

# Acute respiratory infections in children: Case management in small hospitals in developing countries

A Manual for  
Doctors and other  
Senior Health Workers

**Programme for the Control of  
Acute Respiratory Infections**

**World Health Organization  
Geneva**



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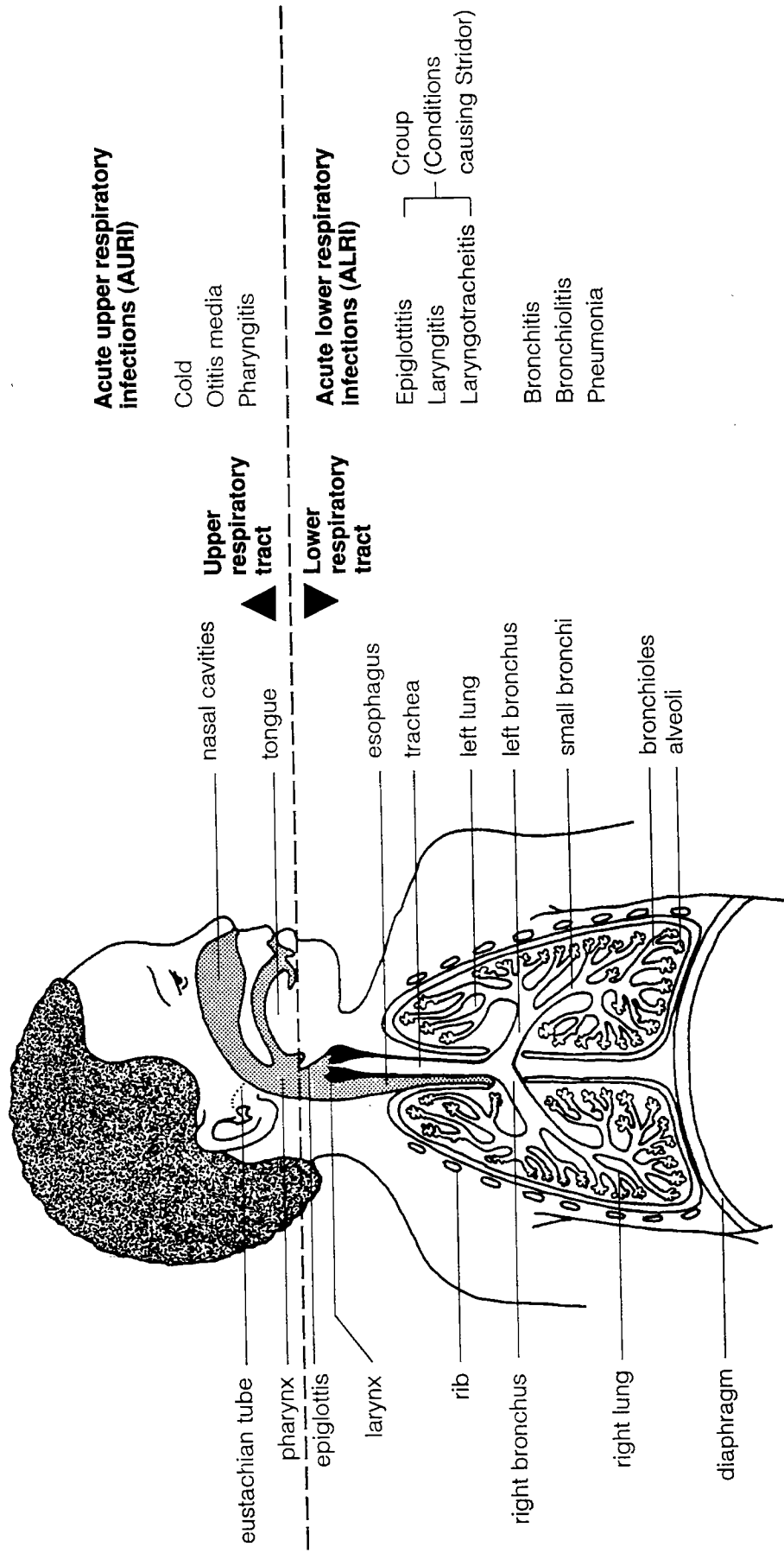
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## Acute Respiratory Infections (ARI): Clinical syndromes





## SECTION 1.

**ARI Case management: Introduction**

Acute respiratory infections (ARI) are one of the commonest causes of death in children in developing countries. They are responsible for four of the estimated 15 million deaths that occur in children under 5 years of age each year; two-thirds of these deaths are in infants (especially young infants). Lung puncture studies in developing countries indicate that most cases of severe pneumonia in children are caused by bacteria, usually *Streptococcus pneumoniae* or *Haemophilus influenzae*. This contrasts with the situation in developed countries, where the great majority are due to viruses.

The acute upper and lower respiratory (tract) infections are depicted in the Figure opposite.

**1.1 Case management of acute lower respiratory infections to reduce ARI mortality**

Almost all ARI deaths in young children are due to acute *lower* respiratory infections (ALRI), mostly pneumonia. However, not all acute lower respiratory infections are serious: for example, bronchitis is relatively common and rarely fatal.

Clinical experience and intervention studies in developing countries have indicated that early treatment with antibiotics can reduce mortality from pneumonia. Many pneumonia deaths occur at home, some after only a few days of illness. The key to reducing ARI mortality is to ensure better access to and timely use of correct case management of pneumonia. This requires the strengthening of health services to enable them to provide early treatment with antibiotics, based on clinical signs that are easily detectable. Most cases of pneumonia can be detected using a simple protocol to look for fast breathing and chest indrawing in children who present with cough or difficult breathing (see Annexes 1 and 2).

It is now apparent that the large number of pneumonia cases and deaths in the first few months of life has often been underestimated. This is a result of several factors, including under-reporting owing to cultural restrictions which prevent the mother and neonate from leaving home.

Neonates and one-month-old infants with pneumonia may not cough and their normal respiratory rate often exceeds 50 breaths per minute. Bacterial infections in this age group (called "young infants" in this manual) may present with non-specific clinical signs only, making it difficult to distinguish pneumonia from sepsis

and meningitis. These infections can be rapidly fatal in young infants, who are best treated in hospital with parenteral antibiotics. Therefore, guidelines for the detection and treatment of pneumonia in young infants must differ from those for older infants and young children.

Improving case management and ensuring a regular supply of appropriate antibiotics through first-level facilities and community-based practitioners are the most effective ways of reducing mortality from pneumonia. A further reduction in mortality can be achieved by providing effective referral care for children with severe ALRI who need oxygen, second-line antibiotics, and greater clinical expertise. This manual provides clinical guidelines for staff who provide care in facilities at the first referral level, sometimes referred to as "small hospitals".

## 1.2 Case management of acute upper respiratory infections

Acute upper respiratory infections (AURI) result in few deaths in children but cause considerable disability. Otitis media is the leading preventable cause of deafness in developing countries and is a significant contributor to developmental and learning problems in children. In addition, acute rheumatic fever may follow streptococcal pharyngitis. While the main age group of concern for the detection and treatment of streptococcal pharyngitis to prevent acute rheumatic fever (and chronic rheumatic heart disease) is 5-15 years, similar clinical management is appropriate for younger children since rheumatic fever cases also occur in this age group.

Proper case management of AURI is thus important for four reasons. It can:

- (1) relieve suffering.
- (2) reduce the incidence of sequelae (such as deafness).
- (3) help the mother care for her child during illness: if health workers show mothers how to provide appropriate care for AURI, mothers will be more likely to seek care from them when their children are more seriously ill.
- (4) reduce the inappropriate use of antibiotics for respiratory infections (most respiratory infections are due to the common cold and will not benefit from antibiotics). This is an important objective of national ARI control programmes, because it will retard the development of antibiotic resistance and conserve resources.

For these reasons, this manual also provides guidelines for the treatment of AURI, which are often present in children visiting referral facilities.



### 1.3 Scope and application of the ARI case management guidelines presented in this manual

The case management guidelines and antibiotic recommendations in this manual are appropriate for developing countries or areas with limited resources and an infant mortality rate of over 40 per 1000 live births. The treatment regimens are designed for use in hospitals where X-ray and laboratory facilities are limited or do not exist and diagnosis therefore relies on the clinical examination.

The guidelines are based on the assumption that there is a substantial incidence of bacterial pneumonia in children visiting the facility, and that risk factors for pneumonia, such as undernutrition and low birth weight, are relatively common, resulting in high rates of pneumonia-specific mortality. Accordingly, they recommend antibiotic therapy in situations where bacterial pneumonia is a significant possibility.

It should be appreciated that these guidelines will result in the use of antibiotics in some children without a serious bacterial infection (see Annex 1). This is acceptable in situations where all decisions need to be based on clinical grounds, infection with a substantial risk of death is common, and a reduction in deaths can be achieved with inexpensive antibiotic therapy. However, a major effort has been made to limit the use of antibiotics to conditions in which they are justified.

The guidelines discourage inappropriate antibiotic use for children with very common but usually benign respiratory infections. These include the common cold, purulent nasal discharge, pharyngitis in young children, and bronchitis. Administering antibiotics for these common conditions, or for fever alone (with no other signs of serious infection), would result in their very widespread use without benefit and with a substantial risk of side-effects and increased antibiotic resistance. Antibiotics should not be used for upper respiratory infections to try to prevent them from developing into bacterial pneumonia.

The guidelines are intended for use in children under 5 years of age, the target age group of the WHO ARI Programme. Young infants (age less than 2 months) have been considered separately within the guidelines (in section 3.2), since ARI mortality is particularly high in this age group and since disease presentation and treatment are significantly different than in older infants and young children. Case management guidelines for older children and adults are not provided in this manual.

It is recognized that treatments other than those outlined here will be required for certain patients, depending on individual circumstances and the availability of facilities.

This manual is limited to the management of ARI. It does not give detailed instructions on the management of non-respiratory complications such as congestive heart failure or convulsions. For the management of these conditions, consult standard paediatric texts. Much more expensive therapeutic options such as ceftriaxone, ribavirin, and mechanical ventilation, which would be the treatment of choice for certain conditions in a setting with ample resources (yet usually low mortality), are not discussed.

## 1.4 Relationship of the manual to the guidelines for health workers in first-level facilities

Annex 2 contains the ARI case management chart “Management of the child with cough or difficult breathing”, which summarizes the guidelines for health workers at a first-level facility (without inpatient capacity). The chart and accompanying module<sup>1</sup> for the supervisors of first-level facility workers present a simplified case management process to facilitate the training of health workers with various medical backgrounds, giving emphasis to case detection and proper treatment of childhood pneumonia with a standardized antibiotic regimen.

This simplified process uses the smallest number of clinical signs and symptoms for the classification of the child’s illness which are adequate to make each decision about management in a first-level facility with no inpatient capacity and a limited supply of essential drugs and medical equipment. In the module and chart, no special management instructions are provided for measles, pertussis, diphtheria, or pneumonia that does not respond to standard antibiotic therapy. Children with signs suggesting severe pneumonia or danger signs of a very severe disease<sup>2</sup> are referred immediately to hospital. Children with chronic cough or with a first episode of wheezing with chest indrawing or evidence of respiratory distress are also referred. On arrival at a referral facility, these children require further assessment, classification, an admission decision, and then an inpatient or outpatient treatment plan.

The assessment process suggested in this manual for doctors and other senior health workers at a facility with inpatient capacity incorporates more clinical signs than those suggested for health workers at first-level facilities because of the need for a more comprehensive management plan for children who reach this level of health care. Instructions are provided for both inpatient and outpatient treatment. The same principles underlie standard case management of outpatients whether it is provided by first-level facility health workers who use the simplified process or by doctors and other senior health workers at a facility with inpatient capacity who use this manual.

The ARI case management chart “Management of the child with an ear problem or sore throat” is also presented in Annex 2.

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<sup>1</sup> Management of the Young Child with an Acute Respiratory Infection. WHO, 1990.

<sup>2</sup> These danger signs (not able to drink, convulsions, abnormally sleepy or difficult to wake, stridor in calm child, and severe undernutrition) are highlighted in grey in the table on page 9. In similar fashion, the assessment steps for first-level facility workers are highlighted in grey on pages 5, 10, 11 and 22.

## SECTION 2.

**Assessment and classification****2.1 Assessment of the child with cough or difficult breathing**

The most important objective of ARI case management is to recognize and treat pneumonia. Children who present with cough or difficult breathing may have pneumonia and need careful assessment. They should be assessed as follows:

- (1) **Ask** the mother several questions
- (2) **Look and listen**

The order of the examination is important and is described in detail below. To obtain a correct count of the respiratory rate and an accurate assessment of chest indrawing, wheezing, and stridor it is essential that the child be calm or asleep when his or her breathing is observed. Children often become upset when touched; that is why the child should be touched only **after** observation of his or her breathing. The use of a quiet area in the clinic will facilitate the assessment of children with cough or difficult breathing.

ASK:	LOOK, LISTEN:
<ul style="list-style-type: none"> <li>• How old is the child?</li> <li>• Is the child coughing? For how long?</li> <li>• Age 2 months up to 5 years: Is the child able to drink?</li> <li>• Age less than 2 months: Has the young infant stopped feeding well?</li> <li>• Has the child had fever? For how long?</li> <li>• Has the child had convulsions?</li> <li>• Has the child had periods of not breathing or turning blue?</li> </ul>	<p>(Child must be calm)</p> <ul style="list-style-type: none"> <li>• Count the breaths in one minute.</li> <li>• Look for chest indrawing.</li> <li>• Look and listen for stridor.</li> <li>• Look and listen for wheeze.</li> <li>• Age less than 2 months: look and listen for grunting.</li> <li>• Look and listen for apnoeic spells and the "whoop" of pertussis.</li> <li>• See if the child is abnormally sleepy, or difficult to wake.</li> <li>• Measure the temperature (or feel for fever, or low body temperature).</li> <li>• Look for severe undernutrition.</li> <li>• Check for dehydration.</li> <li>• Examine the tongue for central cyanosis.</li> <li>• Examine the skin for measles rash.</li> <li>• Examine the young infant for abdominal distention.</li> <li>• Note any other signs of severe disease.</li> </ul>

The health worker should **ASK** the mother:

- How old is the child?
- Is the child coughing? For how long?
- Age 2 months up to 5 years: Is the child able to drink?
- Age less than 2 months: Has the young infant stopped feeding well?

*Feeding less than half the normal amount (if feeding well before) is a danger sign in the young infant age less than 2 months. However, many feeding problems occur which are not associated with serious bacterial infection. Be sure that the feeding problem is associated with the current illness.*

- Has the child had a fever? For how long?
- Has the child had convulsions?
- Has the child had periods of not breathing or turning blue?

The health worker should then **LOOK AND LISTEN** to the child.

The child must be calm while the health worker is looking at and listening to the child's breathing:

- Count the breaths in one minute.

*A timing device is required.*

*Fast breathing is 60 breaths per minute or more in young infants age less than 2 months; 50 breaths per minute or more in children 2 months up to 12 months; 40 breaths per minute or more in children 12 months up to 5 years. In the young infant age less than 2 months, breathing 60 per minute or more is only of significance if it is sustained. If elevated, the count should be repeated at least once.*

- Look for chest indrawing.

*Chest indrawing means a definite inward motion of the lower chest wall on breathing in.*

*If only the soft tissue between the ribs or above the clavicle goes in when the child breathes in (intercostal or supraclavicular retractions), this is not chest indrawing. Chest indrawing as defined here is the same as "subcostal indrawing" or "subcostal retractions". Be especially careful when looking for chest indrawing in young infants. Mild chest indrawing is normal in young infants because their chest wall is soft. However, severe chest indrawing (very deep and easy to see) may be a sign of pneumonia.*

*If there is any question about whether the child has chest indrawing, reposition the child and look again. If the child's body is bent at the waist, it is hard to judge the movement of the lower chest wall. Reposition the child so that s/he is lying flat in the mother's lap. If the chest indrawing is still not clearly visible, assume that the child does not have chest indrawing. Chest indrawing is only significant if it is present all the time and definitely visible. If you see it only when the child is upset or trying to feed, but not when s/he is resting peacefully, do not consider this as chest indrawing.*

- Look and listen for stridor: a harsh noise on breathing in.
- Look and listen for wheeze: a musical noise on breathing out.

*Wheeze is not always audible by ear but may be so by holding the ear near the child's mouth. Health workers can learn to recognize wheezing in most cases by watching the child breathe. A child with wheeze takes longer than normal to breathe out (prolonged*

*expiratory phase) and makes an effort in doing so. (Further assessment of the wheezing child is described in section 3.3.)*

- Age less than 2 months: look and listen for grunting.

*Grunting is the short gruff sounds that a child makes at the beginning of expiration when s/he has difficult breathing.*

- Look and listen for apnoeic spells and the “whoop” of pertussis.

The health worker can then touch the child:

- See if the child is abnormally sleepy or difficult to wake.
- Measure the temperature (or feel for fever or low body temperature).
- Look for severe undernutrition (see Annex 3).
- Check for dehydration.
- Examine the tongue for central cyanosis.

*This requires good lighting; comparison with the mother's tongue can be helpful. Cyanosis of the tongue (central cyanosis) suggests hypoxia, but it may not be present in a hypoxic child with severe anaemia. Peripheral cyanosis can occur as a result of chilling or shock.*

- Examine the skin for measles rash.

*A haemorrhagic rash is a sign of severe disease.*

- Examine the young infant. Check to see if abdomen is distended and tense.
- Note any other signs of severe disease: poor tone, weak cry, or signs of shock (rapid and feeble pulse, peripheral cyanosis).

