I. INTRODUCTION
I. INTRODUCTION

Asthma is a **chronic inflammatory disorder** of the airways associated with widespread but variable airflow obstruction. This obstruction is often reversible, either spontaneously or with treatment.

The **clinical presentation of asthma is not uniform** and reflects the many factors involved in the development and course of asthma. Many patients have **episodic symptoms** and known triggers, while many others present a different picture.

In ‘typical’ cases the diagnosis will be obvious from the clinical history but in many others **establishing the diagnosis objectively** relies on demonstrating variability of the airflow obstruction.

There are certain conditions that frequently accompany asthma and also serve to exacerbate asthma symptoms. These **co-morbid problems**, need to be recognised and properly treated if the patient is to achieve proper control of his disease. Some of these problems include:

- Allergic rhinitis
- Sinusitis
- Gastroesophageal reflux

The key to effective asthma management is the education of patients and/or parents about the disease.
II. DIAGNOSIS OF ASTHMA AND DIFFERENTIAL DIAGNOSES
DIAGNOSIS OF ASTHMA AND DIFFERENTIAL DIAGNOSES

Consider the diagnosis in the following situations:

- History of any of the following:
  - Cough, worse particularly at nights
  - Cough, wheeze or tight chest after exercise
  - Recurrent wheezing
  - Recurrent chest tightness
- Symptoms occur or worsen at nights, awakening patient.
- Symptoms occur or worsen on exposure to
  - Smoke
  - Viral Infection
  - Pollen
  - Changes in temperature
  - Aerosol chemicals
  - Animals with fur
  - Domestic dust (in mattresses, pillows, upholstered furniture, carpets)
  - Strong emotional expression (laughing or crying)
  - Physical exercise
- Colds repeatedly 'go to the chest', take more than 10 days to clear up, or improves when asthma medication is given.
- Reversible and variable airflow limitation – as measured with a spirometer or peak flow meter:
  - PEF increases more than 15% 20 minutes after inhalation of a short acting $\beta_2$-agonist, e.g. salbutamol
  - PEF varies more than 20% from morning to evening
  - PEF varies more than 15% after 6 minutes of running or exercise.

- If the above features are recurrent and patient responds to asthma treatment, then it is likely that the patient is asthmatic.

**DIFFERENTIAL DIAGNOSES**

**Adults**
- COPD
- Bronchitis
- Laryngeal dysfunction
- Localised airway obstruction
- Extrinsic compression (tumours, aortic loops)
- Heart failure
- Allergic bronchopulmonary aspergillosis
- Vocal cord paralysis

**Children**
- Bronchitis/bronchiolitis
- Foreign bodies
- Laryngomalacia and bronchomalacia
- Functional laryngeal dysfunction (psychogenic)
- Heart failure
- Bronchopulmonary dysplasia
- Cystic fibrosis

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<th>PROTOCOL: DIAGNOSIS OF ASTHMA AND DIFFERENTIAL DIAGNOSES</th>
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<td>Date Revised:</td>
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<td>Approved by:</td>
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III. CLASSIFICATION OF ASTHMA SEVERITY
# CLASSIFICATION OF ASTHMA SEVERITY*

**Clinical Features Before Treatment**
(One of the features of severity is sufficient to place a patient in that category)

<table>
<thead>
<tr>
<th>Asthma Severity</th>
<th>Symptoms</th>
<th>Night-time Symptoms</th>
<th>PEF or FEV₁</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 4</strong> Severe Persistent</td>
<td>Continuous Limited physical activity</td>
<td>Frequent</td>
<td>&lt;60% predicted Variability &gt;30%</td>
</tr>
<tr>
<td><strong>Step 3</strong> Moderate Persistent</td>
<td>Daily Use β₂-agonist daily Attacks affect activity</td>
<td>&gt;once/week</td>
<td>&gt;60% to 80% predicted Variability &gt;30%</td>
</tr>
<tr>
<td><strong>Step 2</strong> Mild Persistent</td>
<td>&gt;once/week but &lt;once/day</td>
<td>&gt;2 times/month</td>
<td>&gt;80% predicted Variability 20 to 30%</td>
</tr>
<tr>
<td><strong>Step 1</strong> Intermittent</td>
<td>&lt;once/week Asymptomatic and normal lung function between attacks.</td>
<td>&lt;2 times/month</td>
<td>&gt;80% predicted Variability &lt;20%</td>
</tr>
</tbody>
</table>

*Adapted from the Caribbean Guidelines for Asthma Management and Prevention

Patients with mild or moderate asthma may be managed at a health center but severe asthma should be managed at hospital.

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PROTOCOL: CLASSIFICATION OF ASTHMA SEVERITY

<table>
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<th>Date Revised:</th>
<th>Distribution to Types III, IV and V health centres and to all hospitals</th>
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Approved by: Director, Family Health Services
Protocol for the Management of Asthma

IV. HIGH RISK PATIENTS
HIGH RISK PATIENTS

The following list is not to be considered all inclusive. Each patient should be assessed individually (especially those patients with many chronic medical disorders);

- Patients with severe persistent asthma who are maintained on oral steroids
- Patients with serious cardiac problems
- Patients who were recently hospitalized for acute exacerbation of asthma
- Patients who have previously been admitted to the ICU for control of asthma
- Patients with associated chronic or acute pulmonary problems
- Patients with multiple chronic medical problems

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V. Severity of Asthma Attacks Charts
SEVERITY OF ASTHMA ATTACKS

<table>
<thead>
<tr>
<th>Parameter*</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Respiratory Arrest Imminent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing</td>
<td>Walking</td>
<td>Talking</td>
<td>At rest</td>
<td>Infant–stops feeding</td>
</tr>
<tr>
<td></td>
<td>Can lie down</td>
<td>Infant–softer shorter cry, difficulty feeding</td>
<td>Infant–soft cry</td>
<td>Hunched forward</td>
</tr>
<tr>
<td>Talks in</td>
<td>Sentences</td>
<td>Phrases</td>
<td>Words</td>
<td></td>
</tr>
<tr>
<td>Ability to cry</td>
<td>Good cry</td>
<td>Soft cry</td>
<td>Groaning</td>
<td></td>
</tr>
<tr>
<td>Alertness</td>
<td>May be agitated</td>
<td>Usually agitated</td>
<td>Usually agitated</td>
<td>Drowsy or confused</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Increased</td>
<td>Increased</td>
<td>Often &gt;30/min(adults)</td>
<td></td>
</tr>
</tbody>
</table>

Guide to rates of breathing associated with respiratory distress in awake children:

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 months</td>
<td>&lt;60/min</td>
</tr>
<tr>
<td>2–12 months</td>
<td>&lt;50/min</td>
</tr>
<tr>
<td>1–5 years</td>
<td>&lt;40/min</td>
</tr>
<tr>
<td>6–8 years</td>
<td>&lt;30/min</td>
</tr>
</tbody>
</table>

Guide to Limits of pulse rates in infants and children:

<table>
<thead>
<tr>
<th>AGE</th>
<th>NORMAL RATE</th>
<th>BRADYCARDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants</td>
<td>2–12 months</td>
<td>&lt;160/min</td>
</tr>
<tr>
<td>Preschool</td>
<td>1–2 years</td>
<td>&lt;120/min</td>
</tr>
<tr>
<td>School age</td>
<td>3–8 years</td>
<td>&lt;110/min</td>
</tr>
</tbody>
</table>

Pulsus paradoxus

| Absent | May be present | Often present | Absence suggests Respiratory muscle fatigue |

PEF after initial bronchodilator

| % predicted or % personal best | Over 80% | Approximately 60–80% | <60% predicted or personal best 100 L/min (adults) or response lasts <2 hours |

PaO₂% (on air)

| > 95% | 91–95% | < 90% |

PaO₂ (on air) And/or

| >60 mmHg | <60 mmHg |

PaCO₂

| <45 mmHg | >45 mmHg: Possible respiratory failure |

Hypercapnia (hypoventilation) develops more readily in young children than in adults and adolescent.

