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Review Article

Clinicians dilemma in the management of acute flare-up wheeze with asthma: An update

Haralappa Paramesh

Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru, Karnataka, India.

***Corresponding author:**
Haralappa Paramesh,
Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru, Karnataka, India.

drhparamesh@gmail.com

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ABSTRACT

Asthma is the earliest onset of non-communicable respiratory disease with a significant psycho-socio economic burden. Each country have their own guidelines to manage asthma for their need based on availability, accessibility, and affordability. The acute flare-up of asthma, where there is a progressive increase of symptoms of asthma, causing higher morbidity and mortality. The clinician often confronts with a dilemma in the management – in confirming the diagnosis of asthma, look for the risks for flare-up and mortality, followed by assessing the severity of flare-up for proper management. There is some dilemma in using the nebulized steroid in acute flare-up of asthma. The author highlights the current knowledge in clearing those issues for the practicing clinicians.

Keywords: Asthma, Flare-up, Nebulization, Management

INTRODUCTION

Asthma is a chronic early-onset non-communicable environmental airway disease with significant psycho-socio economic burden to the family and society at large and characterized by airway inflammation, airway obstruction, airway hyperreactivity, and present with wheeze, cough, shortness of breath, and chest tightness. It is estimated that 1 billion people were suffering from asthma in the year 2015 and expected to reach 4 billion by 2050 as for WHO prediction, and it will be a global epidemic.[1]

Our Indian national health profile 2018 reveals that communicable diseases are decreasing from 61 to 33% and non-communicable diseases such as asthma, allergic rhinitis, COPD, cancer, and diabetes are increasing from 30–55% between 1990 and 2016.[2]

Each country kept their own guidelines to manage asthma and wheeze cases with training modules, to have uniformity and cost containment with their available resources.

ACUTE ASTHMA FLARE-UP

Acute asthma flare-up is characterized by a progressive increase in symptoms of shortness of breath, cough, wheeze, and chest tightness and progressive decrease in the lung functions, in a pre-existing diagnosed asthma patient or it can be the first presentation of asthma as well.[3]

Here, I want the clinicians to understand that the older terms are given up like – Exacerbation: Not suitable in clinical practice many patients cannot pronounce or remember. Attack: Has varying meaning may not perceive the gradual worsening of asthma symptoms.

Episode: Many patients and health care providers have not understood asthma.[3]

When a clinician confront a child with flare-up of wheeze, he should focus on three issues –

1. Is it asthma?
2. What are the risks for flare-up is there any risk for asthma-related death?
3. How severe the illness? For proper management.

Is this wheezing child, has asthma?

The diagnosis of asthma is mainly based on clinical evaluation and documenting reversible airway obstruction as a supportive evidence.[3]

a. Having a history variable respiratory symptoms, as shown in [Table 1]
b. b) One has to document variable respiratory airflow limitation by pulmonary function testing after inhalation of bronchodilators, more so before using any controllers such as steroids, as shown in [Table 2]

WHAT ARE THE RISKS FOR FLARE-UP OF ASTHMA

- Exposure to tobacco smoking; noxious agents and aeroallergens
- Children with chronic mucus hyper secretions may have reduced the growth of lungs. Usually, they present with more crackles in the chest than wheeze may be that they are different phenotypic categories
- Asthmatic children who are not on steroids
- Children whose sputum shows eosinophilia

Table 1: Respiratory symptoms.

Cough	More than one symptoms with variable time and intensity
Wheeze	Symptoms worse at night and early AM
Shortness of breath	Triggered by physical, emotional stress or cold air
Chest tightness	Often starts with viral infection

Table 2: Reversible airway limitations by lung function.

FEV1 by >200 ml and 12% of baseline in spirometry	PEF Increase by 15% in children (normal variation >13% in children, 10% in adults)
Reversibility is may be absent in Severe attack Viral infections	Clinical documentation in children under 4 years Improved social smile Good sucking efforts Less wheeze

- Children who have fixed airway obstruction like in premature babies, small for date children from air pollution, leading to placental vascular coagulopathy and children who gain weight rapidly in infancy as obesity is directly proportional to decreased lung function
- One has to watch these children in reducing the controller drug in asthma, and they have a higher risk for flare-up and future candidates of airway remodeling.[3]

RISKS FOR ASTHMA DEATHS

Here are the group of children where the clinician should be alert and proper management instituted at the earliest without any delay at a proper facilities. The risks are –

- History of near-fatal attack needing ventilation and having has tracheal intubation
- Having had previous admissions with similar episodes of wheeze
- Currently started using steroids or stopped the oral steroids or not using any inhaled corticosteroids
- Uses short-acting beta-2 agonist more than one canister per month
- Children with some psychosocial problems
- People with poor compliance of treatment
- Children with food allergy. Since they get anaphylactic reactions more often than others.

ASSESSMENT ASTHMA FLARE-UP

The clinician should assess whether it is mild/moderate, severe, or life-threatening flare-up based on clinical features, as shown in [Table 3].