## 2.2 Classification of the child age 2 months up to 5 years with cough or difficult breathing

Most children with cough or difficult breathing can be assessed for pneumonia and managed as described in the table “Pneumonia Management at the Small Hospital” (page 14). This table lists the clinical signs that are used to determine whether pneumonia is present and, if so, its severity. However, children who have certain clinical signs of very severe disease (i.e., stridor when calm, severe undernutrition, abnormally sleepy or difficult to wake, or convulsions) require special management as described below. The summary table should not be used for these children.

### ***Children with stridor, severe undernutrition, or signs suggesting meningitis***

Children with these danger signs should be managed as follows (the pneumonia management table on page 14 is **not** appropriate for these children):

Children with **stridor when calm** should be managed according to section 3.4. Children with stridor and significant chest indrawing when they are resting quietly may have impending airway obstruction and need careful airway management.

Children who have **severe undernutrition** (see Annex 3) should be admitted to hospital for nutritional rehabilitation and medical therapy. Particular attention should be paid to severely undernourished children since they may have a weak or

absent cough and an impaired respiratory response to hypoxia. Both fast breathing and chest indrawing depend on intact respiratory drive and muscle strength. The presence of severe undernutrition modifies the pneumonia management recommendations summarized in the table on page 14. Children with severe undernutrition and fast breathing or chest indrawing should receive chloramphenicol and other specific therapy (as for very severe pneumonia - see section 3.1), rather than oral antibiotics or parenteral benzylpenicillin.

Consider meningitis if the child is **abnormally sleepy or difficult to wake**, or has other signs suggesting meningitis (such as **convulsions**). If a lumbar puncture cannot be done and meningitis is suspected, treat for meningitis with chloramphenicol (the same treatment as for very severe pneumonia). Consult standard paediatric texts for other specific therapy. Bacterial meningitis can occur in children with pneumonia. In areas with falciparum malaria transmission, antimalarial therapy for cerebral malaria should be considered (see section 5.3 and the recommendations of the national malaria programme). Since this manual focuses on the management of ARI, detailed instructions on the management of convulsions, meningitis, malaria, and other non-respiratory conditions are not included.

***Children without stridor, severe undernutrition, or signs suggesting meningitis***

The classification and treatment of these children is summarized in the table "Pneumonia Management at the Small Hospital" on page 14. The decision as to whether the child has pneumonia is based on two key clinical signs: fast breathing and chest indrawing. As in the guidelines for use at first-level facilities, these signs allow the health worker to distinguish children with pneumonia who can be treated with an antibiotic at home (fast breathing with no chest indrawing and no clinical signs of very severe disease) from those who should be admitted to hospital because their pneumonia is severe (chest indrawing).

Children who have neither of these signs (fast breathing or chest indrawing) do not have pneumonia. Most often, they have a simple cough or cold. Those with an ear problem or sore throat should be assessed and treated (see sections 4.1 and 4.2). Children with a chronic cough should be evaluated for tuberculosis and other causes of chronic cough (see section 3.6). The procedure for classification and treatment of children without danger signs who have pneumonia or a simple cough or cold (no pneumonia) is the same as at first-level facilities.

Two additional clinical signs, cyanosis and inability to drink, are used at the small hospital to distinguish children with severe pneumonia who can be managed without oxygen from children with very severe pneumonia who require oxygen therapy.

The summary table on page 14 can assist in determining whether or not pneumonia is present and, if present, its severity. The management of pneumonia in the child age 2 months up to 5 years is described in detail in section 3.1. The presence of wheezing may alter the management of these children. The pneumonia classifications include some children with bronchiolitis and asthma.

In wheezing children, chest indrawing may be present even with mild bronchospasm or small airway obstruction from bronchiolitis. In children with wheezing and chest indrawing, further assessment is necessary to determine the severity of the disease and decide on clinical management. The management decision is based on the presence or absence of respiratory distress and other signs of severity (cyanosis, not able to drink); whether the child is experiencing the first

episode of wheezing or has recurrent wheezing; **and** the response to a rapid-acting bronchodilator. The assessment and treatment of the wheezing child are described in section 3.3 and summarized on page 25.

The presence of certain clinical signs or categories of illness may indicate that other specific management is needed, **in addition** to the treatment instructions summarized in the pneumonia management table, as follows:

Children with **measles who have a haemorrhagic rash; stridor; or severe dehydration, undernutrition, or pneumonia** need admission (see section 3.7). Additional management recommendations for all children with measles are also discussed in section 3.7.

Children with **pertussis who have apnoeic or cyanotic spells** are at higher risk of death and should be admitted to hospital if possible (see section 3.8). Additional management recommendations for all children with pertussis are also discussed in section 3.8.

Children with **chronic cough** who do not have pneumonia need further evaluation and treatment as summarized in section 3.6.

Children with **persistent pneumonia** which has not responded to 10 days of standard antibiotic therapy need further evaluation and treatment as summarized in section 3.1.

Children with cough or difficult breathing who have **severe dehydration** or signs of **shock** require careful fluid management (see section 5.4).

**IN SUMMARY:** the management of most children with cough or difficult breathing follows the guidelines presented in the pneumonia management table (page 14). Some children classified as having pneumonia have wheezing conditions that require specific management; the changes in management procedures when wheeze is present are noted in the pneumonia management table and explained further in section 3.3. In addition to the procedures summarized in the pneumonia management table, special management recommendations are provided for children with measles (section 3.7), pertussis (section 3.8), chronic cough (section 3.6), persistent pneumonia (section 3.1), and severe dehydration (section 5.4). The presence of stridor, severe undernutrition, or signs suggesting meningitis alters the management of the child with cough or difficult breathing; the pneumonia management table does not apply to these children.

The signs indicating a need for admission are listed in the table below.

SIGNS INDICATING A NEED FOR ADMISSION IN CHILDREN AGE 2 MONTHS UP TO 5 YEARS WITH COUGH OR DIFFICULT BREATHING	
	see section:
• Not able to drink	3.1
• Convulsions	
• Abnormally sleepy or difficult to wake	
• Stridor in calm child	3.4
• Severe undernutrition	Annex 3
• Cyanosis	3.1
• Chest indrawing in child who is not wheezing	3.1
• Respiratory distress from wheezing, not relieved by bronchodilator	3.3
• Measles with a haemorrhagic rash, stridor, or severe undernutrition, dehydration, or pneumonia	3.7
• Pertussis in infants less than 6 months old, or any child with apnoeic or cyanotic spells, pneumonia, convulsions, dehydration or severe undernutrition	3.8
• Diphtheria	
• Severe dehydration or shock	5.4

## 2.3 Classification of the young infant age less than 2 months with cough or difficult breathing

In the young infant (age less than 2 months), the normal resting respiratory rate is higher and more variable than in the older infant. The respiratory rate threshold for case detection of pneumonia is therefore higher (60 breaths per minute) and more than one respiratory rate measurement is recommended (see Annex 1). As cough may be absent, it cannot be a required sign for detecting cases of pneumonia.

Other aspects of the assessment are also specific to the young infant. Feeding problems, fever, hypothermia, abdominal distension, and apnoeic or cyanotic episodes may be the only signs of a serious bacterial infection. Young infants may respond to a serious infection with either fever or hypothermia. Grunting needs to be recognized. Since mild chest indrawing can be normal in the compliant chest-wall of the young infant, only severe chest indrawing is considered evidence of disease.

Treatment for possible pneumonia, sepsis, or meningitis should be based on the presence of these clinical signs, which are summarized in the chart on page 22 and discussed in section 3.2.

## 2.4 Assessment of the child with an ear problem

ASK:	LOOK, FEEL:
<ul style="list-style-type: none"> <li>• Does the child have ear pain?</li> <li>• Does the child have pus draining from the ear? For how long?</li> </ul>	<ul style="list-style-type: none"> <li>• Look for pus draining from the ear or red, immobile ear drum (by otoscopy).</li> <li>• Feel for tender swelling behind the ear.</li> </ul>

If the child has an ear complaint (or an unexplained fever) the child should be assessed as follows:

The health worker should **ASK** the mother:

- Does the child have ear pain?

*Pain is more likely to be significant if it has been present for a day or more.*

- Does the child have pus draining from the ear? For how long?

The health worker should then **LOOK AND FEEL**:

- Look for pus draining from the ear or a red, immobile eardrum (by otoscopy).
- Feel for tender swelling behind the ear.

*In young infants, the swelling may be above the ear.*



## 2.5 Assessment of the child with a sore throat

ASK:	LOOK, FEEL:
<ul style="list-style-type: none"> <li>Is the child able to drink?</li> </ul>	<ul style="list-style-type: none"> <li>Feel the front of the neck for nodes.</li> <li>Look for exudate on the throat.</li> <li>Look for signs of a throat abscess</li> </ul>

The health worker should **ASK** the mother:

Is the child able to drink?

The health worker should then **LOOK AND FEEL**:

- Feel the front of the neck for nodes.

*Only large and definitely tender nodes are of any significance.*

- Look for exudate on the throat.

*A grey, adherent membrane suggests diphtheria.*

- Look for signs of a throat abscess.

Many children who are brought to the clinic with acute respiratory complaints such as a cold, a sore throat, or an ear problem, do **not** have cough or difficult breathing. These children do not need to have their respiratory rate counted.

The management of upper respiratory infections is described in section 4.

## Introduction to sections 3, 4, and 5.

In sections 3 and 4, the clinical signs, additional clinical information (or, in some cases, further assessment), treatment, and reassessment of different acute lower and upper respiratory infections are presented in summary form. The information on treatment indicates the appropriate steps to be taken based on the following decisions:

- Whether to admit to hospital or treat at home,
- Whether to give oxygen,
- Whether to give antibiotic therapy,
- What other specific therapy is appropriate,
- What supportive care is indicated (in hospital or at home).

Detailed instructions on oxygen therapy, bronchodilator therapy, supportive care in hospital, and home care are given in section 5. All antibiotic doses are given in section 5.6.

For purposes of clarity, the new terminology that has been adopted in these guidelines and in other training materials of the WHO ARI Programme is compared with the previous terminology in Annex 4.

### **CARING FOR THE CHILD'S OTHER PROBLEMS**

Children who also have diarrhoea should be managed according to the WHO "Manual for the Treatment of Diarrhoea."<sup>1</sup> Children with both pneumonia and diarrhoea are at increased risk of death.

All children who are due for immunizations should receive them unless they are admitted for very severe disease. Pneumonia, otitis media, or a cough or cold are **not** reasons to defer immunization.

The answers to certain questions on ARI case management that are commonly raised by health workers are provided in Annex 5.

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<sup>1</sup> A manual for the treatment of diarrhoea for use by physicians and other senior health workers. Unpublished document WHO/CDD/SER/80.2 Rev.2 (1990).

## SECTION 3.

**Guidelines for the management of acute lower respiratory infections****3.1 Pneumonia in the child age 2 months up to 5 years**

The following chart summarizes the management of children age 2 months up to 5 years with cough or difficult breathing who do not have stridor, severe undernutrition, or signs suggesting meningitis (abnormally sleepy or difficult to wake or convulsions). Children with stridor should be managed according to section 3.4. The presence of severe undernutrition modifies the management recommendations; this is discussed in Annex 3.

**■ Very severe pneumonia**

This classification includes some children with wheezing conditions (bronchiolitis and asthma). Additional treatment instructions for children with wheezing are presented in sections 3.3 and 5.2.

**Clinical signs**

Cough or difficult breathing with:

central cyanosis or  
not able to drink.

Chest indrawing is usually also present.

**Additional clinical information**

If the child has convulsions or is difficult to wake, do a lumbar puncture to ascertain whether meningitis is present.

If the child is not able to drink, examine for a throat abscess (see section 4.3).

**Treatment**

**Admit to hospital.**

**Give oxygen** (see section 5.1).

**Antibiotic therapy:**

Give chloramphenicol intramuscularly every 6 hours. When the child has improved (usually after 3-5 days), change to oral chloramphenicol. Give chloramphenicol for at least 10 days. If chloramphenicol is not available, give benzylpenicillin<sup>1</sup> plus an aminoglycoside (for example, gentamicin). Chloramphenicol is also effective for bacterial meningitis, which can occur in children with pneumonia.

<sup>1</sup> Benzylpenicillin refers to penicillin G or crystalline penicillin for intravenous or intramuscular use.

***Pneumonia management at the small hospital***

For the child age 2 months up to 5 years with cough or difficult breathing  
(who does not have stridor, severe undernutrition, or signs suggesting meningitis)<sup>a</sup>

CLINICAL SIGNS	CLASSIFY AS: <sup>b</sup>	SUMMARY OF TREATMENT INSTRUCTIONS
<ul style="list-style-type: none"> <li>Central cyanosis or</li> <li>Not able to drink.</li> </ul>	VERY SEVERE PNEUMONIA	ADMIT Give oxygen. <b>Give an antibiotic:</b> chloramphenicol. Treat fever, if present. Treat wheezing, if present. Give supportive care. Reassess twice daily.
<ul style="list-style-type: none"> <li>Chest indrawing and</li> <li>No central cyanosis and</li> <li>Able to drink.</li> </ul>	SEVERE PNEUMONIA If child is wheezing, assess further before classifying.	ADMIT <sup>c</sup> <b>Give an antibiotic:</b> benzylpenicillin. Treat fever, if present. Treat wheezing, if present. Give supportive care. Reassess daily.
<ul style="list-style-type: none"> <li>No chest indrawing and</li> <li>Fast breathing.<sup>d</sup></li> </ul>	PNEUMONIA	ADVISE MOTHER TO GIVE HOME CARE. <b>Give an antibiotic (at home):</b> cotrimoxazole, amoxycillin, ampicillin or procaine penicillin. Treat fever, if present. Treat wheezing, if present. Advise the mother to return in 2 days for reassessment or earlier if the child is getting worse.
<ul style="list-style-type: none"> <li>No chest indrawing and</li> <li>No fast breathing.</li> </ul>	NO PNEUMONIA: COUGH OR COLD	If coughing more than 30 days, assess for causes of chronic cough. Assess and treat ear problem or sore throat, if present. Assess and treat other problems. ADVISE MOTHER TO GIVE HOME CARE. Treat fever, if present. Treat wheezing, if present.

<sup>a</sup> If the child has stridor, follow the treatment guidelines outlined in section 3.4.

If the child has severe undernutrition, admit for nutritional rehabilitation and medical therapy (see Annex 5).  
Treat pneumonia with chloramphenicol (see section 3.1).

If the child has signs suggesting meningitis, admit and treat with chloramphenicol (see pages 7-8).

<sup>b</sup> These classifications include some children with bronchiolitis and asthma — see section 3.3.

<sup>c</sup> If oxygen supply is ample, also give oxygen to a child with:

- restlessness (if oxygen improves the condition),
- severe chest indrawing, or
- breathing rate of 70 breaths per minute or more

<sup>d</sup> Fast breathing is: 50 breaths per minute or more in a child age 2 months up to 12 months;  
40 breaths per minute or more in a child age 12 months up to 5 years.

Suspect staphylococcal pneumonia if there is a clinical deterioration despite chloramphenicol treatment, or if chest X-ray shows a pneumatocele or empyema. It should be treated with cloxacillin (or flucloxacillin, oxacillin, nafcillin or methicillin) plus gentamicin, for at least 3 weeks.

**Treat fever**, if present (see section 5.3).

**Treat wheezing**, if present (see section 3.3).

**Supportive care** (see section 5.4).

**Be cautious with fluid therapy** (see section 5.4).

**Reassessment** (see summary on page 18):

Doctor should assess at least twice per day.

Nurse should assess every 2 hours.

If the child responds poorly to treatment:

- Examine for complications:
  - empyema** — consider if there is persistent fever, dullness to percussion, pleural fluid on X-ray.
  - heart failure** — look for big liver, heart rate over 160, large heart (greater than 60% of the thoracic diameter), cardiac murmur, high venous pressure, poor blood flow to the extremities. (A large heart may also indicate purulent pericarditis.)
  - bronchospasm** — see section 3.3.
- Switch to cloxacillin plus gentamicin if staphylococcal pneumonia is suspected.
- If pneumonia persists for more than 10 days despite antibiotic therapy, consider the causes of persistent pneumonia (see section 3.1).

### ■ **Severe pneumonia**

This classification includes some children with wheezing conditions (bronchiolitis and asthma). Decisions on admission should be made after further assessment and, if the child is in respiratory distress or has recurrent wheezing, after assessing the response to a rapid-acting bronchodilator. This is described in section 3.3.

#### **Clinical signs**

Cough or difficult breathing and chest indrawing, but:

no central cyanosis and  
able to drink.

#### **Additional clinical information**

If the child is cyanotic or not able to drink, treat for very severe pneumonia (see section 3.1). If the child has convulsions or is difficult to wake, do a lumbar puncture to ascertain whether meningitis is present. If a lumbar puncture cannot be done and meningitis is suspected, treat for meningitis (as for very severe pneumonia).

## Treatment

### Admit to hospital.

If admission of all children with chest indrawing is not feasible, antibiotic therapy at home with close follow-up can be considered for those without severe chest indrawing, cyanosis, or signs of very severe disease.

**Give oxygen** (where there is an ample supply) if the respiratory rate is above 70, there is severe chest indrawing, or restlessness (if oxygen improves the condition) (see section 5.1).

### Antibiotic therapy:

Give benzylpenicillin intramuscularly every 6 hours for at least 3 days. (Intramuscular ampicillin, although expensive, can be substituted for benzylpenicillin.) After the child has improved, switch to oral ampicillin or amoxycillin, or daily procaine penicillin injections to finish a course of at least 5 days. Antibiotic treatment should be continued for 3 days after the child is well.

