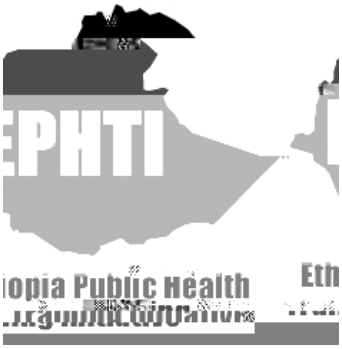
MODULE

Pneumonia in Under-Five Children

For the Ethiopian Health Center Team



Gondar College of Medicine

In collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education

2001

Funded under USAID Cooperative Agreement No. 663-A-00-00-0358-00.

Produced in collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education.

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TABLE OF CONTENTS

Preface

Teaching -learning is a challenge under all circumstances. It is even more challenging in developing countries like Ethiopia where textbooks are scarce, learning materials few, teachers overwhelmed and conditions unfavorable. Moreover, many of the learning materials such as textbooks are often bulky and at times not suitable to the conditions existing in the home country.

These modules are prepared specifically for the health center team, which must learn to work effectively together. The health center team is basically involved in primary care at the grass-root level. Most of the activities concentrate on health promotion, identification and treatment of common illnesses, and disease prevention and control.

This module addresses childhood pneumonia, which is a major killer disease in children under five years of age. The Core Module is prepared for health officers, public health nurses, environmental health and medical laboratory technology students. The health officer training is B.Sc. level training. There are two programs: 1) the post-basic where the training is given for nurses a duration of two and half years, and 2) the generic where new entrants from high school are accepted and trained for four years. The other categories of students are trained at the diploma level (two-year).

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UNIT ONE

INTRODUCTION


Ethiopia Public Health Training Initiative
EPHTI

1.2 Directions For Using The Module

Direction

UNIT TWO
CORE MODULE

2.1.1.4 Pneumonia is the most important killer respiratory disease in children.

a) True b) False

2.1.1.5 The most important measures to decrease death of children from pneumonia include

a) Early diagnosis
b) Prompt treatment
c) Intensive investigation for the etiologic agent
d) Admitting and treating every child
e) 'a' and 'b'

2.1.1.6 The caregivers of the under-five children do not have a role in the treatment process of pneumonia.

a) True b) False

2.1.1.7 List two important clinical symptoms that can be recognized by the caregiver to diagnose pneumonia.

1) _____
2) _____

2.1.1.8 At a health center level the diagnosis of pneumonia largely depends on

a) Laboratory investigations

2.1.2. Questions For Health Officers

2.1.2.1 List four common bacterial causes of pneumonia in an under-five child.

1. _____. 3. _____.
2. _____. 4. _____.

2.1.2.2 Respiratory Syncytial virus is a common cause of viral pneumonia in older children above 5 years of age.

a) True b) False

2.1.2.3 Which of the following etiologic agents accounts for the majority of deaths from pneumonia?

a) Staphylococcus aureus
b) Streptococcus pneumoniae
c) Hemophilus influenzae
d) Adenoviruses
e) 'b' and 'c'

2.1.2.4 Child 'X' is 4 years old. His mother has died recently. The child is diagnosed to have HIV/AIDS and has developed pneumonia. Which of the following is the most likely etiologic agent

a) Klebsiella pneumoniae
b) Streptococcus pyogenes
c) S.pneumonine
d) H. influenze
e) 'c' and 'd'

2.1.2.5 Which of the following factor does <u>not</u> predispose to pneumonia?

a) Measles
b) Protein energy malnutrition
c) Exposing a child to smoke
d) Low birth weight
e) Exposure to sunlight

2.1.2.6 Based on clinical sym

c) _____Immunization against measles and pertussis

d) _____Breast feeding

2.1.2.10 Which of the following antibiotics are used to treat a child with pneumonia?

a) Amoxicillin

b) Co-trimoxazole

c) Gentamycin

d) Tetracycline

e) 'a' and 'b'

2.1.3 Questions For Public Health Nurses

2.1.3.1 In a child age 2 months up to 12 months, the child has fast breathing when his breathing rate is _____ times per minute or more.

a) 30 b) 60 c) 50

d) 40 e) none

2.1.3.2 A cut of point for fast breathing in a young infant (<2 months) is more than _____ breaths per minute.

a) 30 b) 60 c) 50

d) 40 e) none

2.1.3.3 Signs of respiratory distress include all, except

a) Tachypnoa

b) Subcostal retraction

c) Fever

d) Cynaosis

e) Grunting

2.1.3.4 The nursing intervention for a child with pneumonia include all, except:

a) Control fever
b) Check vital sign frequently
c) Maintain proper record
d) Administer drug properly
e) None of the above

2.1.3.8 The three priority nursing diagnoses for a child with pneumonia based on ABC (Airway, Breathing, Circulation) are:

a) Under-nutrition, hyperthermia and irritability

b) Inadequate airway clearance, ineffective breathing pattern and impaired gas

Write True Or False For Each Statement

2.1.3.12 _____ Culture and belief have no influence in control of pneumonia.