*Note: The presence of several parameters, but not necessarily all, indicate the general classification of the attack.

PROTOCOL: SEVERITY OF ASTHMA ATTACKS

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VI. Predicted Average Peak Flow Values
These tables are only a guideline. It is recommended that a patient's personal best be used as a baseline reading. Personal best is the maximum peak flow rate that patients can attain when their asthma is considered to be under control.

**PREDICTED AVERAGE PEAK EXPIRATORY FLOW (L/min)**

### Normal Males*  

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>152</th>
<th>165</th>
<th>178</th>
<th>191</th>
<th>203</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>554</td>
<td>575</td>
<td>594</td>
<td>611</td>
<td>626</td>
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<tr>
<td>25</td>
<td>580</td>
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<td>622</td>
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<td>75</td>
<td>496</td>
<td>515</td>
<td>532</td>
<td>547</td>
<td>560</td>
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### Normal Females*  

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>140</th>
<th>152</th>
<th>165</th>
<th>178</th>
<th>191</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>444</td>
<td>460</td>
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<td>455</td>
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<td>404</td>
<td>416</td>
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<td>436</td>
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<td>75</td>
<td>377</td>
<td>391</td>
<td>402</td>
<td>413</td>
<td>422</td>
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</table>

### Normal Children and Adolescents*  

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>Males &amp; Females</th>
<th>Height (cm)</th>
<th>Males &amp; Females</th>
<th>Height (cm)</th>
<th>Males &amp; Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>109</td>
<td>147</td>
<td>130</td>
<td>254</td>
<td>150</td>
<td>360</td>
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<td>112</td>
<td>160</td>
<td>132</td>
<td>267</td>
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<td>373</td>
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<tr>
<td>114</td>
<td>173</td>
<td>135</td>
<td>280</td>
<td>155</td>
<td>387</td>
</tr>
<tr>
<td>117</td>
<td>187</td>
<td>137</td>
<td>293</td>
<td>157</td>
<td>400</td>
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<tr>
<td>119</td>
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<td>124</td>
<td>227</td>
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<td>165</td>
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<td>127</td>
<td>240</td>
<td>147</td>
<td>347</td>
<td>168</td>
<td>454</td>
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VII. Management of Mild to Moderate Acute Exacerbation (in young children)
MANAGEMENT OF MILD/MODERATE ACUTE EXACERATION IN YOUNG CHILDREN
(Under 5 Years)

**NOTE CAREFULLY:** Patients with SEVERE OR LIFE THREATENING ASTHMA should be managed in a hospital-based setting (e.g. casualty department/A&E), where support staff for close monitoring and resuscitation can be provided.

A) COMMUNITY/PRIMARY CARE SETTING

**If features of mild/moderate episode exist**

$b_{2}$-agonist therapy; up to 10 puffs by metered dose inhaler (MDI) with a spacer device (+/- face mask) at 1 puff every 15–30 secs. or by nebuliser 0.02 mls/kg of salbutamol solution (5 mg/ml) in 2 mls. N/saline 3–4 hourly.

**Responds favourably:**
- Resp. rate reduced
- Reduced use of accessory muscles

**Unresponsive or relapse within 3–4 hours**
- Increase frequency of $b_{2}$-agonist; Repeat every 20–30 mins, for on signs of worsening cardiac status closely and monitor dose of inhaled steroids if patient was on it before. If $b_{2}$-agonist still required 3-4 hourly after 12+ hours, start a short course of prednisone for 1–3 days.

Patients 1-5 years: 1–2 mg/kg/day (max 20 mg)

Patients >5 years: 1 mg/kg/day (max 20 mg)

Start after oral prednisone.

**Oxygen therapy to maintain O$_{2}$ Sat. >95% (4-6 L/min)**

Transfer to hospital

## Protocol Details

<table>
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<tr>
<th>Date Revised:</th>
<th>Distribution to all types III, IV and V health centres and all hospitals</th>
<th>Index: VII</th>
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Approved by: Director, Family Health Services
VIII. Management of mild to Moderate Acute Exacerbation
(in older children and Adults)
MANAGEMENT OF MILD/MODERATE ACUTE EXACERBATION IN OLDER CHILDREN AND ADULTS

NOTE CAREFULLY: Patients with SEVERE OR LIFE THREATENING ASTHMA should be managed in a hospital-based setting (e.g. casualty dept./A&E), where support staff for resuscitation and close monitoring can be provided.

COMMUNITY/PRIMARY CARE SETTING

If Features of mild/moderate episode

Initial Treatment

Short-acting \( \beta_2 \)-agonist; by metered dose inhaler (up to 10 puffs) or 1 ml salbutamol in 2-3 mls N/saline by nebuliser.

Oxygen to achieve \( O_2 \) saturation >90%.

Systemic corticosteroids if no immediate response or patient recently took steroid tablets.

SEDATION is contraindicated
Repeat Assessment

(Physical Exam., PEF, \(O_2\) saturation, other tests as needed)

Moderate episode

- PEF 60–80% predicted/personal best
- Physical exam: moderate symptoms
  
  Mix 1 ml salbutamol with 0.25 mg ipratropium bromide and 1–2 mls N/saline via nebuliser repeat every 20-30 mins as needed.

  Consider corticosteroids

  Continue treatment 1–3 hours provided there is improvement.

Good response

- Response sustained 60 mins after last treatment
- Physical exam: normal
- PEF>70%
- No distress
- \(O_2\) saturation >90%

Poor response or relapse within 1-2 hours

- Increase frequency of \(b_2\)-agonist to every 30 mins. or continuously if necessary.
- Add 0.25 mg ipratropium bromide to nebuliser solution.
- Oxygen to maintain \(O_2\) sat >90% (4–6 L/min)

Discharge Home

- Continue treatment with inhaled \(b_2\)-agonist
- Consider doubling maintenance dose of inhaled steroid if patient was on it before.
- Consider a short course of prednisone for 1–3 days

Patient education:
- Take medication properly
- Review action plan
- Close medical follow-up.

Transfer to Hospital

Discharge Home
IX. Management of Acute Severe Asthma in Children Under 5 Years Old
MANAGEMENT OF ACUTE SEVERE ASTHMA
IN CHILDREN UNDER 5 YEARS OLD

REMEMBER: In pre-school children there are other important causes of breathlessness and wheeze.