The wheeze sound in medicine is a dry musical expiratory sound produced by air moving in high velocity past a fixed obstruction in the lower airway, and it cannot be felt on the chest. Its diagnostic value for asthma is the sensitivity of 74.7% and specificity of 87.3% positive predictive value is 12.4%.[4]

Table 3: Severity of asthma flare-up.

Mild/moderate Prefers sitting Talks in phrases Neck muscles are not used Not agitated	HR – 100–120 O_2 sat – 90–95% PEF – >50%
Severe Talks in words Tripod position with a hunch Neck muscle are used with flaring Agitated	HR – >120 RR – ↑ increased O_2 sat – <90% PEF – < 50%
Life-threatening Drowsy Confused Silent chest	Urgently transfer to an acute care facility

If it is a 1st time wheeze and had localized signs in lungs, the clinician should rule out other causes of wheeze since asthma may overlap with other airway disorders, making the differential diagnosis difficult.

Especially if the patient is an infant, other causes of wheeze to be ruled out such as – congenital anomalies, aspiration syndromes, structural lesion pressing on airways, infections, genetic diseases, and hyperventilation syndrome. Some of the clinical clues to suspect these conditions are shown in [Table 4].[5]

Our observation of 229 wheezing children who admitted to the hospital for evaluation as showed in [Table 5].

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN EMERGENCY ROOM

Step I:

- Use humidified oxygen to keep oxygen saturation of 93–98% in adolescents and 94–98% in children between 6 and 12 years

Table 4: Guidelines for the evaluation of resp. Distress with a wheeze.

Congenital lesions	Wheeze started early in life Intensifies with age and Worsens with URI
Structural lesions of central airways	Sound loudest during activity Disappear during quite breathing Alters with change of position Wheeze increased with bronchodilators
Extrinsic pressure on extra pulmonary airway	Extended neck with wheeze
F.B. aspiration	Choking followed by cough and asymptomatic for few days Followed by persistent wheeze
C.F	Wheeze with growth failure
Immune deficiency	Clubbing
Chr. aspiration syndrome	G.I. Symptoms Recurrent respiratory infection

Table 5: Causes of wheeze in hospital children (N-229).

Diagnosis	No	%
Asthma	112	55.46
Bronchiolitis	51	22.28
Bronchopneumonia	25	10.9
Laryngo tracho bronchitis	9	3.93
Mycoplasma bronchitis	5	2.18
Tuberculosis	2	0.9
Foreign body	2	0.9
Pertussis syndrome	1	0.45
GERD	1	0.45

- Use salbutamol (SABA) + Ipratropium (SAMA) every 20 min 3 times either by nebulization or meter dose inhaler in spacer.

Step II:

- Continue SABA + Ipratropium q30 min X 3 times followed by q 4-6hrs, to be weaned off and stopped in 24 h
- Use rescue steroids, either oral, hydrocortisone IV or methyl prednisone X 3 days
- I.V magnesium sulfate with monitoring facilities
- No improvement admit to ICU.[6,7]

Step III:

- I.V. Aminophylline infusion in ICU
- Non-invasive ventilation
- Mechanical ventilation as a last resort
- Wean off support systems with last in first out principle with improvement
- Discharge on SABA every 4-6hrs till the child is asymptomatic along with oral rescue steroids.

Always watch with the pulmonary index score while the patient is in the hospital.

DILEMMA IN USING NEBULISED STEROIDS IN ACUTE FLARE-UP OF ASTHMA

GINA – 2020 recommends inhaled corticosteroids in intermittent asthma cases since SABA only increases the risk of flare-up and low lung function and overuse of SABA more than 3 canister/year has a high risk of flare-up and more than 12 canister/year has a high mortality.

The review of literature on inhaled steroids in acute flare-up of asthma is controversial.[7-12] Our observations are –

- The use of nebulized steroids in acute flare-up of asthma is almost similar to oral prednisolone in response and not much of a satisfied improvement
- The use of nebulized budesonide in high doses is almost equal to oral steroids and did not decrease the hospitalization rate
- The use of fluticasone propionate nebulization is as beneficial as budesonide without the involvement of the adrenocortical axis
- At this stage, we clinicians have to keep in mind social determinants which dictate terms in the management. The societal preference is –
  - Oral medications
  - Single-dose medicines
  - Drugs with less adverse reactions
  - Less expensive drugs
  - Drug covered by health insurance.

In addition, we clinician should also pay attention to other logistics like –

- Maintenance of nebulizers at home
- Safety factors

- Patients compliance
- Impracticality
- Cost containment.

CONCLUSION

While evaluating flare up of acute wheezing in asthmatic children, the clinician should assess that it is asthma only, find out the risks for flare-up, and whether the patient had any previous near-fatal flare-ups and severity. If it is the first episode of wheeze, he has to rule out other possible causes which mimic asthma with red flag signs. While managing the patient of asthma with wheeze – the use of SABA +SAMA + steroids with humidified oxygen is recommended.

Inhaled high-dose steroid nebulization is still a controversial issue due to various factors, as discussed.

- SABA = Short-acting Beta- 2 agonists
- SAMA = Short-acting muscarinic agonist.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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