If beta-lactamase-producing *H. influenzae* is common in your area, or if the child is severely undernourished, treat instead with chloramphenicol (as for very severe pneumonia - see section 3.1).

**Treat fever**, if present (see section 5.3).

**Treat wheezing**, if present (see section 3.3).

**Supportive care** (see section 5.4).

**Be cautious with fluid therapy** (see section 5.4).

**Reassessment** (see summary on page 18):

Doctor should assess daily.

Nurse should assess every 2 hours.

Switch to chloramphenicol if the child has not improved after 48 hours on benzylpenicillin, or if the child worsens on therapy. Examine for complications.

## ■ Pneumonia

This classification includes some children with wheezing conditions (bronchiolitis and asthma). Additional special management for these children is described in section 3.3.

### Clinical signs

Cough (or difficult breathing) and fast breathing with no chest indrawing.

### Additional clinical information

If the child shows signs of chest indrawing or cyanosis, or is not able to drink, treat as for very severe or severe pneumonia, as appropriate (see section 3.1). If the child is severely undernourished, admit and treat as for very severe pneumonia. If the child has convulsions, or is difficult to wake, do a lumbar puncture to ascertain whether meningitis is present. If a lumbar puncture cannot be done and meningitis is suspected, treat for meningitis (as for very severe pneumonia).

**Treatment**

**Treat at home.**

**Antibiotic therapy:**

Give oral cotrimoxazole, ampicillin, amoxycillin, or daily intramuscular procaine penicillin injections. Give the first dose in the clinic and instruct the mother to give the antibiotic at home for 5 days (or to return to the clinic for a daily procaine penicillin injection).

**Advise the mother to give home care** (see section 5.5).

**Treat fever**, if present (see section 5.3).

**Treat wheezing**, if present (see section 3.3).

**Reassessment** (see summary on page 18):

Advise the mother to return in 2 days for reassessment, or earlier if the child's breathing becomes faster or more difficult, or if the child becomes sicker or is not able to drink.

**■ No pneumonia: cough or cold****Clinical signs**

Cough (or difficult breathing) without fast breathing or chest indrawing. Breathing should be less than 50 per minute in children 2 months up to 12 months; less than 40 per minute in children 12 months up to 5 years.

**Additional clinical information**

Assess and where necessary treat for wheezing (see section 3.3), chronic cough (see section 3.6), ear, nose, or throat complaint (see section 4). The child may have bronchitis. This is characterized by a productive cough but no chest indrawing, fast breathing, wheezing, or cyanosis, and does **not** require antibiotic therapy (see section 3.5).

**Treatment**

**Treat at home.**

**Antibiotic therapy should not be given.**

**Other specific therapy:** for a cough or cold (see section 4.1).

**Treat fever**, if present (see section 5.3).

**Advise the mother to give home care** (see section 5.5).

The most important element of home care is watching the child for signs of pneumonia. Advise the mother to **RETURN QUICKLY** if:

- breathing becomes difficult,
- breathing becomes fast,
- child is not able to drink,
- child becomes sicker.

**REASSESSING THE CHILD WITH VERY SEVERE PNEUMONIA****IF THE CHILD IS:**

Getting worse after 48 hours on chloramphenicol.

**THEN:**

Examine for complications and switch to cloxacillin plus gentamicin if staphylococcal pneumonia is suspected.

**REASSESSING THE CHILD WITH SEVERE PNEUMONIA****IF THE CHILD IS:**

Not improving after 48 hours on benzylpenicillin or getting worse on benzylpenicillin.

**THEN:**

Examine for complications and switch to chloramphenicol.

Still showing signs of pneumonia after 10 days of antibiotic treatment.

Examine for causes of persistent pneumonia.

**REASSESSING THE CHILD WITH PNEUMONIA (TREATED AT HOME WITH AN ANTIBIOTIC)**

**Try to see the child again in 2 days and check for signs of improvement:  
breathing slower, less fever, eating better.  
Assess again and then decide:**

**IF THE CHILD IS:**

Not able to drink, has chest indrawing or signs of very severe disease.

**THEN:**

Admit. Treat as for severe or very severe pneumonia.

Not improving at all but has no signs of severe pneumonia or other signs of very severe disease.

Switch antibiotic and follow closely.

cotrimoxazole

<-----  
switch to  
----->

amoxycillin,  
ampicillin,  
or  
procaine  
penicillin

Improving.

Continue antibiotic. Return if child worsens.

Completely better.

Finish the 5-day course of antibiotic.



### ■ *Persistent pneumonia*

#### Clinical signs

Occasionally a child with a diagnosis of pneumonia remains ill despite 10-14 days of treatment with adequate doses of an appropriate antibiotic. There is usually chest indrawing, a high respiratory rate, and a low-grade fever. If possible, obtain a chest X-ray. Possible causes are:

- **tuberculosis:** seek history of contact, carry out a Mantoux test, and take a chest X-ray if possible (see section 3.6);
- **foreign body:** seek history of sudden onset of symptoms while feeding or playing, take inspiratory and expiratory chest X-rays (see section 3.4);
- **chlamydial pneumonia:** consider especially in infants less than 6 months of age;
- **pneumocystis pneumonia:** may occur in undernourished infants and children with AIDS;
- Also consider other non-infectious causes of persistent symptoms: bronchospasm (see section 3.3) and heart failure.

#### Treatment

Admit (or keep hospitalized).

#### Antibiotic therapy:

- If asthma, a foreign body, or heart failure seem **unlikely**, consider trying high-dose cotrimoxazole (10 mg of trimethoprim per kg of body weight, every 12 hours) to treat possible pneumocystis infection. If there is an improvement after 1-2 weeks, give the drug for a total of 3 weeks.
- If tuberculosis seems likely, or if there is no improvement after 2 weeks' treatment with cotrimoxazole, consider a trial of tuberculosis therapy (see section 3.6).
- See section 3.4 for the management of foreign body.

Supportive care (see section 5.4).

#### Reassessment:

Record the resting respiratory rate each day. Consider possible causes of persistent pneumonia and perform additional diagnostic tests as appropriate.

## 3.2 Pneumonia in the young infant age less than 2 months

### ■ *Severe pneumonia (or very severe disease)*

In this age group the clinical presentation of pneumonia, sepsis, and meningitis may be with respiratory or with less specific clinical signs. Given the similarities in the clinical presentation of these serious bacterial infections, the speed with which they

can result in death in a neonate and a 1-month-old infant, and the fact that instructions for admission and treatment can be basically the same, efforts to distinguish between pneumonia, meningitis, and sepsis have been kept to a minimum in these guidelines. The management of all these conditions in young infants is summarized in this section on severe pneumonia or very severe disease.

All young infants with suspected pneumonia should be admitted for treatment.

There are a number of specific conditions, mainly related to prematurity and complicated delivery, which may present with respiratory signs in the first 48 hours of life and which are not related to pneumonia or sepsis. Hyaline membrane disease is a common example of this. These guidelines are not appropriate for these non-infectious conditions. For their management the reader should consult standard textbooks of paediatrics and neonatology.

### Clinical signs

Suspect pneumonia, sepsis, or meningitis if the neonate or 1-month-old infant has any of the following clinical signs:

- Stopped feeding well (*if feeding well before*)
- Convulsions
- Abnormally sleepy or difficult to wake
- Stridor in calm child
- Wheezing
- Fever (38°C or more) or low body temperature (below 35.5 °C)
- Fast breathing - 60 breaths per minute or more (*this is significant only if it is sustained; the measurement should be repeated at least once*).
- Severe chest indrawing
- Central cyanosis (of the tongue)
- Grunting
- Apnoeic episodes
- Distended and tense abdomen

Indications for oxygen

Fever is uncommon in young infants. When it occurs, it is an indication for antibiotic therapy. (Fever is **not** an indication for antibiotic therapy in children 2 months of age or older.)

### Treatment

Admit to hospital.

Give oxygen if the child has central cyanosis, is not able to drink, has severe chest indrawing, is grunting, or is restless (if oxygen improves the condition) (see section 5.1).

#### Antibiotic therapy:

Give benzylpenicillin (50 000 units per kg of body weight, intramuscularly) AND either gentamicin (2.5 mg per kg of body weight) OR kanamycin (10 mg per kg of body weight). Give the benzylpenicillin every 12 hours for the first week of life; every 6 hours after the first week. Give the gentamicin or kanamycin every 12 hours for the first week of life; every 8 hours after the first week. Gentamicin is preferable to kanamycin.

Treat for at least 5 days. Continue the treatment for 3 days after the child is well.

If **meningitis is suspected**, treat for at least 14 days. Ampicillin plus gentamicin may be more effective than penicillin plus gentamicin.

**Alternative antibiotic therapy:**

In young infants over 1 week of age, chloramphenicol can be given (25 mg per kg of body weight, every 12 hours). Do not give to premature infants.

Streptomycin (12.5 mg per kg of body weight, every 12 hours) can be substituted if gentamicin and kanamycin are not available. Streptomycin should be reserved for the treatment of tuberculosis, if possible.

If no aminoglycoside is available, give benzylpenicillin plus cotrimoxazole. Do not give cotrimoxazole if the neonate is jaundiced or premature.

If hospitalization for parenteral therapy is not possible, oral antibiotics can be administered at home. However, they may not be as effective and should **not** be recommended if parenteral therapy is possible. Consider the possibility of twice-daily visits to the clinic for injections.

**Special supportive care:**

**Maintain a good thermal environment**

Special supportive care is necessary for young infants. The young infant should be kept in a **warm** room (25°C). The room will be easier to heat if it is small with a low ceiling, and has a heavy curtain over the window.

Young infants lose heat rapidly, especially when they are wet. They need to be kept dry and well wrapped, and ideally held close to the mother's body. A hat or bonnet is valuable to prevent heat loss from the head.

Avoid using a heat lamp (the bulb may break, burning the child) or a radiant warmer unless a nurse can be at the bedside. Incubators are hazardous unless they are known to be functioning correctly and electricity is in constant supply. Hot-water bottles should be used only if they are covered with several layers of cloth and do not directly touch the child.

Feel the hands and feet - they should be warm. The rectal temperature should be between 36.5°C and 37.5°C.

**Careful fluid management**

Help the mother to breast-feed frequently, unless the child is in respiratory distress. If the young infant is not able to drink for more than 2 days, give 20 ml of milk per kg of body weight by nasogastric tube 6 times a day (total 120 ml/kg/day). Expressed breast milk is best.

**Other specific therapy:**

If the young infant has stridor when calm, see section 3.4. Stridor is uncommon at this age and usually due to a congenital malformation.

Wheezing in the young infant is usually due to bronchiolitis (see section 3.3).

### ■ *No pneumonia (or very severe disease)*

If the child is breathing at a rate of less than 60 breaths per minute and has no signs of pneumonia (or very severe disease):

Antibiotic therapy should **not** be given.

Advise the mother to keep the baby warm, to breast-feed frequently, and clear a blocked nose if it interferes with feeding.

The mother must **RETURN QUICKLY** if the child's condition worsens, if breathing is difficult, or if feeding becomes a problem.

The following chart summarizes the management of the young infant age less than 2 months.

<b>Management of the young infant with cough or difficult breathing at the small hospital</b> For the young infant age less than 2 months		
CLINICAL SIGNS	CLASSIFY AS:	SUMMARY OF TREATMENT INSTRUCTIONS
<ul style="list-style-type: none"> <li>• Stopped feeding well,</li> <li>• Convulsions,</li> <li>• Abnormally sleepy or difficult to wake,</li> <li>• Stridor in calm child,</li> <li>• Wheezing,</li> <li>• Fever (38°C or more) or low body temperature (below 35.5°C),</li> <li>• Fast breathing<sup>a</sup>,</li> <li>• Severe chest indrawing,</li> <li>• Central cyanosis,</li> <li>• Grunting,</li> <li>• Apnoeic episodes, or</li> <li>• Distended and tense abdomen</li> </ul>	SEVERE PNEUMONIA OR VERY SEVERE DISEASE	ADMIT  Give oxygen <sup>b</sup> if: <ul style="list-style-type: none"> <li>• central cyanosis,</li> <li>• not able to drink.</li> </ul> Give antibiotics: benzylpenicillin and gentamicin. Careful fluid management. Maintain a good thermal environment. Specific management of wheezing or stridor.
<ul style="list-style-type: none"> <li>• No fast breathing, and</li> <li>• No signs of pneumonia or very severe disease.</li> </ul>	NO PNEUMONIA: COUGH OR COLD	ADVISE MOTHER TO GIVE THE FOLLOWING HOME CARE: Keep young infant warm. Breast-feed frequently. Clear nose if it interferes with feeding. Return quickly if: Breathing becomes difficult. Breathing becomes fast. Feeding becomes a problem. The young infant becomes sicker.

<sup>a</sup> Fast breathing is 60 breaths per minute or more in the young infant (age less than 2 months) - repeat the count.

<sup>b</sup> If oxygen supply is ample, also give oxygen to a young infant with:

- restlessness (if oxygen improves the condition),
- severe chest indrawing, or
- grunting.

### 3.3 Wheezing

#### ■ *Managing the wheezing child*

Wheezing occurs when the air flow from the lungs is obstructed, due to narrowing of the small airways.

Infection or an allergic response causes narrowing of the airways by two mechanisms:

- Contraction of the smooth muscles surrounding the airways in the lung (a bronchospasm): this occurs as a reaction to an infection (as in pneumonia) or as an allergic response (as in asthma).
- Swelling of the lining of the bronchioles: this occurs in bronchiolitis, a viral infection of the bronchioles which often occurs in epidemics. It usually affects infants.

The main causes of wheezing are bronchiolitis, other respiratory infections, and asthma (recurrent wheezing). An inhaled foreign body and tuberculous nodes compressing a bronchus can also cause localized wheezing in children (see section 3.4).

Bronchiolitis often occurs in annual epidemics, usually during a particular season of the year. The seasonal pattern varies from country to country. Rural areas may experience epidemics only every 2 to 3 years.

Wheezing can occur during other respiratory infections (including cases of pneumonia). Both pneumonia and wheezing can cause chest indrawing and fast breathing. Therefore, care must be taken when treating wheezing children not to miss treating pneumonia with an antibiotic.

It is not known why there is more wheezing in some geographical areas than in others.

#### **Clinical signs**

Clinical signs of wheezing include:

- the wheeze sound,
- prolonged expiratory phase of respiration,
- effort in breathing out,
- diminished air entry,
- chest indrawing (retractions),
- recurrent cough (especially at night),
- hyperinflated chest (as evidenced by large anterior-posterior dimension or hyperresonance).

Assess whether the child is in respiratory distress:

A child in respiratory distress is uncomfortable and is obviously not getting enough air. The child may also have trouble drinking, feeding, or talking.

Although a stethoscope is not essential, it can be helpful in assessing air entry in a wheezing child before and after the administration of a bronchodilator.

## Treatment

Give oral salbutamol if the child has no respiratory distress. Give also an antibiotic if the child has fast breathing.

Assess initial response to rapid-acting bronchodilator if the child has respiratory distress or if this is a recurrent episode of wheezing.

Administer a rapid-acting bronchodilator (such as nebulized salbutamol) and assess the response after 15 minutes. Repeated administration may be necessary. Guidelines for administering bronchodilators are presented in section 5.2. A decision on the child's condition should be made on the basis of an assessment carried out at least 30 minutes after the last administration of a bronchodilator, since many children will respond then relapse quickly.

Signs of improvement are:

- less respiratory distress (easier breathing),
- less chest indrawing,
- improved air entry.

With improvement, the wheeze sound may decrease or actually increase, if the child was moving little air previously.

### ■ **Recurrent wheezing (asthma)**

Recurrent episodes of wheezing suggest asthma. Asthma is an allergic, non-infectious condition, although attacks can be triggered by respiratory infections.

A child with asthma may have only a recurrent cough (often worse at night). On examination an audible wheeze or difficulty in breathing out may not be present. Consider this possibility when evaluating a child with chronic cough (see section 3.6).

**Response to a rapid-acting bronchodilator** is an important part of the assessment of a child with recurrent wheezing to determine whether the child can be managed at home or should be admitted for more intensive treatment.

#### **Decide on clinical management:**

Children with cyanosis or who are not able to drink should be admitted and treated with rapid-acting bronchodilators and oxygen.

Children who continue to have respiratory distress after bronchodilator treatment should be admitted for treatment. Also admit children who improve then deteriorate rapidly.

Children who do not have respiratory distress and those with initial respiratory distress who improve on the bronchodilator, are not cyanotic, and are able to drink can often be managed at home on oral salbutamol.

These steps are summarized on page 25.

**Summary of treatment instructions for children with wheezing**

If the child is in respiratory distress or if this is a recurrent episode of wheezing:

give salbutamol by nebulizer or metered-dose inhaler (substitute subcutaneous epinephrine if no salbutamol), then decide on management based on the child's response at least 30 minutes later.

**CLINICAL SIGNS****SUMMARY OF TREATMENT INSTRUCTIONS**

- Central cyanosis or
- Not able to drink.

ADMIT  
Give oxygen.  
Give rapid-acting bronchodilators.  
**Give an antibiotic:** chloramphenicol.<sup>a</sup>  
Treat fever, if present.  
Supportive care.

Respiratory distress persists with:

- No central cyanosis and
- Able to drink.

ADMIT<sup>b</sup>  
Give rapid-acting bronchodilator.  
**Give an antibiotic:** benzylpenicillin.<sup>a</sup>  
Treat fever, if present.  
Supportive care.

No respiratory distress and:

- Fast breathing<sup>c</sup>

ADVISE MOTHER TO GIVE HOME CARE  
Give oral salbutamol at home.  
**Give an antibiotic (at home):** cotrimoxazole, amoxycillin, ampicillin or procaine penicillin.<sup>a</sup>

- No fast breathing

ADVISE MOTHER TO GIVE HOME CARE  
Give oral salbutamol at home.

