NATIONAL GUIDELINE ON MANAGEMENT AND CONTROL OF ASTHMA IN CHILDREN AT PRIMARY LEVEL
Unfortunately asthma prevalence, particularly in children, is increasing worldwide. It is under-diagnosed and undertreated.

✧ Asthma causes recurring episodes of coughing, wheezing, chest tightness, and difficult breathing. Asthma attacks can be life threatening and can be prevented.

✧ Asthma is a chronic inflammatory disorder of the airways. Chronically inflamed airways are hyperresponsive and, when exposed to various stimuli or triggers, become obstructed thus limiting airflow (by bronchoconstriction, mucus plugs, and increased inflammation).

✧ Asthma attacks are episodic, but airway inflammation is chronically present. Asthma is a chronic disorder requiring long-term management. For many patients, this means taking preventive medication every day.

✧ Asthma cannot be cured. It can be treated and controlled so that patients can:
  - prevent troublesome symptoms during the night and day
  - prevent serious attacks
  - require little or no quick-relief medication
  - have productive, physically active lives
  - have (near) normal lung function.

✧ Asthma may be preventable. For infants with a family history of asthma or atopy, it is highly likely that avoiding early exposure to allergenic foods (fish and eggs), passive smoking (including during pregnancy) and to domestic
dust mite, cat and cockroach allergens will help prevent the initial development of asthma.

**MANAGEMENT OBJECTIVES**

Make appropriate care available to every child with asthma to:

- relieve symptoms
- prevent premature morbidity and mortality by restoration of normal or best possible long-term airway function
- promote education and self-management/control
- enable normal growth to occur
- promote regular clinic attendance for follow-up and re-evaluation
- improve quality of life and participation in school and related activities
- reduce the risk of severe attacks
- reduce the economic burden to the individual, family and community
- manage acute asthma as a crisis.

**TARGETS AT PRIMARY HEALTH-CARE LEVEL**

The targets at this health-care level should include the following:

- Recognition and early diagnosis of asthma and exacerbation of asthma.
- Education of health-care professionals, their patients and families.
- Prevention, detection and management of complications.
- Ensuring the permanent availability of drugs and flow meters.
- Applying the principles of best practices.
- Maintenance of good patient records.
Self-monitoring of response to treatment (over 5 years of age).
Control of certain trigger factors and reduction of exposure to causitive agents.

Target Population

Primary target:
Children with asthma (a child is a person \( \leq 18 \) years).
Health professionals.
Families/friends of patients.

Secondary target:
School personnel.

Asthma must be diagnosed in a child with a chronic persistent or recurrent cough, which worsens at night, a tight chest and/or wheeze that responds rapidly (within 10 - 30 minutes) to an inhaled bronchodilator. (A wheeze is the characteristic whistling breath sound of asthma. It is best heard during expiration [breathing out]. Wheezing is not a reliable indicator of severity of asthma).

1 Lung function:
- Measure the peak expiratory flow rate (PEFR) before and after the administration of the \( \beta_2 \)-agonist (not for acute attacks). An improvement of more than 10% in the PEFR after 10 minutes indicates reversible airway obstruction.
- PEF varies more than 20% from morn-
- Onset, duration and frequency of symptoms (e.g., cough, wheeze)
- Trigger factors for asthma
- Relevant family history of allergy to certain antigens
- Relevant medical history
- Weight and growth history
- Activities of daily living:
  - attend school every day
  - play/participate in sports
  - sleep pattern during the night
- Drug history and/or previous treatment
- Complications
- Typical symptoms: reaction to artificial colourants and preservatives
- Associated atopic features:
  - rhinitis
  - eczema
  - conjunctivitis
- Family/community support

- Weight and height growth chart
- Respiratory signs:
  - wheezing/other audible sounds
  - prolonged expiration phase
- chest shape
- Associated allergic status:
  - allergic rhinitis
  - allergic conjunctivitis
  - eczema
- Cyanosis
- immediate referral for emergency treatment

> 5 years old peak flow measurement
Exerc ise challenge (6 minutes of running as mentioned previously)