2.1.3.13 _____ Fever is uncommon in the first two months of life.

2.1.3.14 _____ Tea with sugar or honey is safe home remedy to soothe the throat and relieve the cough.

2.1.3.15 _____ A child who with fast breathing and chest in drawing, should be treated at home level.

2.1.4 Questions For Environmental Health Technicians

2.1.4.1 Which of the following statements is a predisposing factor for pneumonia in under-five children

a) Poverty
b) Malnutrition
c) Not being immunized
d) In-door air pollution
e) All of the above

2.1.4.2 In prevention and control of pneumonia, social mobilization of the community is more practical to

a) Improve housing conditions and ventilation
b) Increase immunization coverage in the catchment area
c) Make early diagnosis
d) Practice breast feeding and weaning

2.1.4.3 Which of the following interventions is not applied to susceptible host

a) Prompt treatment
b) Immunization
c) Health education
d) Improving ventilation

2.1.4.4 Which of the following statement is not true about improved ventilation?

a) Proper house construction
b) Opening windows and doors
c) Proper arrangements of house furniture
d) Cross ventilation is better than through ventilation

2.1.4.5 Which of the following is not a health promotion and prevention strategy with regard to pneumonia?

a) Proper ventilation
b) Proper nutrition
c) Immunization
d) Treatment

2.1.4.6 Which types of EPI vaccines directly contribute to the prevention of Pneumonia?

1) _____ 2) _____

2.1.4.7 List at least three most important preventive and control measures of Pneumonia.

2.1.4.8 Which of the following statements is not a practical objective of an environmental health technician with respect to pneumonia?

a) Help early diagnosis
b) Increase immunization coverage in the catchment area

c) Improve housing condition and ventilation

d) Treat pneumonia

2.1.5 Questions For Medical Laboratory Technicians

2.1.5.1 What are the main laboratory tests that assist for the diagnosis of pneumonia?

2.1.5.2 Using an old solution of iodine can be the cause of false negative result in gram staining technique.

a) True b) False

2.1.5.3 Which of the following are the major reasons for false negative results in gram reaction?

a) Old culture smear preparation

b) Cell wall–acting antibiotic therapy

c) Excessive heat fixation

d) Over decolorization of the smear

e) All of the above

2.1.5.4 Arrange chemical reagents according to order of gram staining procedure

a) Crystal violet – gram's iodine – acetone alcohol - safranin

b) Gram's iodine – crystal violet – safranin – acetone alcohol

c) Acetone alcohol – Gram's iodine – crystal violet - safranin

d) Safranin – acetone alcohol – Gram's iodine – crystal violet

2.1.5.5 Which of the following are indicators of purulent respiratory secretion?

a) >25 neutrophils/LPF and <10 squamous epithelial cells/LPF

b) <25 neutrophils/LPF and >10 squamous epithelial cells/LPF

c) >25 neutrophils/LPF only

d) Presence of mucus in the sputum

2.1.5.6 The decolorizing agent for gram staining technique is

a) Safranin

b) Acid-alcohol

c) Acetone-alcohol

d) Crystal violet

2.1.5.7 The mordant agent in gram-staining technique is

a) Acid-alcohol

b) Safranin

c) Gram's iodine

d) Diluted carbol-fuchsion

2.1.5.8 Which of the following correctly describes the microscopic appearance of Streptococcus pneumoniae?

a) Gram positive lancet – shaped diplococci

b) Gram positive cocci in chains

c) Gram negative diplococci

d) Gram negative cocci in chains

e) Gram positive cocci in clusters

2.4 Case Study: Learning Activity 1

Study The Case Presented Below Carefully And Discuss Among Yourselves. The Discussion Should Preferably Be Made In A Group Of Six To Eight Students.

Senait Berhanu is a ten months old female infant. Two days back she started to have running nose, irritability and cough. She then developed fast breathing and high-grade fever. For these problems she was taken to a nearby private clinic where she was treated with unspecified injection and syrup. However, although the fever looked subsided, there was no improvement in her general condition. Later on, Senait started grunting and breathing became more difficult. Her cough became frequent and severe. She also refused to breast-feed and take food. The mother became worried and took her to Gondar Health Center.