<sup>a</sup> An antibiotic is usually not necessary if the child has asthma.

<sup>b</sup> If oxygen supply is ample, also give oxygen to a child with restlessness (if oxygen improves the condition), or severe chest indrawing, or a breathing rate of 70 breaths per minute or more.

<sup>c</sup> Fast breathing is: 50 breaths per minute or more in a child age 2 months up to 12 months;  
40 breaths per minute or more in a child age 12 months up to 5 years.

**Treatment in hospital****Oxygen therapy:**

Give oxygen if the child is cyanotic or is not able to drink (treatment is similar to that for very severe pneumonia). If the oxygen supply is ample, also give oxygen if the child is restless (if oxygen improves the condition), or has severe chest indrawing, or is breathing 70 breaths per minute or more (see section 5.1).

**Antibiotic therapy:**

Asthma is an uncommon cause of death in children in developing countries and does not usually require treatment with antibiotics if the child is known to have asthma and has no other signs of a serious bacterial infection. It should be treated with bronchodilators. Management protocols for severe asthma vary from country to country.

**Bronchodilator therapy:**

See section 5.2 for guidelines on the administration of bronchodilators.

**Treat fever, if present** (see section 5.3).

**Supportive care** (see section 5.4).

Correction of fluid deficits is important because bronchodilators work poorly in acidotic, dehydrated children.

**Other specific therapy:**

A short course of steroid treatment may sometimes be useful in asthmatic children who are experiencing a prolonged or severe attack. Steroids should not be used in children with suspected bronchiolitis, bacterial pneumonia, or tuberculosis. Anti-malarial chemoprophylaxis should be given concurrently in malarious areas.

**Treatment at home**

**Advise mother to give home care** (see section 5.5).

**Bronchodilator therapy:**

Give oral salbutamol for 5 days. Reassess the child in 2 days. Treatment with oral salbutamol may need to continue for some weeks at home.

Some children need additional therapy at home, such as salbutamol by metered-dose inhaler.

**■ First episode of wheezing**

The first episode of wheezing in an infant under 6 months of age is probably due to bronchiolitis. As the infant gets older, the likelihood of bronchiolitis declines and more first episodes of wheezing will be due to an initial attack of asthma. At 18 months, bronchiolitis is unlikely and a first episode of asthma more common. The first episode of wheezing can also be due to bronchospasm induced by a viral, parasitic, or bacterial respiratory infection (including bacterial pneumonia).

If the child is in respiratory distress, administer a rapid-acting bronchodilator.<sup>1</sup>

<sup>1</sup> The use of bronchodilators in infants varies. Some paediatricians do not try a bronchodilator in infants (particularly those less than 6 months) since only a small portion will respond; others try therapy at least once and continue if a good response is observed.



Children with wheezing who are breathing comfortably and are not in respiratory distress can be managed without trying a rapid-acting bronchodilator. They should be alert and able to feed.

Use the table on page 25 to decide on management.

### **Treatment in hospital**

#### **Oxygen therapy:**

Oxygen is important in the treatment of severe wheezing, particularly if the child does not respond to bronchodilators. Give oxygen if the child is cyanotic or not able to drink. If the oxygen supply is ample, also give oxygen if the child is restless (if oxygen improves the condition), or has severe chest indrawing, or is breathing 70 breaths per minute or more (see section 5.1).

#### **Antibiotic therapy:**

All children experiencing a first episode of wheezing who have fast breathing or signs of severe wheezing should receive an antibiotic because of the difficulty of clinically excluding a secondary bacterial pneumonia. In the absence of radiography, bronchiolitis cannot be reliably distinguished from wheezing due to bacterial pneumonia<sup>1</sup>. The specific antibiotic to be given depends on the severity of the illness. Children with severe wheezing should receive benzylpenicillin or chloramphenicol. Children with fast breathing but no respiratory distress can be treated with cotrimoxazole, amoxycillin, ampicillin, or procaine penicillin.

#### **Bronchodilator therapy:**

Infants with bronchiolitis whose wheezing is caused only by swelling of the lining of the small airways (mucosal oedema) will not respond to a bronchodilator. In contrast, a bronchodilator may be effective in infants whose wheezing is caused by spasm of the smooth muscles surrounding the small airways.

In children with suspected bronchiolitis, inhalations of salbutamol should be continued only if there is evidence of response to its initial administration. If nebulized salbutamol is ineffective, do not treat with epinephrine or aminophylline.

**Treat fever**, if present (see section 5.3).

**Supportive care** (see section 5.4).

### **Treatment at home**

**Advise mother to give home care** (see section 5.5).

#### **Bronchodilator therapy:**

Children with a first episode of wheezing but no respiratory distress who are able to eat and drink and do not appear to be very sick can often be managed at home on oral salbutamol.

<sup>1</sup> This recommendation assumes a setting with a substantial incidence of bacterial pneumonia and prevalence of risk factors for pneumonia, such as undernutrition and low birth weight.

**Antibiotic therapy:**

Children with fast breathing should be treated with cotrimoxazole, amoxycillin, ampicillin, or procaine penicillin (see above).

**3.4 Stridor**

Stridor is a harsh inspiratory noise caused by inflammation of the larynx, trachea, or epiglottis. Croup is the clinical syndrome characterized by stridor.

In industrialized countries, stridor is usually due to simple viral croup, caused by para-influenza, influenza, or respiratory syncytial virus. Congenital malformation and a foreign body can also cause stridor.

In most developing countries, stridor is less often caused by these viruses and is more frequently due to measles, diphtheria (in some countries), or bacterial croup. Bacterial croup can involve the epiglottis (acute epiglottitis, which is usually caused by *H. influenzae*) or the trachea (bacterial tracheitis). Since the common causes of stridor differ greatly from country to country, management protocols for stridor also vary. However, a brief summary of clinical signs and recommended treatment is provided below.

**■ Severe croup****Clinical signs**

Severe croup is characterized by stridor in a calm child, chest indrawing, and hoarseness. In bacterial croup, there may be copious purulent sputum, high fever, drooling, severe airway obstruction, and a prolonged course. Examination of the throat should be avoided or done very cautiously since gagging can precipitate acute obstruction.

Severe croup is more likely to be of bacterial origin than mild croup.

**Treatment**

**Admit to hospital.**

**Antibiotic therapy:**

Give chloramphenicol.

**Other specific therapy:**

Ensure that the child is closely supervised and that tracheostomy equipment is immediately available. A surgeon should examine and follow the child closely. Watch closely for signs of obstruction: severe chest indrawing, agitation and anxiety (air hunger) because of inability to breathe, cyanosis, and minimal air exchange. If any of these signs are present, perform a tracheostomy.

Refer to a tertiary facility after the first dose of chloramphenicol if tracheostomy is not possible or an experienced surgeon is not available. Tracheostomy is very difficult to perform in small children.

Cooled steam, cough suppressants, and mucolytics are not effective.

### ■ *Mild croup*

#### Clinical signs

Mild croup is characterized by a hoarse voice and harsh barking cough but no stridor when calm, and no signs of diphtheria or pneumonia.

Stridor in a child with measles is an indication for admission, even if it occurs only when the child is upset or crying.

#### Treatment

Treat at home.

Antibiotic therapy should **not** be given.

Advise the mother to give home care (see section 5.5).

### ■ *Diphtheria*

#### Clinical signs

Laryngeal diphtheria may present with inspiratory stridor, a harsh cough, and a hoarse voice, and may therefore be confused with other causes of croup. Examine the child's throat and look for a greyish, adherent pharyngeal membrane. An adherent membrane cannot be wiped away with a swab. Be very gentle when examining the throat, because it is very easy to cause complete airway obstruction.

#### Treatment

Admit to hospital.

Antibiotic therapy:

Give procaine penicillin (as for pneumonia), intramuscularly, each day for 7 days.

Other specific therapy:

Give 40 000 units of diphtheria antitoxin, intramuscularly or intravenously.

Tracheostomy may be required for airway obstruction.

Supportive care (see section 5.4).

### ■ **Inhaled foreign body**

#### **Clinical signs**

An inhaled foreign body may cause stridor and cough of sudden onset. The child often has a normal voice and there is usually a history of choking or one suggesting inhalation (e.g., the symptoms may have started suddenly while the child was eating or playing). The cough is usually persistent. Auscultation may reveal localized wheeze or decreased air entry.

#### **Treatment**

Refer to a surgeon who can remove the foreign body by bronchoscopy, if feasible. If the child is seen soon after the choking event, hold the child upside down and slap him or her on the back.

#### **Antibiotic therapy:**

Give an antibiotic for pneumonia if the child has fast breathing.

Careful follow-up is important in case serious complications develop.

### ■ **Retropharyngeal abscess**

Can also cause stridor (see section 4.3).

## **3.5 Bronchitis (tracheobronchitis)**

Bronchitis is common in children. It is almost always caused by a viral infection (due to respiratory syncytial virus, influenza virus, para-influenza virus, or rhinovirus). Bronchitis is usually associated with an upper respiratory infection (a cold) in young children (see section 4.1). It is occasionally caused by *Mycoplasma pneumoniae* in older children.

#### **Clinical signs**

Productive cough **without** cyanosis, chest indrawing, wheezing, or fast breathing (see section 3.1).

Bronchitis usually begins with a dry cough that becomes loose after 2 or 3 days<sup>1</sup>. If wheezing is present, it is often due to asthma or bronchiolitis (see section 3.3). The term 'wheezy bronchitis' should **not** be used.

#### **Treatment**

Treatment is the same as for a cough or cold without pneumonia (see section 4.1).

**Treat at home.**

**Antibiotic therapy should not be given.**

**Advise the mother to give home care** (see section 5.5).

<sup>1</sup> On auscultation, rhonchi (low-pitched, continuous sounds) may be heard. Rhonchi are often difficult to distinguish from transmitted upper airway sound. Auscultation is not necessary for diagnosis.

## 3.6 Chronic cough (for more than 30 days)

### ■ *Tuberculosis*

#### Clinical signs

Chronic cough, persistent fever without obvious cause, large lymph nodes, undernutrition or failure to gain weight. A case of tuberculosis in the household should raise suspicion.

#### Additional diagnostic information

Carry out the following investigations:

- chest X-ray;
- intradermal tuberculin (Mantoux) test with 2 Tuberculin Units of Purified Protein Derivative (PPD) with Tween 80 (an induration measuring 10 mm or more is positive);
- microscopy and culture of lymph node aspirate, pleural fluid, ascites or cerebrospinal fluid if clinically indicated; gastric aspirate for culture in suspected pulmonary tuberculosis.

#### Decide on clinical management

If there is a chest X-ray finding consistent with tuberculosis and a positive Mantoux test or positive smear for acid-fast bacilli (AFB), begin therapy. The tuberculin test may be negative in children with undernutrition, tuberculous meningitis, or miliary tuberculosis.

If these diagnostic tests cannot be carried out, follow weight and symptoms after a course of an antibiotic that is effective against pneumonia (cotrimoxazole, ampicillin, amoxycillin, or procaine penicillin) administered over at least 2 weeks. In some cases, a second or extended course of antibacterial therapy may be tried. If no other diagnosis is apparent and there is no response to antibiotic treatment, consider antituberculosis therapy.

#### Treatment

Give the treatment recommended for children by the national tuberculosis programme. The least expensive treatment for children is isoniazid and thioacetazone daily for 12 months, plus streptomycin daily for the first 1-2 months. Two short-course regimens are:

- isoniazid, rifampicin, and pyrazinamide daily for the first 2 months, then isoniazid and thioacetazone daily for the next 6 months.
- isoniazid, rifampicin, and pyrazinamide daily for 2 months, then isoniazid and rifampicin daily, or twice a week, for 4 months.

The usual doses of these drugs in children are given below:

DRUG	DOSE (in mg per kg of body weight per day) when given daily	MAXIMUM DOSE (in mg per day)
isoniazid	10	300
pyrazinamide	30	2000
rifampicin	10	600
streptomycin	15	1000
thioacetazone	2.5	150

### ■ *Pertussis (whooping cough)*

A child with pertussis has a cough for many weeks and experiences bouts of very severe coughing. Often the child whoops or vomits at the end of a coughing fit.

The treatment of pertussis is explained in section 3.8.

### ■ *Asthma*

Many children with a chronic cough have asthma. The cough is more common during the night.

Give oral salbutamol (see sections 3.3 and 5.2). The child may need to take salbutamol for many weeks. Explain to the mother that the medicine will help the cough, but will not cure it. The child will probably 'grow out' of the cough in time. Do not give antihistamines, which are ineffective.

### ■ *Inhaled foreign body (see section 3.4).*

## 3.7 Measles

The measles virus infects epithelial cells and damages the immune system. The most important complications are pneumonia, croup, otitis media, severe conjunctivitis (which may lead to corneal ulceration and blindness), enteritis, and severe stomatitis. These complications are probably more frequent and more severe in undernourished children and measles may itself lead to under-nutrition. Nutritional support is important both to assure survival and to limit the undernutrition that results from illness.

Most measles-associated respiratory deaths are from pneumonia, which may be caused by the measles virus itself or by bacterial superinfection. Fatal obstruction from croup (laryngotracheitis) can also occur (presenting as stridor - see section 3.4). Measles can be a large contributor to pneumonia deaths in young children. The case management of pneumonia according to the guidelines presented in section 3.1 should help to prevent many measles-associated pneumonia deaths.

Measles is a vaccine-preventable disease.

**Clinical signs**

The measles rash (a fine, morbilliform rash) characteristically spreads from the face to the trunk and limbs. The rash is usually preceded by a cold with cough, running nose, conjunctivitis, high fever, and tiny white (Koplik) spots on the mucosa inside the cheek.

**Treatment**

Most children can be treated at home.

**Admit to hospital if the child has:**

- a haemorrhagic rash;
- stridor (from infection of the larynx and trachea: laryngotracheitis);
- pneumonia, dehydration, or severe undernutrition;
- great difficulty in drinking or eating.

**Antibiotic therapy:**

Treatment with antibiotics is **not** recommended.

Give an antibiotic only if pneumonia (see section 3.1) or otitis media (see section 4.2) are present. Consider staphylococcal pneumonia if the child has had prior antibiotic treatment or responds poorly to standard antibiotic treatment for pneumonia.

**Other specific therapy:**

In areas with known vitamin A deficiency, give vitamin A orally, once:

- 100 000 international units for infants (age less than 12 months),
- 200 000 international units for children 12 months up to 5 years.

**Treat fever** (see section 5.3), if present.

**Careful skin and eye care** should be provided. Give antibiotic eye ointment for conjunctivitis only if there is pus in the eye.

**Manage stridor** if present (see section 3.4).

For the hospitalized child, **give supportive care** (see section 5.4):

Maintaining nutrition is of key importance in treating the child with measles. Severe stomatitis (inflammation of the inside of the mouth) can prevent effective sucking. If this happens, the mother should express breast milk and feed it with a cup and spoon. Children with measles should receive a high-energy diet and should be encouraged to eat frequently. Feeding every 3 to 4 hours may be necessary to maintain nutrition.

For children who can be cared for at home, **advise the mother to give home care** (see section 5.5).

**Reassessment:**

If the child is unable to eat or is losing weight, the mother should return to the clinic or hospital for assistance with feeding. Increased feeding after the illness is very important to help the child regain lost weight.

### 3.8 Pertussis (whooping cough)

**Clinical signs**

In pertussis, nasal discharge and fever are followed by coughing, which progressively worsens. In infants, the main symptom may be apnoea; in older children, there are paroxysms of coughing followed by a whoop, cyanosis, vomiting, or a convulsion. Between paroxysms of coughing the child may look well.

**Additional clinical information**

An attack of whooping cough may last for weeks or even months. It places a great strain on the child and the family and interferes with nutrition. Uncomplicated pertussis is usually an afebrile disease. If the child develops fever, look for pneumonia and otitis media.

**Treatment in hospital****Admit to hospital if:**

- the infant is less than 6 months old;
- there are complications such as pneumonia, convulsions, dehydration, or severe undernutrition;
- there are spells of prolonged apnoea or cyanosis after coughing.

Treatment of severe cases consists primarily of the administration of oxygen, gentle suction, and maintenance of nutrition and hydration. Cough suppressants do not alter the course of the disease; the benefit of salbutamol is not established.

Give oxygen and apply gentle suction to clear the nose and mouth only if the child becomes cyanotic. Keep suction brief; if carried out for too long it can stimulate coughing and make the illness worse.

**Antibiotic therapy:**

Erythromycin<sup>1</sup> should be administered to prevent the spread of infection to other patients (cotrimoxazole is a less effective alternative). If there are signs of pneumonia, give chloramphenicol. Pneumonia is a frequent complication of pertussis.

**Other specific therapy:**

Give DPT vaccine to any unimmunized siblings to prevent the spread of pertussis.

<sup>1</sup> Refer to ARI Technical Paper "Antibiotics in the treatment of acute respiratory infections in young children" (WHO/ARI/90.10).



**Treatment at home**

Antibiotic therapy modifies infectivity and the course of the disease only if given early. Most children are seen after the first week of illness. Therefore antibiotics should usually not be given, unless the child is seen very early in the illness or if there are signs of pneumonia.

**Other specific therapy:**

Cough suppressants, sedatives, mucolytics, and antihistamines should not be given.

Give DPT vaccine to any unimmunized siblings to prevent the spread of pertussis.

