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Healthcare

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# Pediatric Asthma



A Max India Institution

Objective: To ensure uniform practice across Max Healthcare based on evidence

- For initial assessment (including severity) of pediatric patients (below 18 years) of acute asthma for established cases as well as for first attackers
- To differentiate between asthmatic and non asthmatic wheeze
- To plan management of patients accordingly
- To provide guidelines for management of chronic cases

For use in:

- All clinical areas: OPD, emergency and IPD

For use by:

- Physicians/ Pediatricians involved in emergency care

## Physical examination

- Rapid cardiopulmonary assessment
- Evaluation of the work of breathing
- Use of Asthma severity Assessment
- Percentage Peak Flow Determination
- Evaluation of Perfusion
- General physical exam for evidence of infection and hydration status

## Diagnostic Evaluation

- Chest X-Ray
- Not suggested unless there is fever or
- Chances of complications like pneumonia and severe respiratory distress or,
- The patient is being admitted to PICU

## Diagnostic Evaluation

- CBC with differential and blood culture may be performed
- If the child has high fever
- Appears ill
- Or there are other Co-morbidities or complicating factors
- Take into account the age, immunization and nutrition status while investigating pneumonia

## Diagnostic Evaluation

- Blood Gas Analysis (ABG, CBG)
- Is generally not necessary for tracking oxygenation
- But is invaluable for evaluating ventilation ( $p\text{CO}_2$ ) and acid-base balance (pH)

Attempts should be made to access all previous records

## Management plan

- Consists of bronchodilators and anti-inflammatory agents
- Antibiotics are not routinely indicated
- Role of antibiotics is limited to those cases with suspected bacterial infection, high fever, purulent sputum, PMN Leukocytosis

## ASTHMA SEVERITY ASSESSMENT

### Asthma Score

*Circle the appropriate circle*

	1 point	2 points	3 points
<b>Resp Rate</b>			
0-2 years	<40	40-60	>60
2-5 years	<30	30-40	>40
6-18 years	<25	25-30	>30
<b>O<sub>2</sub> Saturations (%)</b>	>95	90-95	<90
<b>Auscultation</b>	Normal to end expiratory wheezing	Expiratory wheezing	Inspir. +expiratory wheezing or diminished breath sounds
<b>Retractions</b>	None or Intercostal	Intercostal+substernal	Intercostal, substernal, supraclavicular
<b>Dyspnea</b>	Speaks in sentences or coos and babbles	Speaks in partial sentences or utters short cries	Speaks in single words or short phrase, or grunts

## Severity Assessment

*Circle the appropriate objective indicators of severity*

	Mild	Moderate	Severe
Asthma score	5-7	8-11	12-15
% Predicted peak flow	>80	50-80	<50

# Management of Acute Asthma in Children

- >3 attacks of wheezing associated with triggers
- Reversible bronchoconstriction- patient has relief with bronchodilators
- Personal history or family history of atopy

**MILD ASTHMA** →  
Asthma score 5–7  
peak flow >80% OR  
**MODERATE ASTHMA**  
Asthma score 8–11%  
Peak flow 50–80%

Salbutamol (1.25 mg, <1 year; 2.5 mg,  
>1 year; 2.5–5 mg, older children)  
via nebulizers X3 every 20 minutes Or  
MDI + mask + spacer (2–4 puffs)  
q 20 minutes x 3;  
reassessment after half an hour

IMPROVED,  
sustained  
for 4–6 hours

Not improved or improvement  
not sustained for 4–6 hours  
First seen at this stage  
Give first dose of oral steroids  
(inhaled steroids do not have a  
role in acute asthma treatment)  
and call consultant

**DISCHARGE HOME**  
Continue salbutamol  
inhalation every  
4–6 hours  
Review compliance,  
trigger elimination,  
prevent drug use  
If on steroids, cont  
for 3–7 days PO  
Review/initiate  
long-term strategy  
Plan follow-up  
All admitted  
patients should  
only be sent home  
after one  
symptom-free night

**ADMIT TO WARD**

Oxygen to keep saturation over 95%  
Salbutamol + Ipratropium via nebulizer  
q 20 minutes x 3  
SC Adrenaline/ Terbutaline (0.01 mg/  
kg SC) x 2 q 20 minutes if poor air  
entry or above treatment not available  
Begin/continue rescue steroids –  
Prednisolone 2 mg/kg/day, max.  
60 mg for 3–7 days May switch to  
Hydrocortisone (10 mg/kg load, and  
then 5 mg/kg q 6 hours)  
IV fluids for maintenance  
Repeat asthma score before each dose  
of salbutamol and Ipratropium and  
20 minutes after the third dose