If you think a child has severe asthma, give $b_2$-agonist at once

RECOGNITION OF ACUTE SEVERE ASTHMA

- Too breathless to talk
- Too breathless to feed
- Respiration >50 breaths/min
- Pulse >140 beats/min
- Use of accessory muscles of breathing

Life Threatening Features

- Cyanosis, silent chest or poor respiratory effort
- Fatigue or exhaustion
- Agitation or reduced level of consciousness

CAUTION: Children with severe attacks may not appear distressed; assessment in the very young may be difficult. Be alert to any of the above features.

1. IMMEDIATE TREATMENT

- High flow oxygen via face mask (4–6L/min)
- Salbutamol (5 mg/ml) 0.02 ml/kg, max 0.5 ml via nebuliser or up to 10 puffs of MDI by a spacer device.
- Pulse oximetry is helpful; maintain $\text{Sa}_2 >95\%$.
- Prednisone 1–2 mg/kg/day (max. 20 mg)

If Bronchodilator Response is Poor:

- Give IV aminophylline 5 mg/kg over 20 mins followed by maintenance infusion of 1 mg/kg/hr; omit the loading dose if child already received oral theophylline.
- Give IV hydrocortisone 100 mg q6hrly.
- Add ipratropium 0.125 mg to nebulised $b_2$-agonist.

Criteria for Hospital Admission:
• Any life threatening features
• Any features of acute severe asthma after initial management.
• Lower threshold for admission if patient had recent admission, previous severe attacks or there is concern over social circumstances.

2. SUBSEQUENT MANAGEMENT

If The Patient Is Improving Continue:
• Oxygen to maintain SaO₂ > 95%
• Prednisone daily
• Nebulised b₂-agonist 2–4 hourly
• Monitor cardiac status

If Patient Is Not Improving After 20–30 Mins
• Continue oxygen and steroids
• Give nebulised b₂-agonist more frequently, up to every 30 minutes.
• Add Ipratropium 0.125 mg to nebuliser and repeat every 4 hours until improvement starts.
• Consider need for Chest X-ray.

If Patient Is Still Not Improving Give:
• Aminophylline (5 mg/kg) I.V. over 20 mins. Repeat every 6 hours as needed.

3. MONITORING TREATMENT
• Oximetry: maintain SaO₂ > 95% and note clinical features at appropriate intervals.

4. CONSIDER ICU ADMISSION IF:
• Worsening or persistent hypoxia or hypercapnia
• Exhaustion, feeble respirations, confusion or drowsiness
• Coma or respiratory arrest
5. WHEN DISCHARGED FROM HOSPITAL

- Patient should be stable on discharge medication for 24 hours and have had inhaler technique checked and recorded
- Treatment with oral corticosteroid for total 1–3 days
- Self Management Plan or written instructions explained to patient.
- Follow-up appointment within 1–4 weeks to outpatient or specialist clinic, \textit{with direct admission if deterioration within 24 hours}.
X. Management of Acute Severe Asthma in Children 5-15 years old
MANAGEMENT OF ACUTE SEVERE ASTHMA
IN CHILDREN AGED 5-15 YEARS OLD

RECOGNITION OF ACUTE SEVERE ASTHMA

- Too breathless to talk
- Too breathless to feed
- Respiration >40 breaths/min
- Pulse >120 beats/min
- PEF <50% predicted or best

Life Threatening Features

- PEF <33% predicted
- Cyanosis, silent chest or poor respiratory effort
- Fatigue or exhaustion
- Agitation or reduced level of consciousness
- Pulsus paradoxus

Blood gas estimates are rarely needed in deciding initial management in children.

CAUTION: Children with severe attacks may not appear distressed; assessment in the very young may be difficult. Be alert to any of the above features.

1. IMMEDIATE TREATMENT

- High flow oxygen via face mask (4–6 L/min)
- Salbutamol 0.02 ml/kg, (max 0.1 ml) via nebuliser or similar dose via MDI and spacer.
- Prednisone 1–2 mg/kg (max. 40 mg).
- NO SEDATIVES

IF LIFE THREATENING FEATURES ARE PRESENT:

- Give IV aminophylline 5 mg/kg over 20 mins, then every 6 hours as needed. Omit the loading dose if child already on oral theophylline.
- Give IV hydrocortisone 100 mg q6hrly.
- Add ipratropium 0.25 mg to nebulised $\beta_2$-agonist (0.125 mg in children 6 years and under).
• Pulse oximetry may be helpful in assessing response to therapy. An $\text{SaO}_2$ <92% may indicate a need for Chest X-ray.

**CRITERIA FOR HOSPITAL ADMISSION:**

• Any life threatening features
• Any features of acute severe asthma after the initial treatment, especially a PEF <33%.
• Lower threshold for admission if patient had recent admission, previous severe attacks or there is concern about the patient’s social circumstances.

2. **SUBSEQUENT MANAGEMENT**

**If Patient Is Improving Continue:**
• High flow oxygen
• Prednisone 1–2 mg/kg daily (max. dose 40 mg)
• Nebulised $b_2$-agonist 4 hourly

**If Patient Is Not Improving After 20-30 Mins:**
• Continue oxygen and steroids
• Mix ipratropium bromide and $b_2$-agonist via nebuliser and repeat every 20-30 mins. if necessary.

3. **MONITORING TREATMENT**

• Repeat PEF measurement 20-30 minutes after starting treatment (if appropriate).
• Oximetry: Maintain $\text{SaO}_2$ >92%
• Chart PEF (if appropriate) before and after the $b_2$-agonist is given and at least 2 times daily during hospitalization.

4. **CONSIDER ICU ADMISSION**

• If deteriorating PEF, worsening or persisting hypoxia or hypercapnia ($\text{PaO}_2$<60 mmHg; $\text{PaCO}_2$>45 mmHg).
• If exhaustion, feeble respirations, confusion or drowsiness.
• If life threatening features are present.
• If coma or respiratory arrest.
5. WHEN DISCHARGED FROM HOSPITAL

- Patient should have been on discharge medication for 24 hours and have had inhaler technique checked and recorded.

- PEF >75% of predicted or personal best and PEF diurnal variability <25%.

- Patient should have started oral steroids, inhaled steroids and inhaled bronchodilators.

- Patient should have a PEF meter and written self management plan, explained to parents.

- Review follow-up at out-patient clinic within 1-4 weeks, depending on patient’s clinical status.

- Letter of admission details to patient’s primary care physician or clinic.
XI. Management of Acute Severe Asthma in Adults
MANAGEMENT OF ACUTE SEVERE ASTHMA IN ADULTS

Many Deaths In Asthma Are Preventable: Delay Can Be Fatal

- **Features of Acute Severe Asthma**
  - PEF <50% of predicted or personal best
  - Can’t complete sentences in one breath
  - Respiration >25 breaths/min
  - Pulse >110 beats/min

- **Life Threatening Features**
  - PEF <33% of predicted or personal best
  - Silent chest, cyanosis or feeble respiratory effort
  - Bradycardia or hypotension
  - Exhaustion, confusion or coma
  - Pulsus paradoxus

If SaO$_2$ <92% or a patient has any life threatening features, measure arterial blood gases.

Blood gas markers of a very severe, life threatening attack:

- Normal (36-45 mm Hg) or high PaCO$_2$
- Severe hypoxia: PaO$_2$ <60 mm Hg irrespective of treatment with oxygen.
- A low pH.