**Treat fever** (see section 5.3), if present.

**Advise the mother to give home care** (see section 5.5).

**Reassessment:**

Encourage the mother to feed the child frequently during and after the illness and especially after each bout of vomiting. Explain that the illness may last for 6-8 weeks (the cough should slowly improve over several weeks). Advise the mother to RETURN QUICKLY if her child starts to breathe fast, has a convulsion, has spells of not breathing, or turns blue.



## SECTION 4.

**Guidelines for the management of acute upper respiratory infections****4.1 Cold and its complications****■ Cold (*nasopharyngitis; common cold*)****Clinical signs**

Colds often cause a fever in the young child which can last from a few hours to 3 days. Nasal discharge can rapidly lead to nasal obstruction, which can interfere with breast-feeding and cause difficult breathing. The nasal discharge often starts as a clear discharge then becomes thick, yellow, and purulent in appearance.

Children often cough when they have a cold.

**Additional clinical information**

Assess for pneumonia if the child has cough or difficult breathing (see sections 3.1 and 3.2).

Assess for otitis media if the child has an ear complaint (see section 4.2).

Some children with a cold and a cough have bronchitis. Bronchitis does not require antibiotic treatment unless signs of pneumonia are present (see sections 3.1 and 3.5).

Children with a sore throat should be assessed for possible streptococcal pharyngitis (see section 4.3).

**Treatment**

**Treat at home.**

**Antibiotic therapy should not be given:**

Antibiotics should not be administered for purulent nasal discharge, high fever, or red throat.

**Advise the mother to give home care** (see section 5.5).

**For high fever or pain, give paracetamol** (see section 5.3).

**Other specific therapy:**

Clear the nose if discharge interferes with feeding. If the nose is blocked with dry or thick mucus, put drops of salted water into the nose or use a moistened wick to help soften the mucus. Advise the mother **not** to buy medicated nose drops – these can be harmful.

Soothe the throat and relieve the cough with safe remedies (see section 5.5). These should not be given to young infants.

### ■ Sinusitis

Purulent nasal discharge is very common in some places and may be chronic; thick green or yellow nasal discharge can also occur during the common cold. However, purulent nasal discharge is usually **not** due to a true bacterial sinusitis. Bacterial sinusitis requiring antibiotic therapy is **uncommon** in children under 5 years.

Sometimes young children poke an insect, a bean, or a stone into a nostril. This can cause a purulent discharge from that nostril.

Posterior drainage of a nasal discharge can cause coughing.

### Clinical signs

Sinusitis is characterized by persistent, purulent, nasal discharge **plus** sinus tenderness, facial or periorbital swelling, or persistent fever. Cough also commonly results from post-nasal discharge.

### Treatment

Purulent nasal discharge alone or with cough is **not** an indication for antibiotic therapy.

**Antibiotic therapy** (cotrimoxazole, ampicillin, or amoxycillin) should be considered **only** if the child has definite signs of bacterial sinusitis: sinus tenderness, facial or periorbital swelling, or persistent fever. This is uncommon in young children.

Advise the mother to give home care (see section 5.5).

## 4.2 Otitis media and its complications

### ■ Acute otitis media

Acute otitis media is an infection of the middle ear. The bacterial pathogens that are most often responsible are *S. pneumoniae* and *H. influenzae*, which are also the most common causes of bacterial pneumonia.

### Clinical signs

Acute otitis media is best diagnosed by pneumatic otoscopy. It is characterized by redness and decreased mobility of the eardrum (tympanic membrane). Mild redness of the eardrum is not sufficient evidence for diagnosing otitis media. Fever occurs in about half of all cases diagnosed by otoscopy.

When an otoscope is not available, acute otitis media should be suspected if pus has been discharging from the ear for less than 2 weeks, or there is sudden, persistent ear pain. Ear rubbing in infants is **not** a reliable sign of otitis media.

### Treatment

Treat at home.

**Antibiotic therapy:**

Give an antibiotic for at least 5 days (the same oral antibiotics as are used for the outpatient treatment of pneumonia: oral cotrimoxazole, amoxycillin, or ampicillin).

**Other specific therapy:**

Give paracetamol for pain or high fever (see section 5.3).

Dry the child's ear by wicking if pus is discharging.

Antihistamines and vasoconstrictors are ineffective in both acute and chronic otitis media.

**Advise the mother to give home care** (see section 5.5).

**Reassessment:**

Reassess after 5 days. Continue the antibiotic for 5 more days if there is pain or fever, or pus continues to drain from the ear. Repeat the otoscopy. Refer if there is no response after 10 days of treatment (if more expert care is available).

**■ Chronic otitis media (chronic suppurative otitis media)**

In many developing countries, children often present with a long history of chronic discharge from one or both ears. If the eardrum has been ruptured for more than 2 weeks, secondary bacterial infection with fungi, yeasts, *Pseudomonas*, *Proteus*, or other Gram-negative enteric organisms usually occurs. This makes antibiotic therapy much less effective. A chronically draining ear will heal only if it is dry. Drying the ear is time-consuming for both the health worker and the mother, but is the only effective therapy.

**Clinical signs**

Pus discharging from the ear for more than 2 weeks.

**Treatment**

Treat at home.

**Antibiotic therapy should not be given<sup>1</sup>.**

**Other specific therapy:**

Wash out the ear:

- Cut the end off a clean, size-8 feeding tube so that it is only 2.5 cm long; attach this to a clean 2-ml syringe.
- Hold the child's head firmly.
- Draw up 0.5 ml of clean water into the syringe; the water should be at room temperature.

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<sup>1</sup> Some paediatricians would give one course of antibiotics to a child with chronic suppurative otitis media.

- Put the cut end of the feeding tube gently into the child's ear and slowly inject the 0.5 ml of water.
- Suck out the water and pus from the ear into the syringe; throw away the dirty water.
- Refill the syringe with 0.5 ml of clean water, and repeat the treatment until no more pus comes out.

You may have to do this once a day for 5 days or more.

**DO NOT FORCE THE FEEDING TUBE INTO THE EAR.** This will damage the eardrum.

After use, soak the syringe and feeding tube in antiseptic solution (for example, 70% alcohol) for 15 minutes, dry them, and store them dry.

**Demonstrate to the mother how to dry the child's ear by wicking at home:**

- Roll a piece of clean, absorbent cloth into a wick and insert it in the child's ear. Leave the wick in the ear for one minute. Then remove it and replace it with a clean wick.
- Watch the mother repeat this until the wick is dry when it comes out (this usually requires about 10-15 minutes). The mother should dry the ear by wicking at home at least 3 times a day, until the wick stays dry. Nothing should be left in the ear between treatments. The child should not go swimming until the ear is dry.

**Reassessment:**

Reassess weekly. More frequent visits may be necessary if the mother needs assistance in drying the ear. Check for mastoiditis. Refer if there is no improvement after 3-4 weeks.

## ■ **Mastoiditis**

### **Clinical signs**

A deep bone infection characterized by painful swelling behind the ear or above the ear in infants.

### **Treatment**

**Admit to hospital.**

**Antibiotic therapy:**

Give chloramphenicol for at least 10 days.

If the child has any signs of brain involvement (meningitis or brain abscess) refer for neurosurgical evaluation (if available).

### 4.3 Pharyngitis and its complications

Most sore throats are due to a virus infection and should not be treated with antibiotics. Apart from diphtheria (which is uncommon), antibiotics are used only:

(1) **To treat** suppurative complications of streptococcal pharyngitis:

- cervical adenitis
- retropharyngeal and peritonsillar abscess

(2) **To prevent** a non-suppurative complication of streptococcal pharyngitis, acute rheumatic fever.

The strategies adopted by national ARI programmes for the prevention of acute rheumatic fever will vary. They should follow the recommendations of the national rheumatic fever programme. Clinical management for children under 5 years can be the same as that recommended for children age 5-15 years, particularly for 3- and 4-year-olds.

Rheumatic fever is rare in children under 3 years of age; most purulent pharyngitis in this age group is of viral origin. Few children of this age need treatment with antibiotics for suspected streptococcal pharyngitis.

#### ■ *Pharyngitis (tonsillitis; pharyngotonsillitis; sore throat)*

##### Clinical signs

If a grey, adherent pharyngeal membrane is seen, suspect diphtheria (see section 3.4).

The clinical signs of streptococcal pharyngitis in children under 5 are:

- tender, enlarged cervical lymph nodes,
- white pharyngeal exudate,
- absence of signs suggesting viral nasopharyngitis: rhinorrhoea, conjunctivitis, cough.

Follow the guidelines of the national rheumatic fever programme. A common approach is to suspect streptococcal pharyngitis in children with both pharyngeal exudate **and** tender, enlarged cervical lymph nodes.

##### Treatment

If streptococcal pharyngitis is suspected (usually in a child 3 years or older), give:

Benzathine penicillin (single injection).

- 600 000 units for children under 5 years
- 1 200 000 units for children 5 years and older

OR, if compliance for 10 days can be assured (which is very difficult):

Ampicillin or amoxycillin for 10 days (same dose as for pneumonia) or penicillin V (phenoxymethylpenicillin) 2-4 times daily for 10 days (see Table of antibiotic doses on page 54).

Cotrimoxazole is not recommended for streptococcal sore throat because it is not effective. If penicillin V is used, give 125 mg twice daily for 10 days.

### ■ **Suppurative complications of pharyngitis**

These are all uncommon in young children.

#### **Clinical signs**

**Cervical adenitis:** enlarged (at least 2.5 cm) and tender lymph node in the neck, which persists after the sore throat has resolved. It should not be confused with lymphadenopathy in the neck, which may accompany a cold or viral sore throat; these lymph nodes are not painful and do not persist after the sore throat has resolved.

**Peritonsillar abscess (quinsy):** very enlarged, red tonsil; sometimes it is fluctuant and the uvula is pushed to one side by the swelling.

**Retropharyngeal abscess:** a large abscess in the back of the pharynx; it may cause stridor and a hyperextended neck.

Both peritonsillar and retropharyngeal abscess can cause difficulty in swallowing and drooling, and may produce tenderness at the angle of the jaw. Consider these possibilities in a child who is not able to drink at all.

#### **Treatment**

Treat at home unless the child is not able to drink at all, has stridor, or requires surgical drainage.

##### **Antibiotic therapy:**

If treated at home: procaine penicillin, ampicillin, or amoxycillin (as for pneumonia).

If admitted: benzylpenicillin (as for severe pneumonia).

Cervical adenitis may require several weeks' treatment. Antibiotics that are effective against staphylococcus may be necessary. Failure to respond to antibiotics may indicate tuberculous infection (scrofula).

##### **Other specific therapy:**

Drainage of the abscess may be necessary.



## SECTION 5. Treatment

### 5.1 Oxygen

#### Indications

If the supply is very limited:

- central cyanosis<sup>1</sup>,
- the child is not able to drink (due to an ALRI).

If there is an ample supply:

- restlessness (if oxygen improves the condition),
- severe chest indrawing,
- or
- in the young infant less than 2 months: grunting,
- in the child 2 months up to 5 years: breathing rate 70 breaths per minute or more.

Young infants with lower respiratory infections have a higher risk of apnoea and respiratory failure if they are not given oxygen when it is required.

#### Administration

Give oxygen through a nasal cannula (tubing with two holes under the nose) or a nasal catheter (a tube in the baby's nose). Nasal catheters require careful placement (to avoid vomiting and gagging) and close nursing supervision to detect catheter blockage and gastric distension.

If giving oxygen by nasal cannula:

- Cut off the nasal prongs, which often irritate the nose.
- Position the holes directly under the nose and tape the cannula to the cheekbone. It is very important to keep the holes in the oxygen cannula directly under the child's nose. Run the cannula tubing under the back of the child's shirt so that the child cannot reach it.
- Keep the child's nose clean and free of mucus: if it is full of mucus, the oxygen cannot reach the lungs. Cleaning can be done by placing 2 or 3 drops of a salt-water solution in each nostril and clearing the nose with a wick of soft cloth. If necessary, give the drops and suction the nose with a soft rubber bulb syringe before feeding and sleeping. Excessive use of the bulb syringe or a suction catheter can cause irritation and swelling and should be avoided.

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<sup>1</sup> Children with severe anaemia and hypoxia will have **pallor** rather than cyanosis.

If giving oxygen by nasal catheter:

- Use an 8FG catheter.
- Insert the catheter in one nostril to a depth equal to the distance from the side of the nose (*alae nasi*) to the front of the ear (*tragus*). If it is not positioned correctly, gagging or vomiting may result.
- If a nasogastric tube is required for feeding, it should be inserted through the same nostril as the oxygen catheter, and the other nostril kept clear of mucus.
- Take care that mucus does not plug the catheter. Monitor the flow of oxygen. Remove and clean the catheter daily.

Adjust the flow of oxygen according to the age of the child, as indicated below:

AGE	LITRES PER MINUTE
Under 2 months:	0.5 litres per minute
2 months or older:	1.0 litre per minute
(2.0 litres per minute may be needed when using the cannula)	

Do not give more because it may cause the stomach to swell and thus hamper breathing. Use a low-flow meter if possible.

If a flow meter is not available, adjust the flow through the nasal cannula so that it can just be felt on your cheek. Nasal catheters should not be used without a flow meter.

Humidification of the oxygen is not necessary with the cannula but desirable with the catheter. Care must be taken to change the water each day. The container, tubing, and catheter must be cleaned and dried at least twice a week to reduce the risk of bacterial contamination.

A head box is another alternative but requires a high flow of oxygen. A head box can deliver a higher concentration of inspired oxygen than the nasal catheter or cannula.

## 5.2 Bronchodilators (administration and dose)

For the purpose of assessing response to a rapid-acting bronchodilator, an agent such as salbutamol administered by nebulizer or metered-dose inhaler with a spacer device is preferred because it causes less tachycardia (than, for example, epinephrine) and cannot be easily overdosed. Subcutaneous epinephrine or intravenous aminophylline should be used only if nebulized salbutamol is not available, or there is a poor response to it in a child with suspected asthma (see section 3.3).

Administer a rapid-acting bronchodilator and assess the response after 15 minutes. If respiratory distress persists, repeat the administration. A decision on the child's condition should be made on the basis of an assessment carried out at least 30

minutes after the last administration of a bronchodilator, since some children will respond then deteriorate quickly. If possible, observe the child on oral salbutamol (or other bronchodilator therapy to be used at home). Children who remain in respiratory distress after a rapid-acting bronchodilator should be admitted to hospital.

In the hospital, continue giving nebulized salbutamol every 4 hours if there is a good response. If necessary, give it every 2 hours. Aminophylline should be added only for children with suspected asthma whose bronchospasm is not adequately controlled with nebulized salbutamol every 2 hours. As the severity of the attack decreases, consider changing from nebulized to oral salbutamol. Observe the child on oral salbutamol for at least 8 hours before discharge.

### ■ **Salbutamol**

#### □ *Salbutamol by nebulizer*

##### **Administration**

Liquid salbutamol can be nebulized by means of a foot pump or an electric air compressor. (It can also be nebulized by a continuous flow of oxygen at 6-8 litres per minute if a plentiful supply of oxygen is available.)

- Unscrew the top of the plastic nebulizer and add the salbutamol and 2 ml of normal saline or sterile water.
- Attach one end of the tubing to the bottom of the nebulizer and the other to the foot pump or the electric air compressor.
- Attach the mask (or T-piece) to the top of the nebulizer.
- For infants and younger children who cannot cooperate, use the aerosol mask. It is not necessary for the mask to be tightly sealed to the child's face.
- The child should be treated until the liquid in the nebulizer has been nearly used up. This usually takes 10-15 minutes.
- Wash the mask with non-residue soap (such as dish-washing detergent) prior to reuse. Wash the tubing and nebulizer daily.
- Do not sterilize with ethylene oxide; this can produce toxic substances. Do not boil or autoclave; this will destroy the tubing.

##### **Dose**

In a child under 5 years, use 0.5 ml liquid salbutamol. Stock solution contains 5 mg/ml.

#### □ *Salbutamol by metered-dose inhaler*

Infants and young children lack the coordination to use a metered-dose inhaler by themselves. Metered-dose inhalers with a spacer device can be used for such children. Spacer devices are available commercially or can be made by modifying locally available containers:

- If the older child can cooperate and breathe through a mouthpiece, an effective spacer can be made by placing the metered-dose inhaler in a one-litre plastic bag and inserting a separate mouthpiece in a corner of the bag. Depress the inhaler to generate 2 puffs and instruct the child to inhale with the mouth closed around the mouthpiece for 5 breaths.
- Younger children who are unable to use a mouthpiece can inhale nebulized salbutamol from a spacer device with an opening that covers the child's nose and mouth. Insert the metered-dose inhaler into the opposite end of the device and depress the inhaler to generate 3 to 5 puffs. Locally adapted spacer devices have included two plastic or waxed cups taped together, a modified plastic intravenous or one-litre soda bottle, and a single coffee cup.

#### □ *Oral salbutamol*

Give oral salbutamol according to the weight and age of the child, 3 times a day.

ORAL SALBUTAMOL	DOSE by AGE or WEIGHT	
	2-11 months (<10 kg)	1-4 years (10-19 kg)
2-mg tablet	1/2	1
4-mg tablet	1/4	1/2

#### ■ *Epinephrine (adrenaline)*

Use the 1:1000 dilution (1 mg/ml = 0.1% solution).

In children with asthma give:

0.01 ml per kg of body weight **subcutaneously**. Use a 1-ml syringe and measure the dose carefully. Avoid use in infants. This dose can be repeated again after 20 minutes.

#### ■ *Aminophylline*

If bronchospasm in the child with asthma is not adequately controlled with nebulized salbutamol, intravenous aminophylline can be added.

