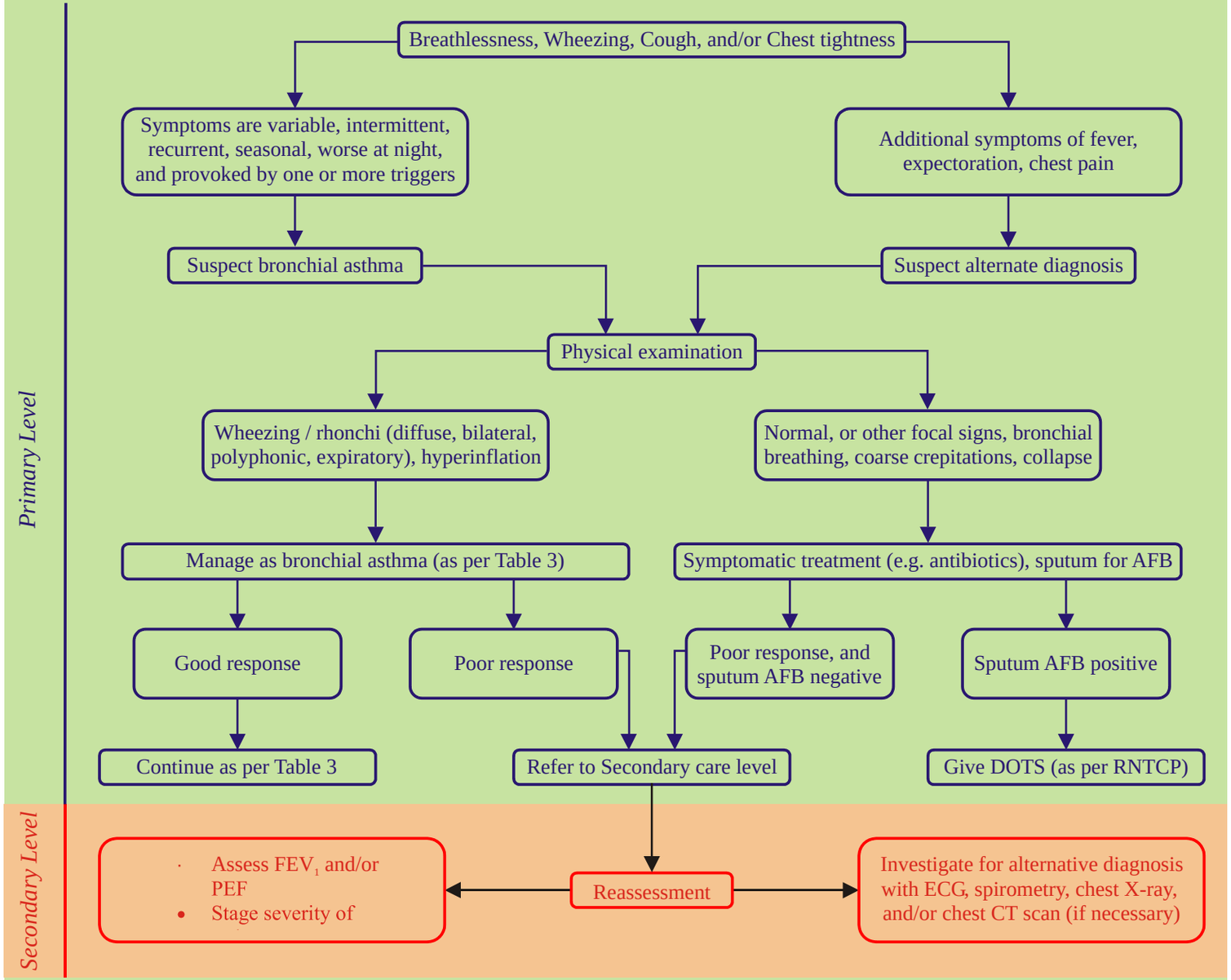
Fig 1. Algorithm for diagnosis and management of bronchial asthma at primary and secondary levels of health care



Note: In children, noisy breathing is an additional important symptom to look for at initial assessment. Physicians must enquire into additional symptoms such as diarrhea, failure to thrive, etc., and find out if symptoms are present since birth. In children, these may be important clues to alternative diagnosis such as foreign body aspiration, congenital cardiopulmonary disorders, or parasitic infestations.