## 2 Clinical (Annexure A):

<table>
<thead>
<tr>
<th>HISTORY</th>
<th>PHYSICAL EXAM</th>
<th>SPECIAL TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset, duration and frequency of symptoms (e.g., cough, wheeze)</td>
<td>Weight and height growth chart</td>
<td>&gt; 5 years old peak flow measurement</td>
</tr>
<tr>
<td>Trigger factors for asthma</td>
<td>Respiratory signs: wheezing/other audible sounds, prolonged expiration phase</td>
<td>Exercise challenge (6 minutes of running as mentioned previously)</td>
</tr>
<tr>
<td>Relevant family history of allergy to certain antigens</td>
<td>chest shape</td>
<td></td>
</tr>
<tr>
<td>Relevant medical history</td>
<td>Associated allergic status: allergic rhinitis, allergic conjunctivitis, eczema</td>
<td></td>
</tr>
<tr>
<td>Weight and growth history</td>
<td>Cyanosis</td>
<td>immediate referral for emergency treatment</td>
</tr>
<tr>
<td>Activities of daily living: attend school every day, play/participate in sports, sleep pattern during the night</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug history and/or previous treatment</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Family/community support</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3 Environmental factors:

House dust, household pets, cigarette smoke, exercise, environmental temperature, house dust mite, viruses, cockroaches, grass and pollen.

Allergens:
House dust, house dust mite, cockroaches, grass and pollen.

Irritants:
Cigarette smoke, exercise, environmental temperature changes and viruses.

ASSESSMENT OF SEVERITY

The grade of severity which is assigned to a patient is the most severe grade in which any one of the listed features occur.

<table>
<thead>
<tr>
<th>FREQUENCY OF ATTACKS OF COUGH AND/OR WHEEZE</th>
<th>NIGHT TIME COUGH AND/OR WHEEZE</th>
<th>PRIOR ADMISSION TO HOSPITAL FOR ASTHMA</th>
<th>PEFR% PREDICTED</th>
</tr>
</thead>
</table>
| SEVERE
More than 1/week or continuous            | Frequent                       | More than 1 previous admission or admission to Intensive Care Unit (ICU) | less than 60%    |
| MODERATE
Less than 1/week (persistent)             | Infrequent                     | 1 previous admission                  | 60% - 80%       |
| MILD (intermittent)                        |                                |                                       | more than 80%   |
| Not more than 1/month                      | No                             | No                                    |                 |
DIRECT REFERRALS TO HIGHER LEVEL FOR TREATMENT

✦ Distressed patients.
✦ All severe chronic cases.
✦ If there is failure to thrive.
✦ Patients not responding to treatment.
✦ Recurrent or persistent acute asthma.
✦ Persistent interference in activities of daily living.
✦ When oral steroids are required more than 3 - 4 times per year
✦ Any history of a life-threatening episode or hospitalisation in previous 6 months.
✦ All children < 12 months with recurrent wheezing (wheezing infant).

PREVENTION OF ASTHMA ATTACKS AND ENVIRONMENTAL CONTROL

✦ Education of the patient and family, which must include:
   - stressing the diagnosis and explaining the nature of the condition
   - issuing a written plan of management, which should include prevention
   - informing all care-givers, including teachers
   - reassuring parents and patients of safety of continuous regular therapy
   - optimal use of medication
   - early warning signs of acute attack
   - avoidance of unnecessary therapy, e.g. cough syrups, mucolytics and breathing exercises.

✦ Cigarette smoking is harmful to an asthmatic patient. Smoking should not be allowed in the home or vehicle with any asthmatic patient. Active steps should be taken to inform household members of the problem and to encourage smokers to quit. The need to help their
child can be a powerful incentive to parents to quit smoking.

✧ In the individual patient where house-dust mites have been shown to be a problem, appropriate control measures should be considered. These include plastic mattress covers, removal of bedroom carpets, and washing bedding in hot water (>70°C).

✧ Soft toys should be avoided.

✧ Air all bedding in sunshine. Damp dust and vacuum (if possible) regularly. Use synthetic filled pillows and duvets. Washable bedroom floors – preferably no carpets.

✧ Pets should not sleep in children’s bedrooms. In addition, cats should be discouraged as pets in families with allergic children. Keep pets outside the house.