**CAUTION:** Patients with severe or life threatening attacks may not be distressed and may not have all the above abnormalities. Be alert to any of the above features.
1. IMMEDIATE TREATMENT

- Oxygen 40–60% (4–6L/min) (CO\textsubscript{2} retention is not usually aggravated by oxygen therapy in asthma).

- Salbutamol 1 ml in 2 mls N/saline via a nebuliser, or 10 puffs salbutamol MDI via a spacer device; may repeat in 20 mins.

- Prednisone 30–60 mg or intravenous hydrocortisone 200 mg.

- NO SEDATIVES OF ANY KIND

- Chest X-ray to exclude pneumothorax.

**NB:** Antibiotics are indicated only where there is definite evidence of infection.

**IF LIFE THREATENING FEATURES ARE PRESENT**

- Mix ipratropium 0.25 mg, 5 mg salbutamol and 1 ml N/saline and give via a nebuliser.

- Give IV aminophylline 250 mg over 20 mins. (DO NOT GIVE BOLUS AMINO-PHILLLINE TO PATIENTS ALREADY TAKING ORAL THEOPHYLLINES).

**CRITERIA FOR HOSPITAL ADMISSION:**

- Any life threatening features

- Any feature of acute severe asthma PRESENT after initial treatment, especially if PEF <33% of predicted or personal best.

- High risk patients

- Incomplete response within 1–2 hours.

2. SUBSEQUENT MANAGEMENT:

**If Patient Is Improving Continue:**

- 40–60% oxygen (4–6 L/min)

- Prednisone 30–60 mg daily or IV hydrocortisone 200 mg q6hrly

- Nebulised \(b_2\)-agonist 2–4 hourly

**If Patient Is Not Improving After 20–30 Mins**
• Continue oxygen and steroids
• Give nebulised $b_2$-agonist more frequently, continuously if necessary.
• Add ipratropium 0.25 mg to the nebuliser 4 hourly until the patient is improving.

3. MONITORING TREATMENT:

• Repeat measurement of PEF 30 minutes after starting treatment.
• Oximetry: maintain $\text{SaO}_2 > 92\%$
• Repeat blood gas measurements within 2 hours of starting treatment if :
  (a) initial $\text{PaO}_2 < 60$ mmHg.
  (b) $\text{PaCO}_2$ normal or raised
  (c) patient deteriorates
• Chart PEF before and after giving nebulised or inhaled $b_2$-agonist (salbutamol) and at least 4 times daily during hospital stay.

4. CONSIDER ICU ADMISSION IF:

• Deteriorating PEF, worsening or persisting hypoxia or hypercapnia ($\text{PaO}_2 < 60$ mmHg; $\text{PaCO}_2 > 45$ mmHg).
• Exhaustion, feeble respirations, confusion or drowsiness.
• Life threatening features are present.
• Coma or respiratory arrest.

5. WHEN DISCHARGED FROM HOSPITAL

• Patients should have been on discharge medication for 24 hours and have had inhaler technique checked and recorded.
• PEF > 75% of predicted or best and PEF diurnal variability <25%.
• Treatment with oral and inhaled steroids in addition to bronchodilators must be given.
• Patient should have a PEF meter and written management plan.
• Follow up appointment within 1–4 weeks depending on severity of attack and frequency of admissions. ALSO

• Determine the reason(s) for exacerbation and admission.

• Send details of admission to the patient’s primary care clinic or physician.
XII. Long term Management of Asthma
XII.1 AIMS OF TREATMENT AND CRITERIA FOR REFERRAL TO A SPECIALIST

The aim of treatment is to control asthma. Good control is achieved when there is:

- Minimal (ideally no) chronic symptoms, including nocturnal symptoms.
- Minimal (infrequent) episodes.
- No emergency visits for acute exacerbation.
- Minimal need for prn $b_2$–agonist.
- No limitation on activities, including exercise.
- PEF variability <20%.
- Normal (or near normal) PEF.
- Minimal (or no) adverse effects from medications.

THE STEPWISE APPROACH to long-term management utilises the classification of asthma severity. Patients should start treatment at the step most appropriate to the initial severity of their condition. **Aim to establish control as quickly as possible;** then decrease treatment to the least medication required to maintain control:

- A rescue course of prednisone may be needed at any time and step.
- Patients should avoid or control triggers at each step.
- All therapy must include patient education.

REFER TO AN ASTHMA SPECIALIST IF:

- Patient has had a life-threatening asthma exacerbation.
- Signs and symptoms are atypical.
- Other conditions complicate asthma.
- Patients require continuous oral steroids or high-dose inhaled corticosteroids.
- Child under 5 years old and requires step 3 or 4 care (see page 35).
- Additional diagnostic testing (e.g., spirometry or CT-scan chest) is indicated.
- Patient is being considered for immunotherapy.
• Patient has severe persistent asthma.
### XII.2. STEPWISE TREATMENT FOR INFANTS AND YOUNG CHILDREN Under 5 Years*

(Preferred Treatments are underlined)

<table>
<thead>
<tr>
<th>Severity</th>
<th>Controllers</th>
<th>Relievers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 4</strong></td>
<td><strong>Severe</strong>&lt;br&gt;Persistent</td>
<td>Inhaled short acting bronchodilator:&lt;br&gt;<em>Inhaled β₂-agonist</em> or ipratropium bromide as needed for symptoms, not to exceed 3–4 times in one day.</td>
</tr>
<tr>
<td></td>
<td>Daily medications:&lt;br&gt;<em>Inhaled corticosteroid</em>&lt;br&gt;• MDI with spacer and face mask &gt;1 mg daily&lt;br&gt;• Nebulized budesonide &gt;1 mg bid&lt;br&gt;• If needed, add oral steroids – lowest possible dose on alternate day, early morning schedule.&lt;br&gt;Long–acting bronchodilator: either a long-acting inhaled β₂-agonist (for children over 5 years) or a sustained–release theophylline. Add a leukotriene antagonist.</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td><strong>Moderate</strong>&lt;br&gt;Persistent</td>
<td>Inhaled short-acting bronchodilator:&lt;br&gt;<em>Inhaled β₂-agonist</em> or ipratropium bromide as needed for symptoms, not to exceed 3–4 times in one day.</td>
</tr>
<tr>
<td></td>
<td>Daily medication:&lt;br&gt;<em>Inhaled corticosteroid</em>&lt;br&gt;• MDI with spacer and face mask 400–800 mcg daily PLUS <em>where necessary</em>&lt;br&gt;• Inhaled long–acting β₂-agonist (children over 5 years old) or&lt;br&gt;• Long acting theophylline.&lt;br&gt;Consider adding a leukotriene antagonist.</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td><strong>Mild</strong>&lt;br&gt;Persistent</td>
<td>Inhaled short-acting bronchodilator:&lt;br&gt;<em>Inhaled β₂-agonist</em> or ipratropium bromide as needed for symptoms, not to exceed 3–4 times in one day.</td>
</tr>
<tr>
<td></td>
<td>Daily medication:&lt;br&gt;Either <em>inhaled corticosteroid</em> (200–400 mcg) or cromoglycate (use MDI with a spacer and face mask or use a nebuliser)</td>
<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td><strong>Intermittent</strong></td>
<td>Inhaled short–acting bronchodilator:&lt;br&gt;<em>Inhaled β₂-agonist</em> or ipratropium bromide as needed for symptoms, but not more than 3 times per week. Intensity of treatment will depend on severity of attack.</td>
</tr>
<tr>
<td></td>
<td>None needed.</td>
<td></td>
</tr>
</tbody>
</table>

### Step down
Review treatment every 3 to 6 months.<br>If control is sustained for at least 3 months, a gradual stepwise reduction in treatment may be possible.

