



# Management of asthma exacerbations in children

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### **Case Scenario**

### <u>History</u>

3 year old male, presents with cough for 2 days, difficulty breathing, and Index wheeze. Low-grade fever.

### **Examination**

T=36.8C, no pallor, RR=48breaths/min, chest indrawing, bilateral wheeze

### **Treatment**

- Nebulized salbutamol 2.5mg in 5mls of Normal Saline
- IV Hydrocortisone 100mg 6hrly for 1 day
- IV Ceftriaxone 1g once a day for 5 days
- Syrup Ascoril 5mls tds for 5 days



# What is asthma?

A heterogeneous disease characterised by chronic airway inflammation, airway hyper-responsiveness and airflow limitation



It is defined by **history** of symptoms such as **wheeze**, **shortness of breath**, **chest tightness** and **cough** that **vary over time** and **in intensity** together **with variable expiratory airflow limitation** 

# Airflow limitation can become persistent



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The process of making a problem, bad situation, or negative feeling worse.

An acute increase in the severity of a problem, illness, or bad situation.



# Asthma exacerbation

A flare-up or exacerbation is an acute or sub-acute worsening of symptoms and lung function compared with the patient's usual status

### **Commonly used terminology**

- 'Flare-up' is the preferred term for discussion with patients
- **'Exacerbation'** is a difficult term for patients
- 'Attack' has highly variable meanings for patients and clinicians
- 'Episode' does not convey clinical urgency



5

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# What happens to the airways during an exacerbation?

- Swelling
- Reddening
- Mucus production
- Narrowing
- Broncho muscle spams





# Signs and symptoms

### **Symptoms**

- Cough
- Difficulty in breathing
- Chest pain/tightness
- Wheezing



### Physical assessment

- To determine severity
- Evaluate response to treatment



# **Assessment of severity**

- Essential for institution of appropriate management
- Signs to assess for:
  - Respiratory rate (RR)
  - Pulse rate (PR)
  - Blood pressure (BP)
  - Degree of breathlessness (ability to talk & feed)



### Assess..

- Use of accessory muscles of respiration
- Extent & loudness of wheeze  $(1/\propto \text{severity})$
- Air entry
- Mental state consciousness, agitation due to hypoxia
- Cyanosis and Oxygen saturation
- Peak expiratory flow rate (PEFR)



# **Classification of severity**

Life-threatening asthma

Severe asthma exacerbation

Moderate asthma exacerbation

Mild asthma exacerbation



# Life-threatening asthma

### **Clinical signs**

- Silent chest
- Cyanosis
- Poor respiratory effort
- Hypotension, bradycardia
- Exhaustion
- Confusion or drowsiness

#### Measurements

■SpO<sub>2</sub> <90%

PEFR <33% of best or predicted



# **Severe asthma exacerbation**

#### **Clinical signs**

- Talks in words (Unable to complete sentences)
- Agitation
- Sits hunched forward
- Use of accessory muscles
- Tachycardia: PR >140/min in <5yrs;</p>

PR >125/min in <5yrs

Tachypnoea: RR >40/min in < 5yrs; >30/min in >5yrs

#### Measurements

- ► SpO<sub>2</sub> <90%
- PERF ≤50% of predicted or best



# **Moderate asthma exacerbation**

#### **Clinical signs**

- Able to talk in phrases
- Prefers sitting to lying down
- Not agitated.
- Accessory muscles not used
- Tachypnoea
- Mild tachycardia: 100-120b/min
- Reduced air entry

#### Measurements

- ► SpO<sub>2</sub> 90-95%
- ► PERF ≥50%



# Mild asthma exacerbation

#### **Clinical signs**

- Able to talk in sentences
- Not agitated
- Pulse rate not increased
- Respiratory rate may be increased
- Mild wheeze

#### Measurements

- ► SpO<sub>2</sub> >94%
- PERF ≥70%





#### **Cornerstone of management**

Inhaled Short-acting β2-agonists (SABA) –relieve obstruction

- Nebulizer: oxygen or air-driven
- Pressurised metered-dose inhaler (pMDI) +spacer

Corticosteroids Oral is the preferred route

Oxygen





# **Inhaled SABA**

- First-line of therapy
- Salbutamol
  - via nebulizer given as 3 doses 20 min apart or
  - Via MDI and spacer 4-10 puffs according to severity; one puff at a time (preferred)

### Aim to have 3 doses in 60 minutes













17

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### **Steroids**

- Given early, reduce progression in severity
- Onset of action same for both oral and IV route (3-4 hrs)
- Oral route preferred (*Davies G, et al. Arch Dis Child 2008; 93: 952-958. The British Guideline on the Management of Asthma. May 2008, revised June 2009. <u>www.brit-thoracic.org.uk</u>. )*
- Duration of therapy should be 3-5 days only





• Prednisone or prednisolone, oral, 1-

2mg/kg/day; max 40mg/day for 3-5 days. No need to taper

- Hydrocortisone (IV), 5mg/kg 6hrly
- Methylprednisolone (IV), 1-2mg/kg 6hrly
- Dexamethasone (IV), 0.15mg/kg 6hrly



# **Re-assess after initial therapy**

### Good response

- Not tachypnoeic
- Minimal wheezing
- No retraction
- Able to speak and feed (young child)
- PEFR ≥80% predicted or personal best

#### Inadequate/poor response

- Tachypnoeic
- Persistent wheezing
- Retraction present
- Impaired speech or feeding
- PEFR ≤79% predicted or personal best



# If inadequate response

### Add Ipratropium Bromide (IB)

- Dose: <2yrs 0.125mg; >2 yrs 0.25mg per dose
- Give every 20 min x 1-2 hrs, then 4 6 hrly and wean off

Alternative to Ipratropium bromide is **Atropine** at 0.03-0.05mg/kg (Max 2.5mg/dose)



# **Other medications**

- IV Magnesium sulphate single dose adequate; 25-50mg/kg/dose (max 2g)
- IV Salbutamol one off; 15µg/kg over 10 min
- Infusion loading dose of 5µg/kg/min over 1 hr then 1-2 µg/kg/min as infusion
- IV Aminophylline narrow therapeutic index, severe side effects. Load with 6mg/kg then 0.5-1mg/kg/hr. Monitor levels



Antibiotics – not necessary except if there is evidence of a bacterial infection (19% of cases, Nantanda et.al 2013)

Ensure adequate hydration

Plan discharge and follow up care (1-2 weeks)

Read Global Initiative for Asthma (GINA) guidelines 2022 (Reference)



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