✧ Certain preservatives can be potent triggers (e.g. benzoates and sulphites) and should be avoided. Refer: Annexure B
MANAGEMENT

INITIATION AND CONTINUATION OF TREATMENT (if not direct referrals)

Self-management and self-monitoring is a priority

<table>
<thead>
<tr>
<th>Intermittent</th>
<th>Persistent</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 OCCASIONAL USE OF RELIEF BRONCHO-DILATORS</td>
<td>REGULAR INHALED ANTI-INFLAMMATORY THERAPY</td>
<td>STEPPING DOWN</td>
<td></td>
</tr>
<tr>
<td>Short-acting inhaled ( \beta_2 ) agonists for symptom relief</td>
<td>Intermittent ( \beta_2 ) agonists</td>
<td>Review treatment need every 3 months.</td>
<td></td>
</tr>
<tr>
<td>100 - 200 micrograms salbutamol daily depending on age (Not more than once daily with a maximum of 3 times a week)</td>
<td>100 micrograms salbutamol twice a day (maximum)</td>
<td>Stop regular anti-inflammatory therapy after 6 to 12 months if few or no symptoms.</td>
<td></td>
</tr>
<tr>
<td>Ensure patient is taking therapy and has appropriate inhaler technique.</td>
<td>and [ \text{Low dosage steroid inhalations} ] (maintenance dose)</td>
<td>If symptoms are seasonal, consider stopping anti-inflammatory treatment at end of season.</td>
<td></td>
</tr>
<tr>
<td>If not controlled introduce step 2.</td>
<td>e.g. beclometasone 100 micrograms twice a day (maximum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A doubled maintenance dose may be required for 1 - 2 weeks initially until control is achieved</td>
<td>Monitor PEFR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If not controlled, refer.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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The inhaled method with spacer is the route of choice.

Spacer:
✧ Children < 5 years must use a spacer with mask.
✧ Other children should use spacer with mouthpiece.
✧ All children with inhaled steroids must use a spacer.
✧ **NO** polystyrene cups should be used as spacers.
✧ Ensure that delivery device fits the spacer.
✧ Prime the spacer before use by putting 2 puffs into chamber prior to administering mask/mouthpiece to patient.

Many patients have difficulty with coordination of the inhaler and inhalation, and a spacer with or without a mask should be used.

**With a spacer:**
1. Remove the caps from both the inhaler and the spacer.
2. Shake the inhaler well.
3. Insert the mouthpiece of the metered dose inhaler into the back of the spacer.
4. Insert the mouthpiece of the spacer into the mouth and close the lips around the mouthpiece. Avoid covering any small exhalation holes.
5. Press down on the vial of the metered dose inhaler to spray the drug into the spacer.
6. Immediately take a slow deep breath for 5 - 10 seconds. Do not breathe in too hard.
7. Repeat steps 4 - 6 for each puff prescribed, waiting at least 30 seconds between puffs.
For children:
1. Allow to breathe slowly in and out of the spacer continuously for 30 seconds.
2. While still breathing, spray the drug from the inhaler into the spacer.
3. Continue breathing for 3 - 4 breaths.
4. If breathing is through the nose, pinch the nose gently while breathing from the spacer.

With a spacer and mask for infants and small children:
1. Remove the caps from both the inhaler and the spacer.
2. Shake the inhaler well.
3. Infants may be placed on the care-giver’s lap or laid on a bed while administering the medication.
4. Apply the mask to the face ensuring that the mouth and nose are well covered.
5. With the mask held firmly on to the face, press down on the vial of the metered dose inhaler to spray the drug into the spacer.
6. Keep the mask in place for at least 6 breaths, then remove.
7. Repeat steps 4 - 6 for each puff prescribed, waiting at least 30 seconds between puffs.

Note:
- The patient or care-giver should demonstrate steps 2 - 6 of the relevant method described above more than once to ensure the correct technique.
- Education requires time and patience, but correct inhaler technique is vital to successful inhaler therapy.
Targets of control

✧ Patients should be symptom-free:
  - Not coughing at night.
  - Attend every school-day.
  - Participate in physical activity, e.g. playing and sport.
✧ Normal growth and development as per growth chart.
✧ Absence of breathlessness, muscle retraction or wheeze.
  PEF must be within 10% of predicted PEF.