### Step Up
If control is not achieved, consider step-up<br>But first; review patient medication technique, compliance and environmental control (avoidance of allergens or other trigger factors).

*Adapted from the Caribbean Guidelines for Asthma Management*
Protocol for the Management of Asthma

Approved by: Director, Family Health Services
### XII.3. STEPWISE TREATMENT FOR OLDER CHILDREN AND ADULTS*

(Preferred Treatments are underlined)

<table>
<thead>
<tr>
<th>Severity</th>
<th>Controllers</th>
<th>Relievers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Persistent</td>
<td>Daily medication (divided in 2 equal doses):</td>
<td>Short-acting bronchodilator:</td>
</tr>
<tr>
<td></td>
<td><em>Inhaled corticosteroids</em>, 800–2,000 mcg or more and</td>
<td><em>Inhaled $b_2$-agonist</em> as needed for</td>
</tr>
<tr>
<td></td>
<td>Long–acting bronchodilator: either long–acting inhaled $b_2$-agonist or sustained-release</td>
<td>for symptoms.</td>
</tr>
<tr>
<td></td>
<td>theophylline. Add a leukotriene antagonist. Corticosteroid tablets or syrup long term.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Persistent</td>
<td>Daily medications (divided in 2 equal doses):</td>
<td>Short-acting bronchodilator:</td>
</tr>
<tr>
<td></td>
<td><em>Inhaled corticosteroid</em>, 800–2,000 mcg and</td>
<td><em>Inhaled $b_2$-agonist</em> as needed for</td>
</tr>
<tr>
<td></td>
<td>Long acting bronchodilator, especially for Night-time symptoms; either long-acting inhaled $b_2$-agonist or sustained-release</td>
<td>for Symptoms; not to exceed 3–4 times in one day.</td>
</tr>
<tr>
<td></td>
<td>theophylline. Consider adding a leukotriene antagonist.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild Persistent</td>
<td>Daily medication (divided in 2 equal doses):</td>
<td>Short-acting bronchodilator:</td>
</tr>
<tr>
<td></td>
<td>Either <em>inhaled corticosteroid</em> 200–500 mcg, <em>cromoglycate, nedocromil</em> or sustained-release theophylline.</td>
<td><em>Inhaled $b_2$-agonist</em> as needed for</td>
</tr>
<tr>
<td></td>
<td>If needed, increase inhaled corticosteroids up to 800 mcg, or add long-acting bronchodilator (especially for night-time symptoms).</td>
<td>for Symptoms; not to exceed 3–4 times in one day.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent</td>
<td>None needed.</td>
<td>Short-acting bronchodilator:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Inhaled $b_2$-agonist</em> as needed for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for symptoms, but less than once per week.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intensity of treatment will depend on severity of attack.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhaled $b_2$-agonist or cromoglycate before exercise or exposure to allergen.</td>
</tr>
</tbody>
</table>

**Step down**
- Review treatment every 3–6 months.
- If control is sustained for at least 3 months, a gradual stepwise reduction in treatment compliance and (avoidance of factors).

**Step up**
- If control is not achieved, consider step up. But first : review patient medication technique, environmental control allergens or other trigger.

*Adapted from the Caribbean Guidelines for Asthma Management and Prevention.*
XII.4. NOTES ON ASTHMA IN PREGNANCY

- Maternal hypoxemia will result in foetal hypoxia.
- Do not withhold medications that are beneficial to the mother.
- Most steroids do not cross the placental barrier freely.
- Remember the possibility of adrenal suppression at delivery.
- Do not give xanthines to mothers who are breast feeding.
XIII. GUIDELINES FOR IMPLEMENTATION OF PROTOCOL
A. TRAINING OF PERSONNEL IN USE OF THE GUIDELINES

This should be done in 2 phases.

**Phase 1:** Is the training of asthma tutors – individuals who will be responsible for ongoing training of personnel. Each Regional Health Authority should identify 4–6 suitable individuals who will receive training as a group, with a view to becoming Asthma Educators. These individuals should be either public health nurses, health educators, nurse practitioners, district medical officers or senior medical residents from hospitals.

This group of 20–25 individuals could be trained by pulmonologists (adult and paediatric) or asthma specialists. Training would require approximately 24 hours of workshop, which could be spread over 2 weekends. Individuals would then receive certification of having received ‘Training in Asthma Management’. These core individuals would undergo a post-test; individuals to be used as Asthma Tutors should receive above 80% on the test.

**Phase 2:** Ongoing ‘Asthma Management Workshops’ 3–4 times per year in each region. All district medical officers, nurse practitioners, casualty officers (sessional or full time), residents on medical and paediatric wards should receive certification **within the first year of the programme.**

The training of other health workers can then be done as a part of the region’s ongoing training for health workers.

B. REGIONAL HEALTH CLINICS

Each region should have at least one ‘Asthma Clinic’. The South East Region, by virtue of its population density should have at least one per parish. Staffing of this clinic should include a minimum of:

- 1 physician (certified in asthma management)
- 1 trained nurse (certified in asthma management)
- A health educator (certified in asthma management) to visit at least once per week.
- Clerical workers
- 1 pharmacist (ideally).
centres and all hospitals

Approved by: Director, Family Health Services
XIII.1. EQUIPMENT FOR ASTHMA CLINICS

1. A Spirometer machine
2. X-ray view box
3. Standing scale
4. Balance scale (infants)
5. Height chart/board
6. Pulse Oximeter Machine
7. Diagnostic Set
8. Heavy Duty Nebulisers x 3; (Casualty and A&E centres x 6)
9. Spacers with face mask x 6 (2 each size)
10. Spacers with removable mouth-piece x 3 (Mouth-pieces x 12)
11. Peak Flow Meters (with removable mouthpieces) x 12 (one per examination room/area)
12. A television and video machine for use in patient education
13. Oxygen cylinders with humidifiers
14. Suction machine and suction catheters
15. IV fluids and branulas
16. IV drip stands
17. Resuscitation tray with resuscitation equipment including laryngoscopes
18. Telephone access to emergency vehicle.