##### Administration

Intravenous aminophylline can be dangerous. It is important to:

- weigh the child carefully and give the right dose slowly (diluted, by infusion using a burette, if possible) and always over at least 20 minutes.
- stop giving aminophylline if the child starts to vomit, develops a headache, has a very fast heart rate (more than 180 per minute), or has a convulsion.

##### Dose

The initial dose is 7 mg/kg followed by a maintenance dose of 5 mg/kg every 6 hours.

If aminophylline is supplied as 250 mg in a 10-ml ampoule (25 mg/ml):

- As an initial dose give 0.3 ml per kg intravenously by burette over 1 hour or by very slow push over at least 20 minutes.
- Then, every 6 hours, give 0.2 ml per kg by burette over 1 hour or by very slow push over at least 20 minutes (use this lower dose for the initial dose if the child has been taking theophylline).

See the technical paper "Bronchodilators and other medications for the treatment of wheeze-associated illnesses in young children" (WHO/ARI/93.29) for information on the use of other bronchodilators.

## 5.3 Fever

A moderate elevation of body temperature may improve the body's defenses against infection. A high fever, however, increases oxygen consumption, interferes with feeding, and may cause convulsions. The most effective way to reduce a high fever is to administer paracetamol. Paracetamol is preferable to aspirin because it has fewer side-effects and its use is not associated with Reye syndrome.

### Assessment

Take a history and perform a physical examination to find the cause of the fever. Consider the following possible causes besides pneumonia:

- |                                      |              |
|--------------------------------------|--------------|
| • otitis media                       | • malaria    |
| • other upper respiratory infections | • measles    |
| • bronchitis                         | • meningitis |
| • tuberculosis                       | • diarrhoea  |
| • urinary tract infection            | • abscess    |

### Treatment

Fever alone is not an indication for antibiotic therapy except in young infants less than 2 months old (see section 3.2).

**Specific therapy:**

**Find and treat the cause of the fever.**

**Presumptive therapy for malaria in a falciparum malarious area:**

If the child has fever or a history of fever (or has convulsions, or is abnormally sleepy or difficult to wake), give an antimalarial, or treat according to the recommendations of the national malaria programme.

**Note:** Cotrimoxazole has antimalarial activity. An antimalarial may not be necessary if the child is receiving cotrimoxazole, unless there are signs suggesting cerebral or other severe malaria infection, in which case quinine should be given. Also give a specific antimalarial instead of cotrimoxazole in falciparum malarious areas if malaria is strongly suspected and there is known resistance to sulfadoxine/pyrimethamine (Fansidar). Consult the national malaria programme.

**Antipyretic therapy:**

Give paracetamol if the axillary temperature is over 39°C (102°F), **except** in young infants: 10 to 15 mg per kg of body weight, orally, every 6 hours.

An antipyretic should be given every 4-6 hours when a child has a febrile convulsion (convulsion due to high fever). With this type of convulsion the child looks well afterwards and has no other signs of severe disease.

Sponging with tepid or cold water should be discouraged because it increases oxygen consumption and carbon dioxide production (which may precipitate respiratory failure in a child with pneumonia), and it is uncomfortable.

See the technical paper "The management of fever in young children with acute respiratory infections in developing countries" (WHO/ARI/93.30) for further information.

**5.4 Supportive care in hospital****■ Food**

Anorexia is common during acute respiratory infections, especially if fever is present. Children with severe pneumonia or bronchiolitis may have difficulty in eating because of fast or difficult breathing. Encourage the child to eat small meals frequently. Also encourage continued breast-feeding; it is important to let the mother stay with the child in hospital. If the child is too ill to breast-feed, the mother can express milk into a cup and feed it with a spoon, slowly. (Expressed breast milk can also be given by nasogastric tube.) Do not force children to eat. Feeding should be avoided if the child is so ill that it could cause aspiration.

**■ Fluids**

Increased fluid loss occurs during acute respiratory infections, especially when there is fast breathing or fever. The fluid loss from the lung consists mainly of water. Therefore, to replace fluid in children without diarrhoea, administer breast milk, clean water, milk feeds, and other low-salt fluids.

Children with pneumonia can develop shock due to sepsis. Shock is caused by the capillary leak of fluids and other effects of bacterial toxins. It should be treated vigorously to restore the circulation.

It is important to remember that children with severe pneumonia, bronchiolitis, or other severe ALRI may secrete an inappropriately large amount of anti-diuretic hormone (ADH) and are at risk of fluid overload and pulmonary oedema. Therefore, when the child is not in shock, intravenous fluid should be avoided and oral or nasogastric fluids used instead. However, because of the risk of aspiration, the latter should be used with great caution during the initial care of a child with respiratory distress. Similarly, the intravenous administration of antibiotics (with the attendant risk of delivering excess intravenous fluid) should be avoided and parenteral antibiotics given by the intramuscular route.

In children with ALRI who are dehydrated (but do not have concurrent diarrhoea), the rate of fluid administration is slower and the sodium content of the fluid lower than when dehydration is caused by diarrhoea. Once dehydration has been corrected, a fluid-restricted regimen of about 70% of normal maintenance requirements is suggested.

These procedures are summarized in the chart below.

<b>Fluid management in severe ALRI without diarrhoea</b>	
<b>IF THE CHILD HAS SHOCK AND/OR SEVERE DEHYDRATION:</b>	
	<b>GIVE:</b>
If in shock	Ringer's Lactate 30 ml/kg/hour by intravenous route over 1 hour. Repeat if signs of shock persist.
If not in shock	ORS <sup>a</sup> at 15-20 ml/kg/hour for 2 hours (by NG if not able to drink). Encourage breast-feeding. If signs of shock develop, give Ringer's Lactate IV.
<b>FOLLOWED BY:</b>	
→ If not in shock	ORS at 10 ml/kg/hour for 4 hours (by NG if not able to drink). Encourage breast-feeding.
<b>AFTER FOUR HOURS:</b>	
→	If signs of dehydration persist, repeat the above and encourage breast-feeding.
→	If there are <i>no</i> signs of dehydration, see below.
<b>IF THE CHILD HAS SOME DEHYDRATION:</b>	
Give ORS at 10 ml/kg/hour for 4 hours (by NG if not able to drink). Encourage breast-feeding. Repeat if signs of dehydration persist.	
<b>IF THE CHILD HAS NO SIGNS OF DEHYDRATION:</b>	
→	Frequent breast-feeding or milk or formula at:  5 ml/kg/hour <sup>b</sup> if age less than 12 months; 3-4 ml/kg/hour <sup>b</sup> if age 12 months up to 5 years.
<sup>a</sup> Oral Rehydration Salts in the WHO-UNICEF recommended formulation of sodium chloride 3.5 g, trisodium citrate, dihydrate 2.9 g, potassium chloride 1.5 g, glucose, anhydrous 20.0 g per litre. <sup>b</sup> The total in 24 hours: 120 ml/kg if age less than 12 months; 72-96 ml/kg if age 12 months up to 5 years.	

In children with ALRI who are dehydrated and also have concurrent diarrhoea, fluid management should be as recommended by the WHO Diarrhoeal Diseases Control Programme.<sup>1</sup> These children should be monitored carefully at all times for signs of fluid overload or increasing respiratory distress.

<sup>1</sup> A manual for the treatment of diarrhoea for use by physicians and other senior health workers. Unpublished document WHO/CDD/SER/80.2 Rev. 2 (1990).

### ■ **Secretions**

As many infants do not normally breathe through the mouth, a blocked nose may cause respiratory distress and some difficulty in breast-feeding. A normal child with a blocked nose tries to suck and thus behaves differently from a child who is anorexic or too ill to feed.

Use a plastic syringe (without a needle) to gently suck any secretions from the nose when it is necessary to clear the airway. Use saline nosedrops if the nose is blocked by dry mucus (see section 4.1).

### ■ **Thermal environment**

It is important not to overheat or chill a child who has pneumonia. Heat and cold stress can both increase a child's oxygen consumption two or threefold, increase carbon dioxide production, and precipitate respiratory failure. A neutral thermal environment minimizes oxygen consumption.

The child with pneumonia or another serious respiratory infection should be nursed, lightly clothed, in a warm room (25°C). Proper temperature control is much more important than humidification of the air. The thermal environment is especially important for the neonate (see section 3.2).

## **5.5 Home care (for the child age 2 months up to 5 years)**

The following sections should help the health worker to advise the mother on the home care of her child with an acute respiratory infection. This advice covers supportive care and careful observation for signs of pneumonia. In addition, if an antibiotic, paracetamol, an antimalarial, or any other specific medicine has been recommended for use at home, the mother must understand how to administer it and when to return for reassessment.

See section 3.2 for home care instructions for young infants (age less than 2 months).

### ■ **Feed the child**

#### **Feed the child during illness, increase feeding after illness.**

Continue feeding during an acute respiratory infection and increase feeding during convalescence to make up lost weight.

Continued feeding will help to prevent undernutrition. It is particularly important for children with lower respiratory infections, whose daily weight loss may be considerable.

Loss of appetite is common during an acute respiratory infection. Encourage the child to eat small, frequent meals. If the child has a fever, lowering the temperature may help him or her to eat.

Ideally, foods given during respiratory infections should have large amounts of nutrients and calories relative to bulk. Depending on the child's age, these should



be mixtures of cereal and locally available beans, or of cereal and meat or fish.<sup>1</sup> Local recommendations will depend on the availability of foods and cultural preferences. Add a few drops of oil to the food, if possible: most staple foods do not contain enough calories per unit weight and need to be enriched with fats or oil and sugar. (In contrast to the recommended diet for a child during and after diarrhoea, it is not necessary to mash or grind food more than usual, or to try and include potassium-containing foods in the diet.) In the exclusively breast-fed infant under 4 months, increase breast-feeding (by giving more milk per feed or by feeding more frequently).

After the respiratory infection is over, if weight has been lost, give one extra meal each day for a week, or until the child has regained normal weight.

#### **Clear the nose if it interferes with feeding.**

If the nose is blocked with dry or thick mucus, put drops of salted water into the nose or use a moistened wick to help soften the mucus. Advise the mother **not** to buy medicated nose drops — these can be harmful.

#### **■ Increase fluids**

##### **Offer the child extra to drink, increase breast-feeding.**

Children with a respiratory infection lose more fluid than usual, especially when they have a fever. Encouraging them to take extra fluid will help to prevent dehydration.

If the child is exclusively breast-fed, breast-feed frequently. If the child is not exclusively breast-fed, offer extra to drink: breast milk, clean water, clear liquids, juice, or milk. Milk feeds should be prepared with the normal amount of clean water.

#### **■ Soothe the throat and relieve the cough with a safe remedy**

Use safe remedies such as tea with sugar and home-made cough syrups.

Cough and cold remedies that contain atropine, codeine, alcohol, phenylephrine, or high doses of antihistamines should be avoided. They may sedate the child and interfere with feeding and the child's ability to clear secretions from the lungs. Cough and cold remedies and antibiotics do not alter the duration of a cold, nor do they prevent pneumonia or otitis media. Some cough and cold remedies are not harmful and may be symptomatically helpful. Simple cough syrups can soothe a sore throat by moistening it and help to relieve a dry cough. These can be prepared in the clinic or at home, or purchased commercially. These should not be given to young infants.

See the technical paper "Cough and Cold Remedies in the Treatment of Acute Respiratory Infections in Young Children" for further information.

<sup>1</sup> This is the same energy-rich food recommended for weaning for a child with undernutrition, or for feeding during and after diarrhoea. Health workers should be familiar with acceptable local recipes that are energy- and nutrient-rich, composed of readily available ingredients, and compatible with existing practices and beliefs regarding the feeding of children during health and illness.

## THE MOST IMPORTANT HOME CARE ADVICE:

■ **Watch for signs indicating that the child may have pneumonia  
(in the child classified as No Pneumonia: cough or cold)**

The mother should watch for the following signs and bring the child back QUICKLY to the health worker if:

- breathing becomes difficult,
- breathing becomes fast,
- the child is not able to drink,
- the child becomes sicker.

Home care advice is summarized as follows on the ARI Case Management Chart:

ADVISE MOTHER TO GIVE HOME CARE (For the child age 2 months up to 5 years)*	
<ul style="list-style-type: none"> <li>• Feed the child.               <ul style="list-style-type: none"> <li>• Feed the child during illness.</li> <li>• Increase feeding after illness.</li> <li>• Clear the nose if it interferes with feeding.</li> </ul> </li> <li>• Increase fluids.               <ul style="list-style-type: none"> <li>• Offer the child extra to drink.</li> <li>• Increase breast-feeding.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Soothe the throat and relieve the cough with a safe remedy</li> <li>• Most important: In the child classified as having No Pneumonia: Cough or Cold, watch for the following signs and return quickly if they occur:               <ul style="list-style-type: none"> <li>• Breathing becomes difficult.</li> <li>• Breathing becomes fast.</li> <li>• Child is not able to drink.</li> <li>• Child becomes sicker.</li> </ul> </li> </ul>

This child may have pneumonia.

\* See section on young infant for home care instructions for that age group (p.22).

■ **Additional advice for the mother**

Advise the mother against overheating the child by overdressing or wrapping, if this practice is common.

It is particularly important to protect the young infant from chilling.

## 5.6 Antibiotics

Table of antibiotic doses

ANTIBIOTIC	Dose/frequency (for each dose, not total daily dose)	Form	Amount per dose (in tablets, capsules, or ml) according to body weight in kg					
			3-5 kg	6-9 kg	10-14 kg	15-19 kg	20-29 kg	
Amoxycillin oral	15 mg per kg every 8 hours	250-mg tablet	tablet	0.25	0.5	0.5	1	1
oral	15 mg per kg every 8 hours	Syrup containing 125 mg in 5 ml	ml	2.5	5	10	10	-
Ampicillin oral	25 mg per kg every 6 hours	250-mg tablet	tablet	0.5	1	1	1	2
intramuscular <sup>a</sup> or intravenous	50 mg per kg every 6 hours	vial of 500 mg, mix with 2.5 ml sterile water	ml	1 <sup>a</sup>	2	3	4-5	5-6
Chloramphenicol <sup>b</sup> intramuscular or intravenous	25 mg per kg every 6 hours	vial of 1 g; mix with 4 ml sterile water	ml	0.5 <sup>b</sup>	1	1.5	2	2.5
oral	maximum 1 gram per dose	125-mg/5-ml sus- pension (palmitate)	ml	6	8	12	15	-
oral		250-mg capsule	capsule	-	-	1	1	2
Cloxacillin, <sup>a</sup> flucloxacillin, oxacillin intramuscular or intravenous	25-50 mg per kg every 6 hours	vial of 250 mg; mix with 1 ml sterile water	ml	0.5 <sup>a</sup>	0.5	1	1	1.5
oral		250-mg capsule	capsule	-	-	1	1	1
Cotrimoxazole <sup>c</sup> oral (trimethoprim- sulphamethoxazole; TMP-SMX)	4 mg of trimetho- prim per kg every 12 hours	Adult single strength tablet containing 80 mg trimethoprim + 400 mg of sulphamethoxazole	tablet	0.25 <sup>c</sup>	0.5	1	1	1
oral	4 mg of trimetho- prim per kg every 12 hours	Paediatric tablet con- taining 20 mg of trimetho- prim + 100 mg of sulpha- methoxazole	paediatric tablet	1 <sup>c</sup>	2	3	3	4
oral	4 mg of trimetho- prim per kg every 12 hours	Syrup containing 40 mg of trimethoprim + 200 mg of sulphamethoxazole per 5 ml	ml	2.5 <sup>c</sup>	5	7.5	7.5	-

<sup>a</sup> Cloxacillin, flucloxacillin, oxacillin, nafcillin, methicillin, and parenteral ampicillin: for infants in the first week of life, give this dose every 12 hours; in the second through fourth weeks of life, every 8 hours.

<sup>b</sup> Do not give chloramphenicol to premature neonates. For young infants over 1 week of age, give chloramphenicol, 25 mg/kg every 12 hours.

<sup>c</sup> If the child is less than 1 month old, give cotrimoxazole 1/2 paediatric tablet or 1.25 ml syrup twice daily. Avoid cotrimoxazole in neonates who are premature or jaundiced.

See the technical paper "Antibiotics in the treatment of acute respiratory infections in young children" (WHO/ARI/90.10) for information on side-effects, doses and efficacy.

*Table of antibiotic doses (continued)*

ANTIBIOTIC	Dose/frequency (for each dose, not total daily dose)	Form	Amount per dose (in tablets, capsules, or ml) according to body weight in kg					
			3-5 kg	6-9 kg	10-14 kg	15-19 kg	20-29 kg	
<b>Gentamicin<sup>e</sup></b> intramuscular or intravenous (an aminoglycoside)	2.5 mg per kg <sup>d</sup> every 8 hours	vial containing 20 mg (2 ml at 10 mg/ml) undiluted	ml	1 <sup>e</sup>	2	3	-	-
		vial containing 80 mg (2 ml at 40 mg/ml) mix with 6 ml sterile water	ml	1 <sup>e</sup>	2	3	-	-
		vial containing 80 mg (2 ml at 40 mg/ml) undiluted	ml	0.25 <sup>e</sup>	0.5	0.75	1	1.5
<b>Kanamycin</b> intramuscular or intravenous (an aminoglycoside)	10 mg per kg <sup>d</sup> every 8 hours	vial containing 250 mg (2 ml at 125 mg/ml)	ml	0.4	0.75	1	1.5	2
<b>Methicillin or<sup>a</sup> nafcillin</b> intramuscular or intravenous	25-50 mg per kg every 6 hours	vial of 500 mg; mix with 1.7 ml sterile water vial of 1 gram; mix with 3.4 ml sterile water	ml	0.5 <sup>a</sup>	0.5	1	1	1.5
<b>PENICILLIN</b>								
<b>Benzylpenicillin<sup>e</sup></b> intramuscular (penicillin G)	50 000 units per kg every 6 hours	vial of 600 mg (1 000 000 units); mix with 2 ml sterile water	ml	0.5 <sup>e</sup>	1	1	2	2
<b>Procaine penicillin</b> intramuscular only	50 000 units per kg daily	vials of 3 grams (3 000 000 units); mix with 4 ml sterile water	ml	0.5 200 000 units	0.75 400 000 units	1 800 000 units	1.5	2
<b>FOR SUSPECTED STREPTOCOCCAL PHARYNGITIS (NOT FOR PNEUMONIA):</b>								
<b>Penicillin V</b> oral (phenoxy- methylpenicillin)	12.5 mg/kg every 6 hours or	125-mg tablet	tablet	0.5	1	2	2	2
	25 mg/kg every 12 hours			1	2	3	3	3
<b>Benzathine penicillin</b> intramuscular only		vial of 1.2 million units		300 000 units		600 000 units		1.2 million units

<sup>d</sup> In administering an aminoglycoside, it is preferable to calculate the **exact** dose based on the child's weight and to avoid using undiluted 40 mg/ml gentamicin.