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**ALL FOLLOW-UP VISITS AT PRIMARY LEVEL**

✧ Evaluate coping with asthma, adherence and self-care.
✧ Review management plan.
✧ Deal with pertinent problems, e.g. signs, symptoms and complications.
✧ Physical exam as for initial visit and peak flow measurement.

Schedule clinic visits **every three months** when controlled.

✧ Peak expiratory flow (PEF) less than 60% of predicted or best.
✧ Cannot complete sentence in one breath, talks in words.
✧ Pulse rate more than 110 beats/min.
✧ Abnormal respiratory rate.
✧ Difficulty with feeding.

**Please note:**  **Normal respiratory rate:**

- 1 - 5 years  < 40/min
- 6 - 8 years  < 30/min

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ASSESS SEVERITY

AT HOME:

✧ β₂ agonist: 2 puffs of salbutamol, using spacer, immediately. Repeat once after 20 - 30 minutes if needed (maximum two puffs at any one time).
✧ If no response after 2 doses (i.e. 2 x 2 puffs) take child to nearest health-care facility.

AT HEALTH-CARE FACILITY:

✧ Nebulise with β₂ agonist and O₂ over 3 minutes.
  0,03 ml/kg of a 0,5% salbutamol solution in 2 - 3 ml of 0,9% sodium chloride. Repeat every 20 minutes in first hour if no relief.
✧ 0,025% ipratropium bromide solution
  0,5 - 1 ml can be mixed with previous solution. May be repeated 4-hourly.
✧ Use metered dose inhaler with spacer if nebuliser is not available - 1 puff every 30 seconds (max. 8 puffs).
✧ Oral prednisone 1 - 2 mg/kg stat (once only).
✧ Hydrocortisone sodium succinate IV,
  1 - 2 mg/kg given as an immediate dose via IV line if oral prednisone cannot be taken or is not effective.
✧ Avoid sedation of any kind.
✧ Maintain oral hydration if possible, otherwise commence IV therapy using 5% dextrose in water.
✧ If poor response, refer.
IMMEDIATE REFERRAL TO NEAREST HOSPITAL

✧ PEFR of less than 33% of the predicted normal or best value, 15 - 30 minutes after nebulisation.
✧ Any life-threatening features, e.g. extreme tachycardia, drowsy, confused, absent, wheeze, cyanosis, collapse.

Administer nasal oxygen (1 L/min.) to all referred patients.
Annexure A

EXAMPLE
ASSESSMENT FORM

HISTORY

Patient's name: ...........................................................................................................
Age:............................................................................................................................

WHEEZING
Age onset:...................................................................................................................
Episode onset:..............................................................................................................
Frequency: early on:....................................................................................................
Frequency: lately:....................................................................................................... 
Length of attacks:....................................................................................................... 
Time of attacks:.......................................................................................................... 
Severity of attacks:.....................................................................................................
Perennial/seasonal:.....................................................................................................
Normal between attacks:............................................................................................

DRUGS
What:...........................................................................................................................
When:............................................................................................................................
Effectiveness:..............................................................................................................

Hospital admission(s):................................................................................................

Other allergies, i.e. hay fever, eczema:........................................................................

Last attack:...................................................................................................................

PRECIPITANTS
Infection:............................................. Hot/cold drink/food:...........................................
Weather:............................................. Milk:.................................................................
Emotion:............................................. Eggs.................................................................
Exercise:............................................. Animals:........................................................
Indoor air pollution (open fires):..................................... Worms:........................................
Cigarette smoking:.................................. Other:.........................................................

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FAMILY HISTORY
Asthma: ......................................................................................................................
Other allergies: .............................................................................................................

SOCIAL HISTORY
Parents’ job: ..................................................................................................................
Assessment of parents: ..................................................................................................
Siblings: ..........................................................................................................................
Housing: ..........................................................................................................................
Domestic stress: .............................................................................................................
Smoking: ....................................................................................................................... 
School progress: .........................................................................................................

FACTORS AFFECTING CLINICAL ATTENDANCE
Money
Public holidays
School attendance
Political unrest

EXAMINATION
Date: .............................................................................................................................
Weight: ..........................................................................................................................
Height: ........................................................................................................................... 
ENT: ................................................................................................................................
Chest: ...........................................................................................................................
Deformity: ....................................................................................................................
Expansion: ...................................................................................................................
Auscultation: .................................................................................................................
Chest X-ray: Date: .........................................................................................................
Other: ............................................................................................................................