<table>
<thead>
<tr>
<th>PROTOCOL: EQUIPMENT FOR ASTHMA CLINICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Revised:</td>
</tr>
<tr>
<td>Distribution to all types III, IV and V health centres and all hospitals</td>
</tr>
<tr>
<td>Index: XIII.1</td>
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</tbody>
</table>

Approved by: Director, Family Health Services
XIII.2. DRUGS FOR ASTHMA CLINICS

**Corticosteroids**
- Inhaled beclomethasone
  - Trade Names: Becotide, Beclofort, Las-Beclamethazone, Q-var
- Inhaled fluticasone
- Oral prednisone
- Parenteral hydrocortisone
- Nebulised budesonide solution
  - Trade Names: Pulmicort

**Long-acting beta$_2$-agonists**
- Salmeterol inhaler
  - Trade Names: Serovent
- Formeterol inhaler
  - Trade Names: Oxis or Foradil

**Sustained-release theophylline**
- Aminophylline solution

**Short-acting beta$_2$-agonists**
- Salbutamol MDIs
  - Trade Names: Metered dose inhalers
- Salbutamol nebuliser solution
  - Trade Names: Ventolin, Las-salbutamol

**Anti-cholinergic agent**
- Ipratropium bromide nebuliser solution
  - Trade Names: Atrovent, Las-ipratropium

**Nasal preparations**
- Beclomethasone nasal drops
  - Trade Names: Betnesol
- Beclomethasone nasal spray
  - Trade Names: Beconase
- Fluticasone nasal spray
  - Trade Names: Flonase

**IV Fluids**
- 0.9% N Saline
- D5%W in 0.2% N Saline
- Hartmann’s or Lactated Ringer’s Solution

**Non-steroidal Anti-inflammatory**
- Nedocromil – Tilade

**Resuscitation Drugs**
- Epinephrine
- Sodium Bicarbonate
- Glucose Solution (50%)

**Leukotriene Antagonists**
- Singulair
- Accolate

**Mast Cell Stabilizer**
- Cromoglycate – Intal

There are newer inhalers with hydrofluoralkane (HFA) propellants which forms a solution and penetrates deeper into the lungs. They are also ozone friendly. However, these are not widely available.
**XIII.3. EDUCATIONAL MATERIALS**

1. 500 poster size charts should be made of charts 1 & 2 and the ‘Some Possible Asthma Triggers’ chart. These should be distributed to all clinics, casualty/A&E department, medical and paediatric wards.

2. 5000 patient booklets entitled ‘You and your family can control asthma’ – 2000 for South East Region and 1000 for each of the other regions.

3. 5000 Home Management Plans, which is found in the centre of the patient booklets.

4. 2500 new intake and 5000 follow-up progress notes.

5. 5000 acute management charts to be used for all asthmatics with acute exacerbation.

6. 1000 copies of the ‘Asthma Protocol’ manual to be distributed to all clinics, medical and paediatric wards, casualty/A&E departments.

7. 5000 medication checklist card to be given to all asthmatics.

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**PROTOCOL: EDUCATIONAL MATERIALS**

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<th>Index: XIII.3</th>
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<tbody>
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</tbody>
</table>

Approved by: Director, Family Health Services
XIV. Asthma Chart for Acute Exacerbation Monitoring
Protocol for the Management of Asthma

Name: ________________________________

Date: ____________________________ Time: ____________________________

Age: _____ Temp: _____ RR: _____ HR: _____ B/P: _____ Wt: _____ Ht: _____

Peak Flow Value: _____ O₂ Sat: _____

Normal PFV for patient: _____

Circle (Y) or (N) of features below.

**Symptoms:**
- Wheezing (Y/N)
- S.O.B (Y/N)
- Cough (Y/N)
- Fever (Y/N)
- Choking (Y/N)
- Vomiting (Y/N), (state # of times in last 24 hrs.)
- Other (state)

**Past History:**
- Asthma (Y/N)
- Wheezing (Y/N)
- Date of last episode of asthma attack or wheezing
- List any asthma medications currently taking? (include dose and duration)
- Any steroid use or dependence ?
- Previous intubation?
- Any drug allergies? (Y/N); if yes, list drugs.
- Attending asthma clinic? ((Y/N) If yes, last appt. date
- Number of admissions for asthma ; last admission date

**Examination:**
- Cyanosis (Y/N); Flaring (Y/N); CR (Y/N); SCR (Y/N); Oedema (Y/N)
- Sweating (Y/N) Restlessness (Y/N); Stridor (Y/N); Clubbing (Y/N);
- Air entry (describe):
- Rhonchi (Y/N), if yes state where:
- Crackles /Creps (Y/N); if yes state where:
- Liver palpable (Y/N):
**Treatment in last 24 hours: Circle whichever is appropriate.**

Inhaled/oral/nebulised salbutamol (Y/N); if yes, state dose & time

Inhaled/oral/IV steroids (Y/N); if yes state dose & time

Oral theophylline/IV aminophylline (Y/N); if yes, state dose & time

Any other drugs? (list:)

**Initial Treatment**

<table>
<thead>
<tr>
<th>Drugs:</th>
<th>Dose:</th>
<th>Time:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhaled salbutamol/nebulised salbutamol</td>
<td></td>
<td>1st</td>
<td></td>
</tr>
<tr>
<td>Prednisone</td>
<td></td>
<td>2nd</td>
<td></td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td></td>
<td>3rd</td>
<td></td>
</tr>
<tr>
<td>Others:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** (asthma severity, drug reactions, etc.)

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**Reassessment**

Time: PFV: \(O_2\) Sat: \(RR:\) HR: Temp: B/P: Flaring (Y/N); Tracheal Tug (Y/N) ICR (Y/N); SCR (Y/N); Air Entry (good/poor); Crackles/Creps (Y/N); Rhonchi (Y/N)

**Subsequent Treatment**

<table>
<thead>
<tr>
<th>Drug:</th>
<th>Dose:</th>
<th>Time:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhaled/nebulised salbutamol</td>
<td></td>
<td>1st</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd</td>
<td></td>
</tr>
</tbody>
</table>

| Ipratropium bromide |       |       |            |
| Aminophylline       |       |       |            |
| IV Hydrocortisone   |       |       |            |
| Other               |       |       |            |

**Investigations/Findings**

- Chest X-ray
- Other
Comments: (Asthma severity, need for admission/transfer etc.)

________________________________________________________

Signature: _____________________________________________

---

**PROTOCOL: ASTHMA CHART FOR MANAGEMENT OF ACUTE EXACERBATION MONITORING**

<table>
<thead>
<tr>
<th>Date Revised:</th>
<th>Distribution to all types III, IV and V health centres and all hospitals</th>
<th>Index: XIV</th>
</tr>
</thead>
</table>

Approved by: Director, Family Health Services

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XV. Asthma Clinic: New Patient Intake Notes
XV. ASTHMA CLINIC: NEW PATIENT INTAKE NOTES

Date: (DD/MM/YY) (___/___/____)
Name: ____________________________________________________________
Date of Birth: ___________________________ Age: ______________________
Address: ___________________________________________________________________________________
Telephone (H) _____________ (W): _____________ Contact: ____________________________
Next of Kin: _____________________________________________________________
Guardian: ____________________________________________________________________________
Mother: ___________________________ Father: _____________________________
Historian: ___________________________ Relationship: ______________________________
Referred from: __________________________________________________________________________
Reason(s) for Referral: ____________________________________________________________________

History (tick or circle where appropriate)
- Known lung disease
- Heart Problems
- Any recurrent or prolonged infections
- Foreign Body Aspiration
- Reflux Disease
- Feeding problems/ excessive vomiting/choking
- Fatty stools
- Consanguinity (Blood relative with the disease)
- HIV/AIDS disease
- Nocturnal Cough
- Exercise induced cough/chest pain/wheeze
- Disturbed sleep (parents/child)
- Diabetes
- Drugs, e.g. NSAIDS or b-blockers?
- Any other illnesses? (List below)

HPC:
Neonatal Problems: ___________________________ Birth Weight: ________________
______________________________________________
______________________________________________
______________________________________________

Hospitalisations (List diagnoses, dates and hospital name):
______________________________________________
______________________________________________
______________________________________________