AFB Acid-fast bacilli, *DOTS* Directly-observed therapy (short course), *ECG* Electrocardiogram, *FEV_1* Forced expiratory volume in first second, *PEF* Peak expiratory flow, *RNTCP* Revised National Tuberculosis Control Programme

Guidelines for Management of Bronchial Asthma in India at Primary and Secondary Levels of Health Care

Developed under the WHO-GOI Biennium (2004-05) at the Consensus Workshop (February 2005) held at the Postgraduate Institute of Medical Education and Research, Chandigarh, with participation of experts from Medical Institutes, State Health Services, and General Practitioners, besides representatives from Indian Council of Medical Research, Indian Chest Society, National College of Chest Physicians and American College of Chest Physicians (India)

Programme Convenor

Dr. S. K. Jindal
Professor and Head
Department of Pulmonary Medicine
Postgraduate Institute of Medical Education and Research
Chandigarh

INTRODUCTION

Asthma is a common clinical problem encountered at all levels of health care. The prevalence rates are variable depending upon the definition and methodology employed. Population prevalence in adults is at least 2.5 percent or more. In children, the prevalence is likely to be higher, exceeding 5 percent. Both men and women are almost equally affected.

Asthma can be defined as a chronic inflammatory disorder of the airways, characterized by recurrent episodes of wheezing, breathlessness, chest tightness and cough that is often reversible, either spontaneously or with treatment. Different terms such as *allergic* or *asthmatic bronchitis*, *wheezy bronchitis*, *intrinsic and extrinsic asthma* are frequently employed in clinical practice.

PATHOGENESIS AND PATHOPHYSIOLOGY

The hallmark of pathological changes in asthma is chronic inflammation of the airways. In addition, there is hyper-responsiveness and imbalance of the autonomic neural control of the airways resulting in bronchospasm. There is swelling and oedema of the airway mucosa, and bronchial hyper-secretion. All these factors together cause narrowing of the lumina of the airways, leading to symptoms of asthma. The current pharmacotherapy is quite effective in controlling these phenomena.

NATURAL HISTORY

Asthma commonly begins in childhood and early youth, but may also start later in life at any age. Contrary to common belief, children do not necessarily 'grow out of asthma'. Almost two third of the asthmatic children continue to have symptoms in puberty/adulthood. About 5-10% children with 'mild' asthma may go on to develop severe asthma later in life.

Some patients, especially those whose asthma remains poorly controlled, may develop more permanent changes due to 'airway remodeling'. This may cause relative irreversibility and persistence of symptoms.

PREDISPOSING AND RISK FACTORS

Exact cause of asthma is not known. Both environmental and genetic factors are important. A family history of asthma or atopy (allergy), presence of other atopic manifestations (e.g. allergic rhinitis, skin allergies) and airway hyper-responsiveness predispose an individual to develop asthma. However, asthma can develop in the absence of family history. Environmental exposures to both indoor and outdoor allergens, air pollution and occupational allergens may also predispose to the development of asthma. Respiratory tract infections, environmental exposures, certain drugs and chemicals known to precipitate acute attacks are important triggers of asthma (Box 1). Food is normally not a trigger unless it is specifically proved to be so in an individual. Most patients may have more than one trigger.

Box 1. Important asthma triggers

- Respiratory infections, usually viral
- Allergens (Indoor/Outdoor)
- Air pollution (Indoor/Outdoor) including smoke and fumes (biomass fuel)
- Tobacco smoke (both active and passive)
- Drugs: beta-blockers and NSAIDs
- Food additives and preservatives

DIAGNOSIS

Diagnosis of asthma is a two-step approach. The first step is to suspect, and the second to confirm the diagnosis. Laboratory investigations are important to exclude alternate diagnoses. Documentation of reversibility and/or variability of forced expiratory volume in first second (FEV_1) on spirometry or peak expiratory flow (PEF) are important to diagnose asthma and differentiate it from chronic obstructive pulmonary disease. It is advisable to follow an algorithmic approach whenever an individual presents with respiratory symptoms (Fig 1, see overleaf).

ASSESSMENT OF SEVERITY

Once the diagnosis of asthma is made, it is important to stage the disease based on its severity. For purposes of management, asthma can be categorized as mild, moderate and severe (Table 1) depending upon the clinical symptoms, limitation of usual (or accustomed) activities, use of rescue drugs and spirometric parameters (whenever available). In the absence of spirometry, PEF measured with the help of a PEF meter can be used as the supportive evidence.