<sup>e</sup> For the first week of life: benzylpenicillin 50 000 units/kg every 12 hours plus gentamicin 2.5 mg/kg or kanamycin 10 mg/kg every 12 hours.

Table of antibiotic efficacy

Activity against common pathogens						
ANTIBIOTIC or antibiotic combinations	<i>Streptococcus pneumoniae</i>	<i>Haemophilus Influenzae</i>	<i>Staphylococcus aureus</i>	Group A streptococcus	Gram-negative enteric bacteria <i>E. coli</i> <i>Klebsiella</i> <i>Salmonella</i>	<i>Chlamydia trachomatis</i>
Recommended for pneumonia:						
Cotrimoxazole (trimethoprim + sulphamethoxazole)	good	good	good	poor	good good good	good
Amoxycillin	good	good <sup>a</sup>	poor	good	good poor good	poor
Ampicillin	good	good <sup>a</sup>	poor	good	good moderate good	poor
Procaine penicillin	good	good <sup>a</sup>	poor	good	poor poor poor	poor
Benzylpenicillin	good	good <sup>a</sup>	poor	good	poor poor poor	poor
Benzylpenicillin + aminoglycoside (gentamicin or kanamycin)	good	good <sup>b</sup>	moderate	good	good good moderate	poor
Cloxacillin, flucloxacillin, oxacillin, nafcillin or methicillin + aminoglycoside	good	good <sup>b</sup>	good	good	good moderate good	poor
Chloramphenicol	good	good	good	good	good good good	poor
Recommended for suspected streptococcal pharyngitis but not for pneumonia:						
Benzathine penicillin	good	poor	poor	good	poor poor poor	poor
Penicillin V (oral) (phenoxymethyl penicillin)	good	poor	poor	good	poor poor poor	poor
Not recommended for pneumonia (or for pharyngitis):						
Tetracycline <sup>c</sup>	moderate	poor	poor	poor	moderate moderate poor	good
Sulphonamide alone	good	poor	poor	poor	moderate moderate poor	poor
Aminoglycoside alone	poor	good <sup>b</sup>	moderate	poor	good good moderate	poor

Poor = **not indicated** for infections caused by this agent

<sup>a</sup> Moderate if one assumes that 25% of *H. influenzae* are beta-lactamase positive.

<sup>b</sup> Good is based on MIC testing; clinical efficacy of aminoglycosides for *H. influenzae* is unknown.

<sup>c</sup> Tetracycline should not be used in young children because of its effect on teeth and bones.



## ANNEX 1:

**Rationale for pneumonia case detection by clinical signs and symptoms without auscultation or radiography*****The need for empirical treatment of childhood pneumonia***

Since pneumonia can be caused by a variety of organisms, the ideal approach to its management would be to identify the causative agent(s) in each individual case so that an appropriate antibiotic (if the cause is a bacterium or *Chlamydia*) can be prescribed.

An etiological diagnosis of pneumonia is very difficult to establish in infants and young children because sputum is usually not available. A bacterial cause of pneumonia in young children can only be established by lung (or pleural fluid) aspiration or blood culture. Rapid immunological techniques such as an enzyme-linked immunosorbent assay (ELISA), latex agglutination, or coagglutination do not yet perform adequately for reliable bacteriological diagnosis in children.

Blood cultures are positive in only a portion of children with bacterial pneumonia. In five recent hospital-based studies (in Bangladesh, Brazil, Pakistan, Papua New Guinea, and the Philippines), bacteria were isolated from the blood cultures of 17-27% of children with severe pneumonia.

While cultures of lung aspirates yield a very low false-positive rate (a positive result is strong evidence of bacterial infection), lung puncture is an invasive procedure and there is a small risk of serious complications associated with its use. During the last 20 years it has been used in 12 studies in developing countries in children with pneumonia who had not received previous antibiotic treatment. When the results of these studies were pooled, bacteria were isolated from 453 (56%) of the 808 children examined; they were found in at least 50% of the children in all but two small studies. In fact, a proportion of the negative results were probably false-negatives, because of factors that mask the presence of bacteria. For example, the appropriate lung lesion may not be reached with the needle, the material collected may be scanty, or the laboratory methods may be inadequate to isolate all bacterial pathogens. Thus, the actual proportion of positive cultures was probably higher than that reported. These studies also demonstrated that *S. pneumoniae* and *H. influenzae* were the most frequently isolated bacteria, being identified in 70-80% of the culture-positive cases. *Staphylococcus aureus* causes a small proportion of pneumonia in untreated children, and a larger proportion when the children studied have already had antibiotic treatment, or have hospital rather than community-acquired pneumonia.

Clinical and radiological criteria are unreliable means of determining the etiology of childhood pneumonias. Clinical data, such as leukocyte counts and the level or evolution of fever, are inaccurate in defining the bacterial or viral etiology of pneumonia in children. Segmental or lobar consolidation on chest X-ray, which is considered typical of bacterial pneumonia, may be caused by viruses. Conversely, diffuse or disseminated infiltrates which suggest a viral infection are often caused by bacteria, or by dual viral and bacterial infection.

Because of such problems, an etiological agent can be established in less than one-quarter of children hospitalized with pneumonia in developed countries, despite full diagnostic facilities, and in an even smaller proportion of ambulatory cases. As a result of these diagnostic limitations, the institution of empirical antibiotic therapy for pneumonia is the commonly accepted practice worldwide. Even in developed countries, where only 5-15% of radiologically diagnosed pneumonia is likely to be caused by bacteria, most paediatricians treat all children with pneumonia with an antibiotic because it is impossible to exclude the presence of bacterial infection.

In developing countries, and especially in those with high infant mortality rates (IMR), as many as half of the pneumonia cases in children attending health services may be of bacterial origin. Because of the higher probability of bacterial pneumonia, there is an even stronger justification for the empirical use of antibiotics than in developed countries. Although the evidence from lung aspirate and blood culture studies relates only to hospitalized children with severe or very severe pneumonia, this is the group that experiences the highest case-fatality rate and may account for much of the overall mortality from acute respiratory infections. The proportion of pneumonia with a bacterial etiology may be lower among children attending primary health care services but is high enough to justify empirical antibiotic treatment for suspected pneumonia.

Almost all these cases of pneumonia can be detected by simple clinical signs, without radiography or laboratory data.

### ***Pneumonia case detection by clinical signs and symptoms***

In developing these guidelines for the case detection of pneumonia, clinical signs or symptoms were sought that would:

- (1) identify children who should be examined for possible pneumonia ("entry criteria"): namely, children with an acute illness with cough or difficult breathing;
- (2) amongst these children, identify all (or almost all) cases of pneumonia, in order to ensure antibiotic therapy for possible bacterial pneumonia;
- (3) amongst these children, identify severe cases of pneumonia at higher risk of death who would benefit from hospital care (parenteral antibiotics, oxygen, greater clinical expertise, and better nursing care).

The main purpose of the assessment is to decide on clinical management. For simplicity and ease in training, the smallest number of criteria was sought that would be adequate to make each decision about management.

Several clinical studies which have compared clinical signs with a chest X-ray have shown that fast breathing and chest indrawing can detect cases of pneumonia in young children with cough or difficult breathing who are not wheezing.

An increase in respiratory rate is one of the physiological responses to hypoxia and stiff lungs. However, it can also occur if a child is frightened or upset, so it is essential that the child is calm when the respiratory rate is measured. Since the normal respiratory rate in young infants (less than 2 months) is higher than in older infants and children, a higher threshold for case detection is used in this age group.



Furthermore, the greater variability in respiratory rate in this age group requires that the finding of an elevated rate be checked by a second count.

Stiff lungs (decreased lung compliance) resulting from severe pneumonia cause **chest indrawing**. Children who present with chest indrawing are more likely to have severe pneumonia than children without this sign. Chest indrawing also occurs in wheezing and obstruction of the upper airways (croup syndromes). Chest indrawing may not occur in children with lobar pneumonia since the involvement of one lobe may not decrease total lung compliance.

Antibiotic therapy is recommended for children with fast breathing **or** chest indrawing. Because the respiratory rate can fall when the pneumonia becomes severe or the child is exhausted, using both signs results in the detection of more pneumonia cases.

The highest case-fatality rates occur in children who are either **cyanosed or not able to drink** (very severe pneumonia). The presence of either of these signs indicates an urgent need for admission and intensive therapy including oxygen and broad-spectrum parenteral antibiotics. (Other signs indicating a need for admission are summarized on page 9.)

### ***Why have other clinical signs not been used for detecting cases of pneumonia?***

**Fever** is not a good predictor of pneumonia. Although most children with pneumonia have fever, so do those with viral infections or malaria. Also, some children with pneumonia do not mount a fever (especially undernourished children) or may be afebrile when seen in clinic after receiving antipyretics. Fever alone is not an indication for antibiotic therapy except in young infants less than 2 months of age in whom fever is rare and more likely to mean a serious bacterial infection.

**Crepitations** (rales) are difficult to hear in small children. Although the auscultatory finding of crepitations can be of value to some skilled clinicians, they frequently do not agree on the interpretation of chest noises in a child. Many clinicians, even after years of practice, mistake upper airway noises or rhonchi for crepitations. Lobar consolidation in small children can be missed by the stethoscope. In addition, auscultation is difficult to teach. Since other, simpler clinical signs perform adequately for pneumonia case detection and classification, the use of auscultation has not been discussed in this manual (except in evaluating the response of wheezing children to bronchodilators) and should not be required for the training of health workers in ARI case management.

### ***What are the advantages of using a case management approach based only on clinical signs compared with an approach that relies on radiography and laboratory tests?***

The predictive value of a positive clinical examination for radiographic pneumonia (the proportion of children with clinical signs suggesting pneumonia who have radiographic pneumonia) is variable because it is influenced by the proportion of children examined who have pneumonia. Several studies suggest that the predictive value of a positive examination is 30-50%. Children treated with antibiotics on the basis of clinical signs in settings with an IMR greater than 40 per 1000 live births and a substantial incidence of bacterial pneumonia would thus be estimated

actually to have bacterial pneumonia in 9-25% of cases (see page 61). This is a more favorable treatment ratio of antibiotic therapy to bacterial pneumonia than in developed countries and, in a setting where pneumonia is a significant contributor to mortality, is a prudent and cost-effective clinical approach.

Additional clinical signs or the availability of laboratory tests add little to this decision process. Radiography can reduce the number of false-positive diagnoses of pneumonia but is often not available and the expense does not justify its use in routine case detection of pneumonia. When a limited number of X-rays can be obtained, they are better used for the management of treatment failures and chronic cough.

In many places, the quantity of antibiotics required to treat suspected pneumonia is small compared with the current, often inappropriate, use of these drugs. In some places, most respiratory infections, including simple coughs and colds without pneumonia, are treated with antibiotics. Simplified guidelines and training in standard ARI case management may thus reduce the total quantity of antibiotics dispensed for acute respiratory infections.

See the technical paper "Technical bases for the WHO recommendations on the management of pneumonia in children at first-level health facilities" (WHO/ARI/91.20) for further information.

## COMPARISON OF THE BENEFIT OF EMPIRICAL THERAPY FOR PNEUMONIA IN HOSPITAL OUTPATIENT CLINICS IN DEVELOPED AND DEVELOPING COUNTRIES

**In settings with a low IMR and radiographic facilities where all children with suspected pneumonia are X-rayed**

Example of a case management strategy:

- Examine for clinical signs of pneumonia
- X-ray children with suspected pneumonia
- Treat all children with radiographic pneumonia with antibiotics

10/10 children treated have radiographic pneumonia

1/10 children with radiographic pneumonia may have bacterial pneumonia

$$\frac{10}{10} \times \frac{1}{10} = \frac{10}{100} \text{ children with bacterial pneumonia}$$

children who receive antibiotics

**RESULT - with radiography:**

**Of 100 children who receive antibiotics, 10 have bacterial pneumonia<sup>a</sup>**

**In settings with an IMR >40 without radiography (or where its use is not cost-effective)**

ARI Programme case management strategy:

- Examine for clinical signs of pneumonia
- Treat all children with clinical pneumonia with antibiotics

3 to 5/10 children treated with clinical signs suggesting pneumonia (clinical pneumonia) have radiographic pneumonia (this proportion will be higher in some settings)

3 to 5/10 children with radiographic pneumonia may have bacterial pneumonia

$$\frac{3 \text{ to } 5}{10} \times \frac{3 \text{ to } 5}{10} = \frac{9 \text{ to } 25}{100} \text{ children with bacterial pneumonia}$$

children who receive antibiotics

**RESULT - without radiography:**

**Of 100 children who receive antibiotics, 9 to 25 have bacterial pneumonia**

<sup>a</sup> In this setting, if some children with clinical pneumonia are treated without chest X-ray or on the basis of auscultatory findings despite a clear chest X-ray, even fewer children who receive antibiotics will have bacterial pneumonia.

ANNEX 2:  
First-level facility  
ARI case  
management  
charts

MANAGEMENT OF THE CHILD  
WITH COUGH OR DIFFICULT BREATHING

ASSESS

ASK:

- How old is the child?
- Is the child coughing? For how long?
- Age 2 months up to 5 years: Is the child able to drink?
- Age less than 2 months: Has the young infant stopped feeding well?
- Has the child had fever? For how long?
- Has the child had convulsions?

LOOK, LISTEN:

(Child must be calm)

- Count the breaths in one minute.
- Look for chest indrawing.
- Look and listen for stridor.
- Look and listen for wheeze. Is it recurrent?

- See if the child is abnormally sleepy, or difficult to wake.
- Feel for fever, or low body temperature (or measure temperature).
- Look for severe undernutrition

CLASSIFY THE ILLNESS

THE CHILD  
AGE 2 MONTHS UP TO 5 YEARS

Does child have danger signs?

SIGNS:	<ul style="list-style-type: none"><li>• Not able to drink.</li><li>• Convulsions.</li><li>• Abnormally sleepy or difficult to wake.</li><li>• Stridor in calm child, or</li><li>• Severe undernutrition.</li></ul>
CLASSIFY AS:	VERY SEVERE DISEASE
TREATMENT:	<ul style="list-style-type: none"><li>▶ Refer URGENTLY to hospital.</li><li>▶ Give first dose of an antibiotic.</li><li>▶ Treat fever, if present.</li><li>▶ Treat wheezing, if present.</li><li>▶ If cerebral malaria is possible, give an antimalarial.</li></ul>

THE YOUNG INFANT  
(AGE LESS THAN 2 MONTHS)

SIGNS:	<ul style="list-style-type: none"><li>• Stopped feeding well.</li><li>• Convulsions.</li><li>• Abnormally sleepy or difficult to wake.</li><li>• Stridor in calm child.</li><li>• Wheezing, or</li><li>• Fever or low body temperature.</li></ul>
CLASSIFY AS:	VERY SEVERE DISEASE
TREATMENT:	<ul style="list-style-type: none"><li>▶ Refer URGENTLY to hospital.</li><li>▶ Keep young infant warm.</li><li>▶ Give first dose of an antibiotic.</li></ul>

Does child have pneumonia?		Signs		Classification		Treatment	
No chest indrawing, and Fast breathing (50 per minute or more for child 2 months up to 12 months; 40 per minute or more for child 12 months up to 5 years)	No chest indrawing, and Fast breathing (50 per minute or more for child 2 months up to 12 months; 40 per minute or more for child 12 months up to 5 years)	No chest indrawing, and Fast breathing (50 per minute or more for child 2 months up to 12 months; 40 per minute or more for child 12 months up to 5 years)	No chest indrawing, and Fast breathing (50 per minute or more for child 2 months up to 12 months; 40 per minute or more for child 12 months up to 5 years)	SEVERE PNEUMONIA	NO PNEUMONIA: COUGH OR COLD	Refer URGENTLY to hospital. Keep young infant warm. Give first dose of an antibiotic. Treat fever, if present. Treat wheezing, if present. (If referral is not feasible, treat with an antibiotic and follow closely.)	Advise mother to give the following home care: Keep young infant warm. Breathe frequently. Clear nose if it interferes with feeding. Return quickly if: Breathing becomes difficult. Feeding becomes fast. The young infant becomes sicker.
<p><b>Signs:</b></p> <ul style="list-style-type: none"> <li>No chest indrawing, and</li> <li>No fast breathing (LESS than 60 per minute)</li> </ul> <p><b>Classification:</b></p> <p>SEVERE PNEUMONIA</p> <p><b>Treatment:</b></p> <ul style="list-style-type: none"> <li>Refer URGENTLY to hospital.</li> <li>Keep young infant warm.</li> <li>Give first dose of an antibiotic.</li> <li>(If referral is not feasible, treat with an antibiotic and follow closely.)</li> <li>Breathing becomes difficult.</li> <li>Feeding becomes fast.</li> <li>The young infant becomes sicker.</li> </ul>							

## TREATMENT INSTRUCTIONS

### Give an Antibiotic

- Give first dose of antibiotic in clinic.
- Instruct mother on how to give the antibiotic for five days at home (or to return to clinic for daily penicillin injection).