IMPROVED

Not improving  
Poor air entry

Salbutamol neb  
as q1–4 hours  
Ipratropium every  
4–6 hours  
Monitor vital signs,  
SaO<sub>2</sub> every 2 hours

Sustained response  
for 4–6 hours  
Plan discharge  
as above  
Steroids PO for  
3–7 days without  
taper

(continued)

## RED FLAG SIGNS\*\*

(any one or more of these present treat as severe asthma)

- Altered sensorium
- Bradycardia
- Poor pulse volume
- Cyanosis
- Excessive use of accessory muscles or exhaustion
- Excessive diaphoresis
- Speech 1-2 words
- Silent chest Persistent
- low SpO<sub>2</sub> < 90%
- ON ABG: pCO<sub>2</sub> rise > 5 mm Hg/hour
- pCO<sub>2</sub> > 42 mm Hg
- pO<sub>2</sub> < 60 mm Hg

## ADMIT TO PICU

Keep ventilator ready  
Start Salbutamol continuous nebulization  
Continue Ipratropium q4-6 hours  
Continue IV Hydrocortisone and  
Add IV Terbutaline (2-10 mcg/kg stat, then IV drip 0.1-0.4 mcg/kg/minute)

Check serum K, CBC, chest X-ray to identify complications (Atelectasis, Pneumonia, Pneumothorax, Pneumomediastinum, SQ emphysema)  
Check ABG/CBG



If poor response to IV terbutaline, or child is very sick, give **Aminophylline** 6 mg/kg IV over 20 minutes.  
Following loading dose give continuous infusion (1-9 year: 1.1 mg/kg/hour, 10+ year: 0.7 mg/kg/hour). If currently taking oral theophylline, *do not* give IV aminophylline - take serum level.



If poor response, then start **Magnesium Sulphate** 25-50 mg/kg/dose max. 2 g slow IV over 20 minutes. May be repeated every 6 hours for two more doses.

Check Mg level prior to next dose

Intubation should be done electively before the emergency of a respiratory arrest. Intubation should be done with atropine/ketamine/midazolam/vecuronium

## Asthma Clinical Pathway Orders for Non-Intubated Patients

NAME \_\_\_\_\_ DOB \_\_\_\_\_

WEIGHT \_\_\_\_\_ HEIGHT \_\_\_\_\_ ALLERGIES \_\_\_\_\_

1. Admit to \_\_\_\_\_
2. IV Fluids:
  - i.  No IV fluids
  - ii.  IV Fluids \_\_\_\_\_ at \_\_\_\_\_ mL/hour
3.  No O<sub>2</sub>
4.  O<sub>2</sub> via \_\_\_\_\_
5. Nebulized Salbutamol \_\_\_\_\_ mg every \_\_\_\_\_ hours, every 1 hour PRN dyspnea
6. Corticosteroids (choose one)
  - i.  Prednisolone 2 mg/kg/day \_\_\_\_\_ mg PO every \_\_\_\_\_ hours
  - ii.  Hydrocortisone 10 mg/kg stat \_\_\_\_\_ mg IV then 5 mg/kg/dose \_\_\_\_\_ mg every 6 hours
7. Nebulized Ipratropium Bromide
  - i.  None
  - ii.  0.25 mg <10 kg, 0.5 mg >10 kg every 6 hours
8. Antibiotics;
  - i.  None
  - ii.  \_\_\_\_\_
9. Chest X-ray  yes  no
10. Other labs:
  - i.  Electrolytes, glucose \_\_\_\_\_
  - ii.  Sepsis work-up \_\_\_\_\_
  - iii.  \_\_\_\_\_
11. Other Medications
  - i. \_\_\_\_\_
  - ii. \_\_\_\_\_
12. Check pulse, resp. rate, pulse oximetry, BP every 4 hours
13. Diet  Regular  Other

\_\_\_\_\_  
Signature of physician with date and time

\_\_\_\_\_  
Name in capitals

Discharge plan should be initiated when the child is admitted. It should include the following

- Parent teaching about elimination of triggers/environmental control
- Symptom/peak flow monitoring
- Asthma action plan written down for the parent
- Medications/delivery system education
- Details about reliever and preventer medications

Discharge to home if,

- Symptom-free for at least 4-6 hours between treatments
- Sleep and eating well
- PEF > 80% of personal best
- Can give prescribed medication adequately
- Knows danger symptoms

Continue beta-2 agonist and oral steroids for desired duration  
follow-up with physician in 24-48 hours.