Circle as appropriate below:
No. of Visits to (Clinic/Casualty or A&E/Private Doctor) for Asthma: _____________________________
Weekly: _______ Monthly: _______ Yearly: _______ Date of last visit: _______

Personal Hx.
• Sinusitis/Allergic Rhinitis/Allergic Conjunctivitis/Eczema
  ________________________________________________

• Smoking (Y/N) If yes: No of cigarettes per day:
• Nursery attendance (Y/N); If yes: Age started:_____; size of nursery:_____; no of children:
• Absence from work/school because of asthma: (Y/N);
• If yes, No. of days per month/term/year: _____________________________________________
  __________________________________________

• Parents workdays missed (per month/per year):

Family History: (state family member's relationship);
• Asthma:
• Lung Problems(including chronic cough):
• Admission or clinic visits to National Chest Hospital:
• HIV/AIDS disease
• Sinusitis/allergic rhinitis/allergic conjunctivitis/severe eczema
• Other:

Environmental and other triggers (circle all that apply):  Medication
List: type/dose/frequency  _____________________________________________
• Infections (colds/flu/other)  1)
• Animals (indoor/outdoor): (dogs/cats/birds/chickens)  2)
• House dust (carpets/rugs/sofa/drapes/stuffed toys, etc.)  3)
• Flowering plants/trees: _____________________________________________  4)
  (name)
• Smoke: cigar/cigarettes/marijuana/coal/wood stoves  5)
• Out-door pollutants: (garbage burning (home or dump), cane burning, construction)  6)
• Exercise
• Strong emotions/stress
• Industries: factories/dressmaking/hairdressing/furniture making/car repairs
- Weather changes
- Foods/others

**Examination:**

Wt: ________  Ht: ________  Temp: ________  HR: ________  RR: ________  PF Value: ________

O₂ Sat: ________________________________________________________________

General

Clubbing: (Y/N)

Lymph Nodes: __________________________________________________________

Eyes: _________________________________________________________________

Ears:

Nose: _________________________________________________________________

Throat: ______________________________________________________________

Lungs: ________________________________________________________________

CVS: _________________________________________________________________

Abdomen: _____________________________________________________________

CNS: _________________________________________________________________

Skin: _________________________________________________________________

Other: ________________________________________________________________

Assessment: __________________________________________________________

Investigations: _________________________________________________________

**Plan (tick those that were done):**

**Asthma Facts:**

**Triggers:** (discuss and give advise on avoidance measures)

**Inhalers:** (explain relievers and controllers; demonstrate how to assess if inhalers are empty, and inform about side effects of medications)

**Action Plan:** (write and explain, discuss asthma symptoms, give advise when to seek help)

**Spacer Device:** (explain, demonstrate and prescribe)

**Peak Flow Meter:** (demonstrate, prescribe and explain usefulness)

**Symptoms/Peak Flow Diary** (explain use, and request at each visit)

Reading material/booklets on asthma.
XVI. Asthma Clinic: Follow-up Progress Notes
XVI. ASTHMA CLINIC: FOLLOW-UP PROGRESS NOTES

Date: (DD/MM/YY) (___/___/____)

Name: _______________________________ Docket No. _______________________

____________________________________ _______________________

Historian: ___________________________ Relationship: _______________________

____________________ __________ __________ __________ __________ __________

Age: HR RR Temp. Wt. Ht.

____________________ __________________ ________

Peak Flow Value (clinic): (home): PF Variability

____________________ __________________ ________

O₂Sat:

____________________ __________________ ________

Since last visit:

Any hospitalisations? (If yes, list dates): ______________________________________

____________________ __________________ ________

Any visits to Casualty/A&E/ Private Doctor/ clinic? (for asthma and any other problem) (List problem and date):

____________________ __________________ ________

____________________ __________________ ________

____________________ __________________ ________

____________________ __________________ ________

____________________ __________________ ________

Current problems:

____________________ __________________ ________

____________________ __________________ ________

____________________ __________________ ________

____________________ __________________ ________

____________________ __________________ ________

Any nocturnal cough? __________________________

Exercise intolerance (same/improved) __________________________
Bronchodilator use: (per day or night, per week)
<table>
<thead>
<tr>
<th>Medications</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examination:**

General: ________________________________  Clubbing (Y/N) ________

Lymph nodes: ____________________________

Eyes: _________________________________

Ears: _________________________________

Nose: ________________________________

Throat: ______________________________

Lungs: ______________________________

CVS: _________________________________

Abdomen: _____________________________

CNS: ________________________________

Skin: ________________________________

Other: ______________________________

**Assessment:**

______________________________

**Investigations:** __________________________

______________________________

Plan: (ask patient to demonstrate spacer and peak flow meter use. Explain home management plan. Review plan from last visit; discuss any concerns with medication. Re-educate as needed.)
Protocol for the Management of Asthma

Medications: 

Appointment: 

Signature: 

PROTOCOL: ASTHMA CLINIC: FOLLOW-UP PROGRESS NOTES

<table>
<thead>
<tr>
<th>Date Revised:</th>
<th>Distribution to all types III, IV and V health centres and all hospitals</th>
<th>Index: XVI</th>
</tr>
</thead>
</table>

Approved by: Director, Family Health Services
XVII. Severity of Asthma Attacks (Poster 1)
Poster 1

**XVII. SEVERITY OF ASTHMA ATTACKS**

<table>
<thead>
<tr>
<th>Parameter*</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Respiratory Arrest Imminent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathless</td>
<td>Walking</td>
<td>Talking Infant--softer shorter cry, difficulty feeding Prefers sitting</td>
<td>At rest Infant--stops feeding Hunched forward</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can lie down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks in</td>
<td>Sentences</td>
<td>Phrases</td>
<td>Words</td>
<td></td>
</tr>
<tr>
<td>Ability to cry</td>
<td>Good cry</td>
<td>Soft cry</td>
<td>Groaning</td>
<td></td>
</tr>
<tr>
<td>Alertness</td>
<td>May be agitated</td>
<td>Usually agitated</td>
<td>Usually agitated Drowsy or confused</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Increased</td>
<td>Increased</td>
<td>Often &gt;30/min (adults)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Guide to rates of breathing associated with respiratory distress in awake children:

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal rate</th>
<th>Paradoxical thoraco–abdominal movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 months</td>
<td>&lt;60/min</td>
<td></td>
</tr>
<tr>
<td>2–12 months</td>
<td>&lt;50/min</td>
<td></td>
</tr>
<tr>
<td>1–5 years</td>
<td>&lt;40/min</td>
<td></td>
</tr>
<tr>
<td>6–8 years</td>
<td>&lt;30/min</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessory muscles and suprasternal retractions</th>
<th>Usual</th>
<th>Usually</th>
<th>Usually</th>
<th>Paradoxical thoraco–abdominal movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usually not</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wheeze</th>
<th>Moderate, only and expiratory</th>
<th>Loud</th>
<th>Usually loud but may be reduced</th>
<th>Absence of wheeze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse/min (adult)</td>
<td>&lt;100</td>
<td>100–200</td>
<td>&gt;120</td>
<td>Bradycardia</td>
</tr>
</tbody>
</table>

Guide to Limits of Pulse rates in infants and children:

<table>
<thead>
<tr>
<th>Pulsus paradoxus</th>
<th>Absent</th>
<th>May be present</th>
<th>Often present</th>
<th>Absence suggests respiratory muscle fatigue</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PEF After initial bronchodilator % predicted or % personal best</th>
<th>Over 80%</th>
<th>Approximately 60–80%</th>
<th>&lt;60% predicted or personal best 100 L/min (adults) or response lasts &lt;2 hours</th>
<th>Absence suggests respiratory muscle fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Test not usually necessary</td>
<td>&gt;60 mmHg</td>
<td>&lt;45 mmHg</td>
<td>&gt;45 mmHg: Possible respiratory failure</td>
<td></td>
</tr>
<tr>
<td>&lt;45 mmHg</td>
<td></td>
<td></td>
<td>Hypercapnia (hypoventilation) develops more readily in young children than in adults and adolescents.</td>
<td></td>
</tr>
</tbody>
</table>

*Note: The presence of several parameters, but not necessarily all, indicate the general classification of the attack.
XVIII. Management of Asthma Attacks (Poster 2)
MANAGEMENT OF ASTHMA ATTACKS: HOSPITAL-BASED CARE

**Initial Assessment**
- History (hx) physical examination (auscultation, use of accessory muscles, heart rate, respiratory rate, PEF or FEV1, oxygen saturation, arterial blood gas of patient in extremis, and other tests as indicated).

**Initial Treatment**
- Inhaled short-acting beta2-agonist, usually by nebulization, one dose every 20 minutes for 1 hour
- Oxygen to achieve O2 saturation ≥90% (95% children)
- Systemic corticosteroids if no immediate response, or if patient recently took steroid tablets or syrup, or if episode is severe
- Sedation is contraindicated in the treatment of attacks.

**Repeat Assessment**
- PE, PEF, O2 saturation, other tests as needed

**Moderate Episode**
- PEF 60-80% predicted/personal best
- Physical exam: moderate symptoms, accessory muscle use
- Inhaled beta2-agonist every 60 minutes ± inhaled anticholinergic
- Consider corticosteroids
- Continue treatment 1–3 hours, provided there is improvement

**Severe Episode**
- PEF <60% predicted/personal best
- Physical exam: severe symptoms at rest, chest retraction
- Hx: high-risk patient
- No improvement after initial treatment
- Inhaled beta2-agonist, hourly or continuous ± inhaled anticholinergic
- Oxygen
- Systemic corticosteroid
- Consider subcutaneous, intramuscular, or intravenous beta2-agonist

**Good Response**
- Response sustained 60 minutes after last treatment
- Physical exam: normal
- PEF >70%
- No distress
- O2 saturation >90% (95% children)

**Incomplete Response Within 1–2 Hours**
- Hx: high-risk patient
- Physical exam: mild to moderate symptoms
- PEF >50% but <70%
- O2 saturation not improving

**Admit to Hospital**
- Inhaled beta2-agonist ± inhaled anticholinergic
- Systemic corticosteroid
- Oxygen
- Consider intravenous aminophylline
- Monitor PEF, O2 saturation, pulse, theophylline

**Admit to Intensive Care**
- Inhaled beta2-agonist ± anticholinergic
- Inhaled corticosteroid
- Consider subcutaneous, intra- muscular, or intravenous beta2-agonists
- Oxygen
- Consider intravenous aminophylline
- Possible intubation and mechanical ventilation

**Poor Response Within 1 Hour**
- Hx: high-risk patient
- Physical exam: symptoms Severe, drowsiness, confusion
- PEF <30%
- PCO2 >45 mm Hg

**Discharge Home**
- Continue treatment with inhaled beta2-agonist
- Consider, in most cases, corticosteroid tablets or syrup
- Patient education: Take medicine correctly
- Review action plan
- Close medical follow-up

**Discharge Home**
- If PEF >70% predicted/personal best and sustained on tablets or syrup/inhaled medication

**Admit to Intensive Care**
- If no improvement within 6–12 hours

*Note: Preferred treatments are inhaled beta2-agonists in high doses and corticosteroids. If inhaled beta2-agonists are not available, theophylline may be considered. There may be a slight therapeutic advantage in using anti-cholinergic medication.*
XIX. ‘Some Possible Asthma Triggers’ (Poster 3)
Some Possible Asthma Triggers

**ALLERGIES**
- Foods such as nuts, chocolate, eggs, orange juice, fish, milk, peanut butter.
- Pollens from flowers, trees, grasses, hay, ragweed. Mould spores.
- Animals such as rabbits, cats, dogs, hamsters, gerbils, chickens, birds.
- Feather pillows, down comforters.
- Insect parts such as those from dead cockroaches.

**DUSTS**
- Cloth upholstered furniture, carpets, draperies that gather dust.
- Brooms and dusters that raise dust.
- Dirty filters on hot air furnaces and air conditioners that put dust into the air.
- Dust in beds and pillows.

**HOUSEHOLD PRODUCTS**
- Vapours from cleaning solvents, paint, paint thinner, liquid chlorine bleach.
- Sprays from furniture polish, starch, cleaners, room deodorizers.
- Spray deodorants, perfumes, hair sprays, talcum powder, scented cosmetics.

**ON THE JOB**
- Dust, vapours, or fumes from:
  - Wood products (western red cedar, some pine and birch woods, mahogany).
  - Flour, cereals, grains, coffee, tea, papain.
  - Metals (platinum, chromium, nickel sulphate, soldering flames).
  - Cotton, flax, hemp.
  - Mould from decaying hay.

**INFECTIONS**
- Colds, other viruses, bronchitis, tonsillitis, sore throat.

**EXERCISE**
- Wheezing may begin after overexertion.

**SMOKE**
- From cigarettes, cigars, pipes - either yours or someone else's.

**WEATHER**
- Blasts of cold air.
- Excessive humidity.
- Changes in seasons.

**AIR POLLUTION**
- Traffic jams.
- Parking jams.
- Smoke-filled rooms.

**NIGHTTIME**
- Lying down, tiredness, accumulating mucus.

**EMOTIONS**
- Fear, anger, frustration, laughing too hard, crying, coughing.

Provided as an educational service to physicians and their patients by:
- Glaxo Educational Support Team
- c/o Glaxo Wellcome Caribbean
- 8 Olivier Road, Kingston 8, Jamaica, W.I.
XX. Asthma Medicine/Management Plan
Asthma Medicine Plan

Name: __________________________
Doctor: ________________________ Date: __________
Phone for doctor or clinic: __________________________
Phone for taxi or friend: __________________________

1. Green - Go
- Breathing is good
- No cough or wheeze
- Can work and play

Use preventive medicine.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How much to take</th>
<th>When to take it</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20 minutes before sports, use this medicine:

Peak Flow Number ___ to ___

2. Yellow - Caution
- Cough
- Wheeze
- Tight chest
- Wake up at night

Take quick-relief medicine to keep an asthma attack from getting bad.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How much to take</th>
<th>When to take it</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Peak Flow Number ___ to ___

3. Red - Stop - Danger
- Medicine is not helping
- Breathing is hard and fast
- Nose opens wide
- Can’t walk
- Ribs show
- Can’t talk well

Get help from a doctor now!
Take these medicines until you talk with the doctor.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How much to take</th>
<th>When to take it</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Peak Flow Number ___ to ___
BIBLIOGRAPHY


