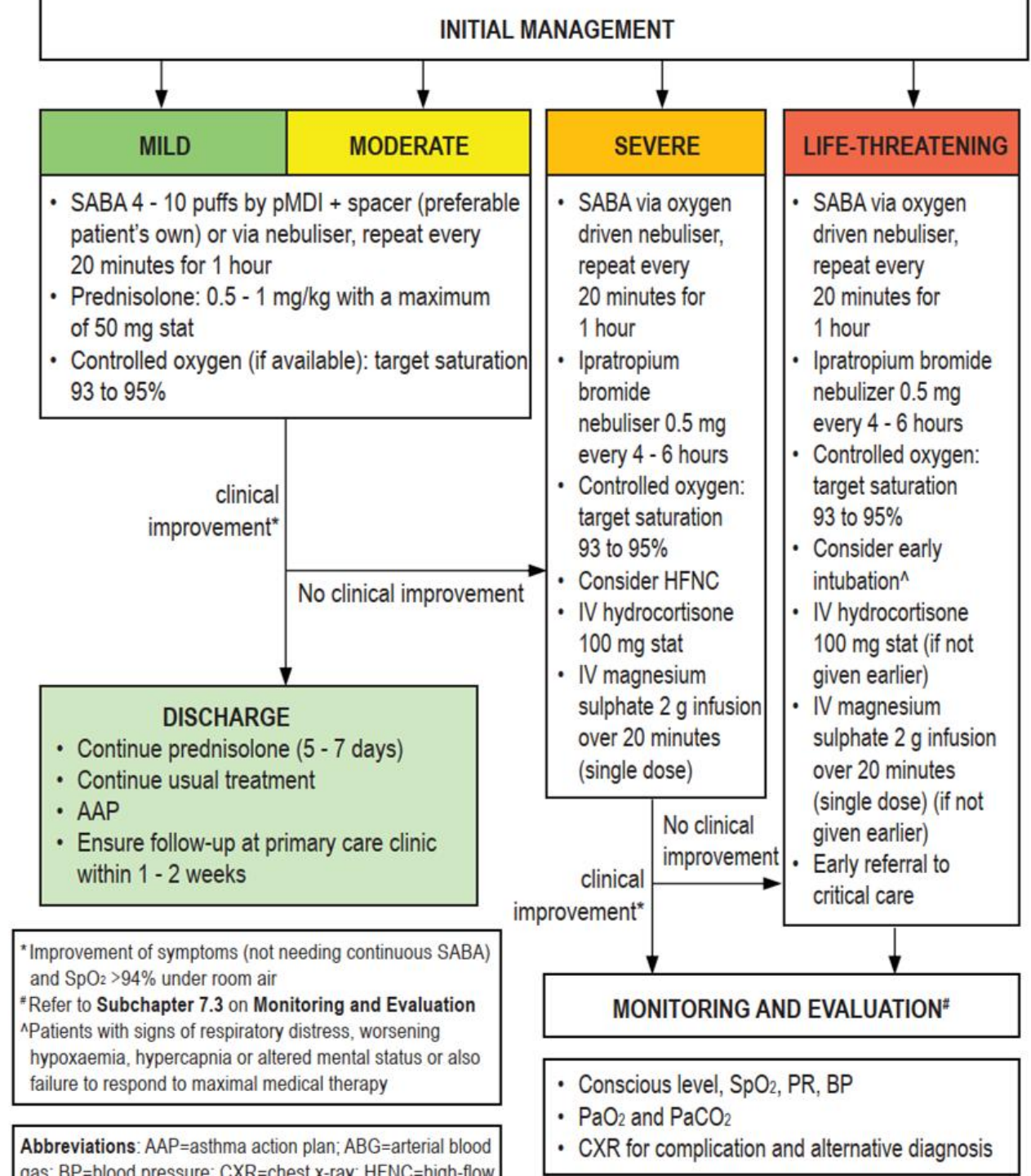
5

Provide referral to a clinic -7
days

Management of Asthma Exacerbation in Primary Care



Management of Asthma Exacerbation in Emergency Department



TAKE HOME MESSAGES



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- **Early recognition and immediate treatment** of asthma exacerbations
- **Severity should guide management**
- **First-line treatment -**
 - **inhaled β_2 -agonists** (via spacer or nebuliser)
 - combined with **ipratropium bromide** in severe and life-threatening asthma exacerbations.
- **Systemic corticosteroids must be started early** to reduce inflammation and prevent relapse
- **Admit severe or non-responding cases**
- **Ensure proper discharge planning with follow-up**, inhaler education, and an asthma action plan.

Thank You!!



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