Annexure B

- EXAMPLES OF ASTHMA TRIGGERS

- The term ‘food intolerance’ is used to denote reactions to food which do not involve a known immune mechanism.

- Sulphites

  Sulphur dioxide and other sulphites are inexpensive preservatives, very effective, and widely used. They are both antioxidants which prevent browning of fresh fruits and preservatives with a broad spectrum antimicrobial action as used in soft drinks, wine and maize milling. Sulphite preservatives are listed below:

<table>
<thead>
<tr>
<th>Sulphite preservatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur dioxide</td>
</tr>
<tr>
<td>Sodium sulphite</td>
</tr>
<tr>
<td>Sodium bisulphite</td>
</tr>
</tbody>
</table>

  Many foodstuffs may contain sulphite preservatives. The most common are soft drinks, dried fruits, cold meats, wine and beer. Some restaurants may keep their salads fresh with a sulphite preservative.
Possible sources of sulphite in food products

<table>
<thead>
<tr>
<th>Food category</th>
<th>Type of food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beverages</td>
<td>Soft drinks, fruit juices, grape juice (esp. citrus drinks)</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td>Wine, beer, cocktail mixes</td>
</tr>
<tr>
<td>Condiments</td>
<td>Wine, vinegar, pickles, salad dressings</td>
</tr>
<tr>
<td>Confections</td>
<td>Molasses</td>
</tr>
<tr>
<td>Dips</td>
<td>Avocado and others</td>
</tr>
<tr>
<td>Fish</td>
<td>Canned or fresh shrimps, shellfish</td>
</tr>
<tr>
<td>Fresh fruit/vegetables</td>
<td>Grapes, fresh pre-cut potatoes</td>
</tr>
<tr>
<td>Gravies</td>
<td>Gravies, sauces</td>
</tr>
<tr>
<td>Processed fruit</td>
<td>Dried fruit, fruit juice concentrates, purees</td>
</tr>
<tr>
<td>Processed vegetables</td>
<td>Instant mashed potatoes, restaurant salad bars, dried vegetables, canned or pickled vegetables, salad dressings</td>
</tr>
<tr>
<td>Processed meats</td>
<td>Sausage (boerewors), cold meats</td>
</tr>
<tr>
<td>Puddings</td>
<td>Fruit fillings, gelatin</td>
</tr>
<tr>
<td>Grain products</td>
<td>Cornstarch, gravies, noodle/rice mixtures</td>
</tr>
<tr>
<td>Jams, jellies</td>
<td>Jams, jellies</td>
</tr>
<tr>
<td>Snack foods</td>
<td>Dried fruit snacks</td>
</tr>
<tr>
<td>Soups</td>
<td>Dried or canned soups</td>
</tr>
<tr>
<td>Sweet sauces/syrups</td>
<td>Molasses, pancake syrup, corn or maple syrup</td>
</tr>
</tbody>
</table>
### Annexure C

**EXAMPLE**

**ASTHMA MANAGEMENT CHART**

**Type of asthma:**

**Investigations**

<table>
<thead>
<tr>
<th>HISTORY</th>
<th>DATE</th>
<th>DATE</th>
<th>DATE</th>
<th>DATE</th>
<th>DATE</th>
</tr>
</thead>
</table>

**SYMPTOMS**

- Date of last attack:
- Number of attacks for the last month:
- Severity of attacks:
- Response to treatment:
- Underlying precipitating events:
- Nocturnal cough:
- Exercise tolerance:
- School absenteeism:
- Length of attacks:

**TREATMENT INSTITUTED**

- Bronchodilators:
- $\beta_2$ Agonist:
- Other:
- Anti-inflammatory:
- Steroid:
- Other:
- Antihistamine:
- Compliance:
- Side effects:

**PULMONARY FUNCTIONS**

- **PEFR**
  - pre:
  - post:
- Other:

**Clinical conclusion:**

**Intermittent/Persistent:**

**EXAMINATION:**

- Allergies:
  - Rhinitis
  - Conjunctivitis
  - Eczema
  - Asthma
  - Acute attack
  - Recovery
  - Stable

**Change of Rx:**

**Control:**

**Intervention required:**

**Return date:**

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