Table 1. Staging of asthma

	Mild	Moderate	Severe
Symptoms disturbing sleep	< once per week	> once per week	Daily
Daytime symptoms	< Daily	Daily	Daily
Limitation of accustomed activities	Nil	Some limitation	Severe limitation
Use of rescue medication *	<1 dose per day	1-2 doses per day	>2 doses per day
FEV1 or peak expiratory flow	Normal	60-80%	<60%

* Each rescue medication dose=200µg inhaled salbutamol=500 µg terbutaline = 2 mg oral salbutamol = 2.5 mg oral terbutaline. Use half dose units for children

MANAGEMENT

It is important to effectively manage asthma to help an individual live a normal life, and avoid acute exacerbations as well as long-term complications. The important currently available anti-asthma drugs can be classified as controllers (required for maintenance treatment) and relievers (required for quick relief, rescue drugs) (Box 2). Inhaled corticosteroids constitute the cornerstone of maintenance therapy (Table 2).

Box 2. Asthma medications

- Controllers (Prophylactic, Preventive, Maintenance)
  - Taken daily to keep asthma under control
  - Steroids, Long-acting beta-2 agonists, Sustained-release theophyllines, Leukotriene receptor antagonists, and Cromones
- Relievers (Quick relief, Rescue)
  - Rapid-acting drugs that relieve bronchoconstriction
  - Short-acting beta-2 agonists, anticholinergics, theophyllines, short-course oral steroids

Table 2. Equivalent doses of inhaled corticosteroids (in µg)

	Low dose		Medium dose		High dose	
	Adult	Child	Adult	Child	Adult	Child
Beclomethasone	200-400	100-200	400-1000	200-400	>1000	>400
Budesonide	200-400	100-200	400-800	200-400	>800	>400
Fluticasone	125-250	50-125	250-500	125-250	>500	>250

The recommendations for use of drugs vary depending upon the stage of asthma (Table 3). Mild asthma can be further divided into intermittent (symptoms for less than two days per week) and persistent (symptoms for more than two days per week) categories, and treatment given accordingly. Systemic corticosteroids on long term basis must be avoided. A short course of upto two weeks (0.5 mg/kg/day) is however often valuable for managing acute severe asthma (Table 4).

Table 3. Management of asthma in adults and children

Stage	Preferred choice	Alternative choice
Mild[a]	Low-dose ICS ± LABA	Theophylline /Cromone
Moderate	Medium dose ICS + LABA and/ or LTRA	-Medium dose ICS + LTRA / theophylline - High-dose ICS
Severe	High-dose ICS + LABA, LTRA, theophylline and/or oral steroids at the lowest dose	Oral steroids at the lowest dose to control symptoms (alternate day if possible) + therapy as above

In addition to daily controller therapy, reliever medications on as needed basis may be taken in all stages
Asthma control requires frequent stepping up or down of therapy
ICS = Inhaled corticosteroid, LABA = Inhaled Long-acting beta agonist, LTRA = oral Leukotriene-receptor antagonist[a] Patients with intermittent or seasonal symptoms can be managed with only reliever medications taken on an as-needed basis.

Table 4. Management of acute severe asthma

Hour 1: 4 doses of inhaled salbutamol ± ipratropium, 100 mg hydrocortisone (IV) or oral prednisolone 60 mg, oxygen, hydration

Hour 2: 4 more doses of inhaled salbutamol with ipratropium, IV aminophylline, subcutaneous terbutaline/adrenaline 0.3-0.5 mg (0.01 mg/kg for children) for 3 doses.

-Acute severe asthma not responding within 2 hours of treatment, or deteriorating:
REFER IMMEDIATELY
Expectorants and mucokinetic drugs do not have any significant role

Other important guidelines regarding use of drugs are listed in Box 3. It is important to remember that a patient may require referral to a secondary/tertiary care level centre earlier than later, immediately after initial control (Box 4)

Box 3. General principles of pharmacotherapy in patients with bronchial asthma

- Inhaled drugs should preferably be given using metered dose inhaler with spacer
- Proper inhalation technique is most essential for optimal results
- Long acting beta-agonists (LABA) should always be combined with ICS
- Short acting beta-agonists (SABA) should be used only as reliever medication
- Methylxanthines can be used as an alternative to inhaled steroids only in mild disease, or in acute severe asthma when standard treatment is not effective
- Anticholinergic drugs provide additive effect to SABA aerosol in exacerbations
- Systemic glucocorticoids are important only in the treatment of exacerbations of asthma

Box 4. Indications for referral

- Diagnosis unclear or in doubt
- Atypical signs or symptoms (see Fig 1)
- Failure to respond to treatment over one month
- Other conditions complicating asthma or its diagnosis, necessitating additional work-up
- Severe persistent asthma
- Life threatening asthma (cyanosis, mental obtundation)

Besides treatment with drugs, asthma control requires avoidance of triggers (Box 1). Since asthma is a life long problem, it is crucial that the patient and the family are educated about the disease and its management for a normal and healthy life.