Review need for preventive treatment:-

- If wheezing attacks less than 6 weeks apart
- Frequency of acute attacks increasing
- Chronic symptoms persist

## Discharge Sheet

Name: \_\_\_\_\_

DOB \_\_\_\_\_

Diagnosis:

Medications to be given at home

RELIEVER MEDICATION

PREVENTER MEDICATION

OTHER

Report to the hospital IMMEDIATELY if

- No improvement 15 minutes after treatment with Salbutamol
- Peak flow less than \_\_\_\_\_
- Child has difficulty breathing with pulling in neck muscles, child cannot lie down, child is struggling to breathe.
- Child has trouble talking or walking
- Lips and nails are blue

\_\_\_\_\_  
Signature of physician with date and time

## Diagnosis and Treatment of Chronic Asthma in Children

Disease severity	day symptoms	night symptoms	PEF/ FEV1 (%)	PEF variability (%)
Mild intermittent	<2 days/week	<2 nights/month	≥80	<20
Mild persistent	>2/week, <1/day	>2 nights/month	≥80	20–30
Moderate persistent	Daily	>1 night/week	60–80	>30
Severe persistent	Continual	Frequent	≤60	>30

NAEPP classification of disease severity.

Asthma is classified by the most severe finding before treatment. Three or more exacerbations in 1 year may place the child in the persistent category if risk factors are present.

## Stepwise Approach for Managing Asthma in Infants and Children

SEVERITY	Preferred medications	Alternate medications
STEP 4 Severe Persistent	High-dose ICS+LABA and <i>if needed</i> oral steroids long term	
STEP 3 Moderate persistent	Low-dose ICS + LABA or Medium-dose ICS in < 5 years Low/medium-dose ICS + LABA in > 5 years	Low/Medium dose ICS + LTRA/SR theophylline*
STEP 2 Mild persistent	Low-dose ICS	Cromolyn or LTRA or theophylline SR*
STEP 1 Mild intermittent	No daily treatment	No daily treatment

ICS – inhaled corticosteroids; LABA – long-acting beta agonist; LTRA – leucotriene receptor antagonist.  
Modified from NIH pub #02-5075, June 2002.

## Recommendations for Infants and Young children

- Asthma diagnosis is difficult in infants and young children
- Under-diagnosis & under treatment are the major concerns in this age group
- A diagnostic trial of bronchodilators and anti-inflammatory medications may be helpful
- Infants & Young children consistently requiring symptomatic treatment more than 2 times per week should be given anti-inflammatory therapy daily
- Once a daily asthma medication the child should be reassessed every 4-8 weeks
- Step down in therapy should occur after 2 months of good control

## Recommendations for Infants and Young children

- The patient's response to therapy should be monitored carefully
- When benefits are sustained, a step down in therapy should be attempted.
- If there are no clear benefits, treatment should occur after 2 months of good control
- The patient's response to therapy should be monitored carefully
- When benefits are sustained, a step down in therapy should be considered
- If there are no clear benefits, treatment should be attempted
- If there are no clear benefits, treatment should be stopped and inhaled corticosteroids are introduced in step 2, doses may range 100 mcg to 400mcg per day (equivalent to 15 mcg/kg)

## Recommendations for Infants and Young children

- When step 3 care is required, control should be established promptly with higher doses of inhaled corticosteroids and,
- Then therapy should be stepped down after 2-3 months to maintain control
- Exacerbations caused by viral respiratory infections may be severe
- Consider systemic corticosteroids if exacerbation is moderate to severe

# Recommendations for Infants and Young children

## Delivery devices for infants and young children

- Children less than 2 yrs: nebulizer therapy may be used for administration of cromolyn and high-dose beta-2 agonists; however MDI+ Spacer +Mask may be used if the technique is properly demonstrated to the parents
- Children between 3-5 yrs may begin with MDI and spacer/holding chamber alone; if desired therapeutic effects are not achieved, a nebulizer may be required
- Always review the medications and technique with the parents at every visit

## Recommendations for Infants and Young children

- Pulmonary function testing should be performed routinely and should use appropriate reference populations
- When initiating daily anti-inflammatory therapy for mild-to-moderate persistent asthma, a trial of cromolyn should be given
- Adolescents and older children should be directly involved in establishing goals for therapy and developing their asthma management plans
- Active participation in physical activities, exercise and sports should be promoted
- A written asthma management plan should be prepared for school

1. Minimal or chronic symptoms, day or night
2. Minimal or no episodes
3. No limitations on activities, no school/work missed
4. PEF > 80% of personal best, if used
5. Minimal use of short-acting or inhaled beta-2 agonist (< 1 per day)
6. No or minimal adverse effects from medications

## Long-term Management of young Children with Asthma

- Potential risks of inhaled corticosteroids are well balanced by their benefits
- Growth rates are highly variable in children
- Short term evaluations may not predict final adult height
- Poorly controlled asthma may delay growth in children
- Use of high doses of inhaled corticosteroids for children with severe persistent asthma has significant less potential for having an adverse effect on linear growth than oral systemic corticosteroids