NATIONAL GUIDELINE ON MANAGEMENT AND CONTROL OF ASTHMA IN CHILDREN AT PRIMARY LEVEL

INTRO-DUCTION

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 ≤ 18 years).
Health professionals.
Families/friends of patients.

Secondary target:
School personnel.

SCOPE OF THE GUIDELINE

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).***

DIAGNOSIS OF ASTHMA

1 Lung function:

- Measure the peak expiratory flow rate (PEFR) before and after the administration of the $ß_2$-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-

SUPPORTIVE FEATURES FOR DIAGNOSIS

ing measurement on rising to measurement 12 hours later in patients taking a bronchodilator (more than 10% in patients who are not taking a bronchodilator), or

- PEF decreases more than 15% after 6 minutes of running.

Patient to do free running for 6 minutes as fast as possible (for example around clinic), sit quietly for 5 minutes and then measure peak expiratory flow again.

2 Clinical (Annexure A):

INITIAL VISIT		
HISTORY	**PHYSICAL EXAM**	**SPECIAL TESTS**
✧ 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 ✧Exercise challenge (6 minutes of running as mentioned previously)

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.

FREQUENCY OF ATTACKS OF COUGH AND/OR WHEEZE	NIGHT TIME COUGH AND/ OR WHEEZE	PRIOR ADMISSION TO HOSPITAL FOR ASTHMA	PEFR% PREDICTED
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 (less than 1/week)	1 previous admission	60% - 80%
MILD (intermittent)			
Not more than 1/month	No	No	more than 80%

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

	Persistent	
		3 STEPPING DOWN
		Review treatment need every 3 months.
		Stop regular anti-inflammatory therapy after 6 to 12 months if few or no symptoms.
		If symptoms are seasonal, consider stopping anti-inflammatory treatment at end of season.
	2 REGULAR INHALED ANTI-INFLAMMATORY THERAPY	
	Intermittent $ß_2$ agonists 100 micrograms salbutamol twice a day (maximum)	
	and	
	Low dosage steroid inhalations (maintenance dose)	
	e.g. beclomethasone 100 micrograms twice a day (maximum)	
	A doubled maintenance dose may be required for 1 - 2 weeks initially until control is achieved	
	Monitor PEFR	
	If not controlled, **refer**.	
Intermittent		
1 OCCASIONAL USE OF RELIEF BRONCHODILATORS		
Short-acting inhaled $ß_2$ agonists for symptom relief		
100 - 200 micrograms salbutamol daily depending on age **(Not more than once daily with a maximum of 3 times a week)**		
Ensure patient is taking therapy and has appropriate inhaler technique.		
If not controlled introduce step 2.		

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 mouth-piece.
- ✧ 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 administrating 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 mouth-piece. 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.
  PEFR must be within 10% of predicted PEF.

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.

ACUTE ASTHMA: CRITERIA FOR DIAGNOSIS

- ✧ 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

EMERGENCY MANAGEMENT OF ACUTE ATTACK OF ASTHMA

ASSESS SEVERITY

AT HOME:

- ß$_2$ 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 ß$_2$ agonist and O_2 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:.....
Weather:.....
Emotion:.....
Exercise:.....
Indoor air pollution
(open fires):.....
Cigarette smoking:.....
Hot/cold drink/food:.....
Milk:.....
Eggs:.....
Animals:.....
Worms:.....
Other:.....

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:

Sulphite preservatives	
Sulphur dioxide	Potassium bisulphite
Sodium sulphite	Sodium metabisulphite
Sodium bisulphite	Potassium metabisulphite

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

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

Annexure C

EXAMPLE
ASTHMA MANAGEMENT CHART

Type of asthma:
Investigations

HISTORY	DATE	DATE	DATE	DATE	DATE
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:					
$ß_2$ 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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