AGE or WEIGHT	COTRIMOXAZOLE		AMOXICILLIN		PENICILLIN	
	Tablet	Syrup	Tablet	Syrup	Tablet	Syrup
Less than 2 months (<5 kg)	1/4*	2.5 ml*	1/4*	2.5 ml	1/4	2.5 ml
2 months up to 12 months (6-11 kg)	1/2	5 ml	1/2	5 ml	1	5 ml
12 months up to 5 years (12-19 kg)	1	10 ml	1	10 ml	1	10 ml

- \* Give oral antibiotic for 5 days at home only if referral is not feasible.
- If the child is less than 1 month old, give 1/2 penicillin tablet or 1.25 ml syrup twice daily.
- Advise cotrimoxazole in tablets for children under one month of age who are premature or jaundiced.

### Advise Mother to Give Home Care

(For the child age 2 months up to 5 years)\*

- Feed the child.
- Soothe the throat and relieve the cough with a safe remedy.
- Most important: In the child classified as having No Pneumonia, Cough or Cold, watch for the following signs and return quickly if they occur:
  - Breathing becomes difficult
  - Feeding becomes fast
  - Child becomes sicker
- Child becomes sicker.

\* See section on young infant for home care instructions for that age group

### Treat Fever

- Fever is high (38.5°C or higher)
- Fever is not high (38.5°C or lower)
- Give paracetamol
- Advise mother to give more fluids

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- Fever is not high (38.5°C or lower)
- Give paracetamol
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- Fever is not high (38.5°C or lower)
- Give paracetamol
- Advise mother to give more fluids

### Treat Wheezing

- Children with First Episode of Wheezing
  - If in respiratory distress → Give a rapid acting bronchodilator and refer.
  - If not in respiratory distress → Give oral salbutamol.
- Children with Recurrent Wheezing (Asthma)
  - Give a rapid acting bronchodilator
  - Assess the child's condition 30 minutes later.
  - If:
    - RESPIRATORY DISTRESS OR ANY DANGER SIGN → Treat for SEVERE PNEUMONIA or VERY SEVERE DISEASE (Refer).
    - NO RESPIRATORY DISTRESS AND FAST BREATHING → Treat for PNEUMONIA, COUGH OR COLD
    - NO FAST BREATHING → Treat for NO PNEUMONIA, COUGH OR COLD

RAPID ACTING BRONCHODILATOR		ORAL SALBUTAMOL	
Nebulized (0.5 mg/ml)	Age or Weight	Age or Weight	Age or Weight
2.5 ml	2 months up to 12 months (<10 kg)	2 mg tablet	2 mg tablet
0.01 ml	12 months up to 5 years (10-19 kg)	1 mg tablet	1 mg tablet

# MANAGEMENT OF THE CHILD WITH AN EAR PROBLEM OR SORE THROAT

## EAR PROBLEM

### ASSESS

#### ASK:

- Does the child have ear pain?
- Does the child have pus draining from the ear? For how long?

#### LOOK, FEEL:

- Look for pus draining from the ear or red, immobile ear drum (by otoscopy).
- Feel for tender swelling behind the ear.

### CLASSIFY THE ILLNESS

<b>SIGNS:</b>	<ul style="list-style-type: none"> <li>• Tender swelling behind the ear.</li> </ul>	<ul style="list-style-type: none"> <li>• Pus draining from the ear LESS than two weeks, or</li> <li>• Ear pain, or</li> <li>• Red, immobile ear drum (by otoscopy).</li> </ul>	<ul style="list-style-type: none"> <li>• Pus draining from the ear two weeks or MORE.</li> </ul>
<b>CLASSIFY AS:</b>	<b>MASTOIDITIS</b>	<b>ACUTE EAR INFECTION</b>	<b>CHRONIC EAR INFECTION</b>
<b>TREATMENT:</b>	<ul style="list-style-type: none"> <li>▶ Refer URGENTLY to hospital.</li> <li>▶ Give first dose of an antibiotic.</li> <li>▶ Treat fever, if present.</li> <li>▶ Give paracetamol for pain.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Give an oral antibiotic.</li> <li>▶ Dry the ear by wicking.</li> <li>▶ Reassess in five days.</li> <li>▶ Treat fever, if present.</li> <li>▶ Give paracetamol for pain.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Dry the ear by wicking.</li> <li>▶ Treat fever, if present.</li> <li>▶ Give paracetamol for pain.</li> </ul>

### TREATMENT INSTRUCTIONS

#### ▶ Give an Oral Antibiotic for an Ear Infection

- ▶ Give first dose of antibiotic in clinic.
- ▶ Instruct mother on how to give the antibiotic for five days at home.

AGE or WEIGHT	COTRIMOXAZOLE trimethoprim + sulphamethoxazole ▶ Two times daily for 5 days			AMOXYCILLIN ▶ Three times daily for 5 days		AMPICILLIN ▶ Four times daily for 5 days	
	Adult Tablet single strength (80 mg trimethoprim + 400 mg sulphamethoxazole)	Pediatric Tablet (20 mg trimethoprim + 100 mg sulphamethoxazole)	Syrup (40 mg trimethoprim + 200 mg sulphamethoxazole per 5ml)	Tablet 250 mg	Syrup 125 mg in 5 ml	Tablet 250 mg	Syrup 250 mg in 5 ml
Less than 2 months (< 5 kg) *	1/4*	1*	2.5 ml*	1/4*	2.5 ml	1/2	2.5 ml
2 months up to 12 months (5-9 kg)	1/2	2	5 ml	1/2	5 ml	1	5 ml
12 months up to 5 years (10-19 kg)	1	3	7.5 ml	1	10 ml	1	5 ml

\* Give oral antibiotic for 5 days at home only if referral is not feasible

\* If the child is less than 1 month old, give 1/2 pediatric tablet or 1.25 ml syrup twice daily. Avoid cotrimoxazole in infants less than one month of age who are premature or jaundiced

#### ▶ Dry the Ear by Wicking

- ▶ Dry the ear at least 3 times a day:
  - ▶ Roll clean, absorbent cloth into a wick
  - ▶ Place the wick in the child's ear
  - ▶ Remove the wick when wet
  - ▶ Replace the wick with a clean one until the ear is dry

# SORE THROAT

## ASSESS

### ASK:

- Is the child able to drink?

### LOOK, FEEL:

- Feel the front of the neck for nodes.
- Look for exudate on the throat.

## CLASSIFY THE ILLNESS

### SIGNS:

- Not able to drink.
- Tender, enlarged lymph node on neck and
- White exudate on throat.

### CLASSIFY AS:

#### THROAT ABSCESS

#### STREPTOCOCCAL SORE THROAT

### TREATMENT:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▶ Refer to hospital.</li> <li>▶ Give benzathine penicillin (as for streptococcal sore throat).</li> <li>▶ Treat fever, if present.</li> <li>▶ Give paracetamol for pain.</li> </ul> | <ul style="list-style-type: none"> <li>▶ Give an antibiotic for streptococcal sore throat.</li> <li>▶ Give safe, soothing remedy for sore throat.</li> <li>▶ Treat fever, if present.</li> <li>▶ Give paracetamol for pain.</li> </ul> |
|--|--|

### ► Treat Fever

• Fever is high ( $\geq 39^{\circ}\text{C}$ ).	• Fever is not high ( $38-39^{\circ}\text{C}$ ).	In a falciparum malarious area: • Any fever, or • History of fever.	• Fever for more than five days
▶ Give paracetamol	▶ Advise mother to give more fluids.	▶ Give an antimalarial (or treat according to your malaria programme recommendations)	▶ Refer for assessment

#### PARACETAMOL doses:

→ Every six hours

Age or Weight	100 mg tablet	500 mg tablet
2 months up to 12 months 6-9 kg	1	1/4
12 months up to 3 years 10-14 kg	1	1/4
3 years up to 5 years 15-19 kg	1 1/2	1/2

FEVER ALONE IS NOT A REASON TO GIVE AN ANTIBIOTIC EXCEPT IN A YOUNG INFANT (AGE LESS THAN 2 MONTHS).

GIVE FIRST DOSE OF AN ANTIBIOTIC AND REFER URGENTLY TO HOSPITAL

### ► Give an Antibiotic for Streptococcal Sore Throat

#### ► Give Benzathine Penicillin

BENZATHINE PENICILLIN IM  
A single injection

< 5 years	600,000 units
$\geq 5$ years	1,200,000 units

OR

- ▶ Give amoxycillin, ampicillin, or penicillin V for ten days.

- ▶ Soothe the throat with a safe remedy.

- ▶ Give paracetamol for pain or high fever.

## ANNEX 3: Assessing nutritional status

Children with severe undernutrition are at increased risk of developing and dying from pneumonia, yet the clinical signs of pneumonia in such children may be less reliable. Admission and careful monitoring during nutritional rehabilitation are recommended for severely undernourished children.

Priority for hospital admission should be given to children with **clinically severe undernutrition**. This means undernutrition that is obvious on examination of the child. It can be recognized by a "skin and bones" appearance (severe marasmus) or by oedema and sparse hair (severe kwashiorkor). Such children are at especially high risk if they appear weak or are having difficulty in eating or drinking.

The proportion of children classified as severely undernourished will vary according to the criteria chosen. The availability of hospital beds for therapeutic refeeding and the admission requirements for supplemental feeding programmes are considerations in deciding which criteria to use.

**Weight-for-height:** An examination of children for clinically severe undernutrition will identify most of those with severe wasting (marasmus), but will miss some children who are significantly wasted and would also benefit from a supervised refeeding programme. Measuring weight and height and determining weight-for-height will identify a somewhat larger group of children; severe undernutrition according to weight-for-height criteria is less than 70% of the median weight expected for a child of a given height (in the absence of oedema).

**Arm circumference:** Depending on the population and the cutoff used, arm circumference may identify quite a large number of children as being severely undernourished. The cutoff measurement is best determined by comparing arm circumference measurements with weight-for-height in a given population. Arm circumference does not change over weeks with refeeding, so that it is not possible to use it alone to monitor nutritional rehabilitation. It is, however, valuable as a screening measurement and may be used to refer children to a feeding programme or to hospital for further assessment.

**Weight-for-age:** This is not a good index for identifying severe undernutrition. In infants less than 3 months of age, low weight-for-age reflects low birth weight. With increasing age, children with low weight-for-age include both wasted and short (stunted) children. Measures of wasting (weight-for-height) are more appropriate for treatment decisions. In some populations, a large number of children may be classified as severely undernourished on the basis of weight-for-age, making this index impractical for decisions on whether or not to admit to hospital.

Children who are not eligible for admission, or who are only moderately undernourished, should be evaluated for clinical conditions contributing to undernutrition. The mother should be advised on ways of improving the child's nutrition with foods available to the family (and enrolled in a home supplementary feeding programme, if available).

If the child has a growth chart, growth faltering or weight loss during an acute respiratory infection should be noted and the mother encouraged to increase feeding during convalescence until the lost weight has been regained.



## ANNEX 4: Change in terminology

Current terminology <sup>a</sup>	Severe pneumonia	Pneumonia	Cough or cold (with no pneumonia)
	Severe wheezing	Wheezing with possible pneumonia	Wheezing
	Danger signs of very severe disease: <ul style="list-style-type: none"> <li>• Not able to drink,</li> <li>• Convulsions,</li> <li>• Abnormally sleepy or difficult to wake,</li> <li>• Stridor in calm child, or</li> <li>• Severe undernutrition.</li> </ul>	Acute ear infection (acute otitis media)  Suspect streptococcal sore throat	Chronic ear infection (chronic otitis media)  Sore throat (without suspected streptococcal sore throat)
Previous Terminology <sup>b</sup>	Severe ARI	Moderate ARI <sup>b</sup>	Mild ARI
Management plans (unchanged) for first-level facilities	Urgent referral to hospital after first dose of antibiotic	Antibiotic and home care (+ salbutamol)	Home care (+ salbutamol)

<sup>a</sup> This summary applies to a first-level facility with resources for antibiotic treatment of otitis media and suspected streptococcal sore throat.

<sup>b</sup> For community-based health practitioners or first-level facility health workers who were trained only to detect and treat pneumonia with antibiotics, moderate ARI referred only to suspected pneumonia.

## ANNEX 5: Answers to questions often asked on ARI case management

*Should purulent nasal discharge, purulent pharyngitis, or purulent sputum be treated?*

**Purulent nasal discharge:** During an uncomplicated common cold, the nasal discharge often thickens and becomes opaque and coloured. A thick, yellow discharge during a common cold can be either thick mucus (containing sloughed epithelial cells from the intense viral infection) or a purulent or mucopurulent discharge (containing leukocytes). Health workers often call any thick discharge "purulent". During most common colds, this will be a result of viral infection only. Bacterial sinusitis is more common in adults and adolescents than in young children. With 6-8 colds per year, young children commonly have nasal discharge. It is ineffective and impractical to treat these children with antibiotics.

**Purulent pharyngitis:** Most children with a white exudate or "pus on the tonsils" have a viral infection. Children should receive an antibiotic only when clinical signs suggest streptococcal pharyngitis (to prevent rheumatic fever) or to treat a suppurative complication such as throat abscess or cervical adenitis (see section 4.3). Most sore throats will resolve on their own.

**Purulent sputum:** Most children under 5 years do not produce sputum and many (older) children with yellow sputum have bronchitis and do not require antibiotics (see section 3.5).

*Should one try to prevent the development of common bacterial pneumonia by treating children with bronchitis or a simple cough or cold with antibiotics?*

No. Antibiotics have no effect on the course or occurrence of viral respiratory infections and cannot prevent them from developing into bacterial pneumonia.

Bronchitis (tracheobronchitis) is a common acute lower respiratory infection. It occurs most frequently in the first two years of life, but also in school-age children. Bronchitis in children is usually a viral infection associated with an acute upper respiratory infection such as nasopharyngitis. As in the common cold, infection of the bronchial mucosa can produce sputum that is thick and purulent in appearance.

The WHO protocol for the detection of young children with pneumonia examines children with a cough or difficult breathing for fast breathing, chest indrawing, and signs of very severe disease and classifies most of them as not having pneumonia. The mother is advised to give supportive care at home and to bring the child back if s/he worsens, is not able to drink, or develops fast or difficult breathing. This covers the possibility that, in a very few children, bacterial pneumonia will subsequently develop.

*Undernourished children have a poor response to infection. In an area with a high rate of undernutrition, isn't it wiser to treat all acute respiratory infections with antibiotics to prevent pneumonia?*

Such an approach will not achieve the desired goal. Antibiotic prophylaxis for acute respiratory infections of viral origin to try to prevent bacterial infection has been tried and has repeatedly failed. Some studies have shown an **increased** rate of bacterial infections. The normal flora provides the best protection. Antibiotics alter this flora and should only be given on suspicion of a current, established bacterial infection, based on a clinical examination. The signs of a serious infection may be less apparent in **severely** undernourished children: these children need special attention (see Annex 3 and page 7).

*Is the WHO standard pneumonia case management protocol also applicable to pneumonia complicating measles, pertussis, bronchiolitis, and influenza?*

Yes. All four conditions can begin as an upper respiratory infection, then progress to involve the lower respiratory tract. The standard case management guidelines are appropriate for children with these infections, who should receive antibiotic treatment if there are clinical signs of pneumonia. Staphylococcal pneumonia should be considered in a child with prior measles or influenza and severe pneumonia, especially if there is a history of prior antibiotic therapy or the child does not respond to treatment.

Measles can contribute substantially to pneumonia mortality; most measles-associated respiratory deaths are from pneumonia. Fatal obstruction from laryngotracheitis can also occur (presenting as stridor). Antibiotic prophylaxis has not been shown to be effective and should be avoided because it can increase the incidence of serious bacterial complications or lead to an infection with an organism that is resistant to the first-line antibiotics.

General nutritional support is an important part of case management in measles and pertussis. Stomatitis, general debility, and fever in measles and repeated paroxysms of coughing with vomiting in pertussis can interfere with feeding.

*Is there a single-dose injection for treating outpatient pneumonia?*

Benzathine penicillin (or a combination of procaine and/or benzylpenicillin with benzathine penicillin) has been advocated for outpatient treatment of pneumonia. This therapy is not recommended because the serum penicillin level is not adequate to treat infection caused by *H. influenzae* (the second most common cause of bacterial pneumonia in young children) or by partially resistant pneumococci. The resulting higher treatment failure rate is hazardous if the mother fails to bring the child back or the illness progresses rapidly. In addition, prolonged low levels of penicillin may induce resistance to the drug. Thus, despite its convenience, benzathine penicillin is not recommended for childhood pneumonia.

*Why do we suspect pneumonia in children with chest indrawing (in children without wheezing)?*

Increased respiratory rate can fail as a sign of pneumonia when the pneumonia becomes very severe or the child is exhausted or near death. When children develop pneumonia their lungs become stiff, which contributes to fast breathing. As the pneumonia becomes more severe, the lungs become even stiffer; indrawing may develop but the respiratory rate often slows. By classifying children who are not wheezing as severe pneumonia on the basis of chest indrawing, even without fast breathing, we will detect most of these cases.