Based On The Case Study Given Above, Try To Answer The Following Questions.

1. *What is the most likely problem of Senait?*
2. *Give your reasons for the diagnosis you have suggested?*
3. *What factors could have predisposed the Senait to acquire the above problem?*
4. *What questions would you like to ask the mother further?*
5. *Who is responsible to treat Senait?*
6. *Do you think it is a life threatening condition? Why**?***

2.5 Definition

Pneumonia is an inflammation of lung tissue including alveolar spaces and interstitial tissue.

2.6 Epidemiology

Global

According to different reports, in developing countries, a child dies every seven seconds from Acute Respiratory infections (ARI) usually pneumonia.

Ethiopia

ARI were reported to be among the leading causes of under-five mortality accounting for 40% of hospital admissions and a third of the deaths in children. The Case Fatality Rate (CFR) in Addis Ababa was 14.7%, which is slightly greater than the highest rate reported in other developing countries. Based on the report of the MOH, pneumonia was the 4th leading cause of morbidity in infants (MOH, 1994/95).

Predisposing (Risk) Factors

1. *Malnutrition, including Protein Energy Malnutrition (PEM), hypovitaminosis A, iron deficiency and rickets*
2. *Inadequate breast-feeding and not breast-feeding*
3. *Unimmunized child (low immunization coverage)*
4. *Low level of education of caregiver*
5. *Low birth weight*
6. *Viral infections*
7. *Over crowding and poor ventilation*
8. *Indoor - air pollution, such as from use of bio-mass fuel (fire wood, charcoal) and cigarette smoking*
9. *Immuno-deficiency states specially HIV/AIDS*
10. *Low socio-economic status*

2.7 Etiology And Pathogenesis

2.7.1. Etiology

Bacteria and viruses are the most important and common causes of pneumonia in children.

I) Viral – Major Cause In Developed Nations

The major viral causes are:

1. Respiratory Syncytial Viru

II) Bacterial

In developing countries bacteria are major causes of pneumonia in children. The most common causes of bacterial pneumonia in under-five children include:

1. Streptococcus pneumoniae
2. Haemophilus influenzae
3. Streptococcus pyogenes
4. Staphylococcus aureus

2.7.2 Pathogenesis

The microorganisms (germs) enter through the respiratory route by inhalation or aspiration. The organisms reach bronchioles and proliferate (multiply). Inflammation occurs in alveolar spaces. Pathological changes depend on the type of organism, the age and the condition of the host/ patient.

2.8 Clinical Features

The clinical presentation and severity of pneumonia differ depending on the type of the causative agent, infective dose, age, nutritional and immunity status of the host.

Viral Pneumonia

It is commonly a mild and self–limiting disease manifesting with previous history of Upper Respiratory Tract Infection. The illness starts with respiratory symptoms such as running nose and cough. The child may have:

1. Low grade fever or no fever
2. Mild cough

Non- Specific, General Danger Signs Of Pneumonia

1. *Vomiting everything*
2. *Convulsions*
3. *Lethargy or unconsciousness (abnormally sleepy)*
4. *Failure to eat or drink*

Complications

Depending On The Type Of The Organism, Immunity Status And Age Of The Child The Following Complications Could Occur

1. *Overwhelming sepsis and septic shock;*
2. *Extra pulmonary infections;*
   - *Arthritis*
   - *Osteomyelitis*
   - *Myocarditis and pericarditis*
3. *Meningitis*
4. *Empyema*
5. *Pneumothorax*
6. *Respiratory failure*

Note: *For additional information read textbooks of pediatrics.*

2.9 Diagnosis

The diagnosis of pneumonia is basically on clinical grounds. This is because most health institutions do not have the facilities to isolate and identify the causative agents. Some of the laboratory investigations are not specific to the disease.

The Diagnosis Is Based On:

A) Symp7m4usand isigs a

8. Minimize exposure to smoke
9. Separate living rooms from kitchen
10. Improve the type of stoves used to decrease the amount of smoke released in the house
11. Adequate exposure to sunlight
12. Proper ventilation

Health Education

- Emphasize on nutritional advice and weaning initiation and breast feeding
- Discourage parental smoking
- Teach caregivers on the danger of smoke in house
  - Caregivers should keep away children from smoke
  - Ventilate living rooms by opening doors and windows

2.12 Group Exercise: Learning Activity 2

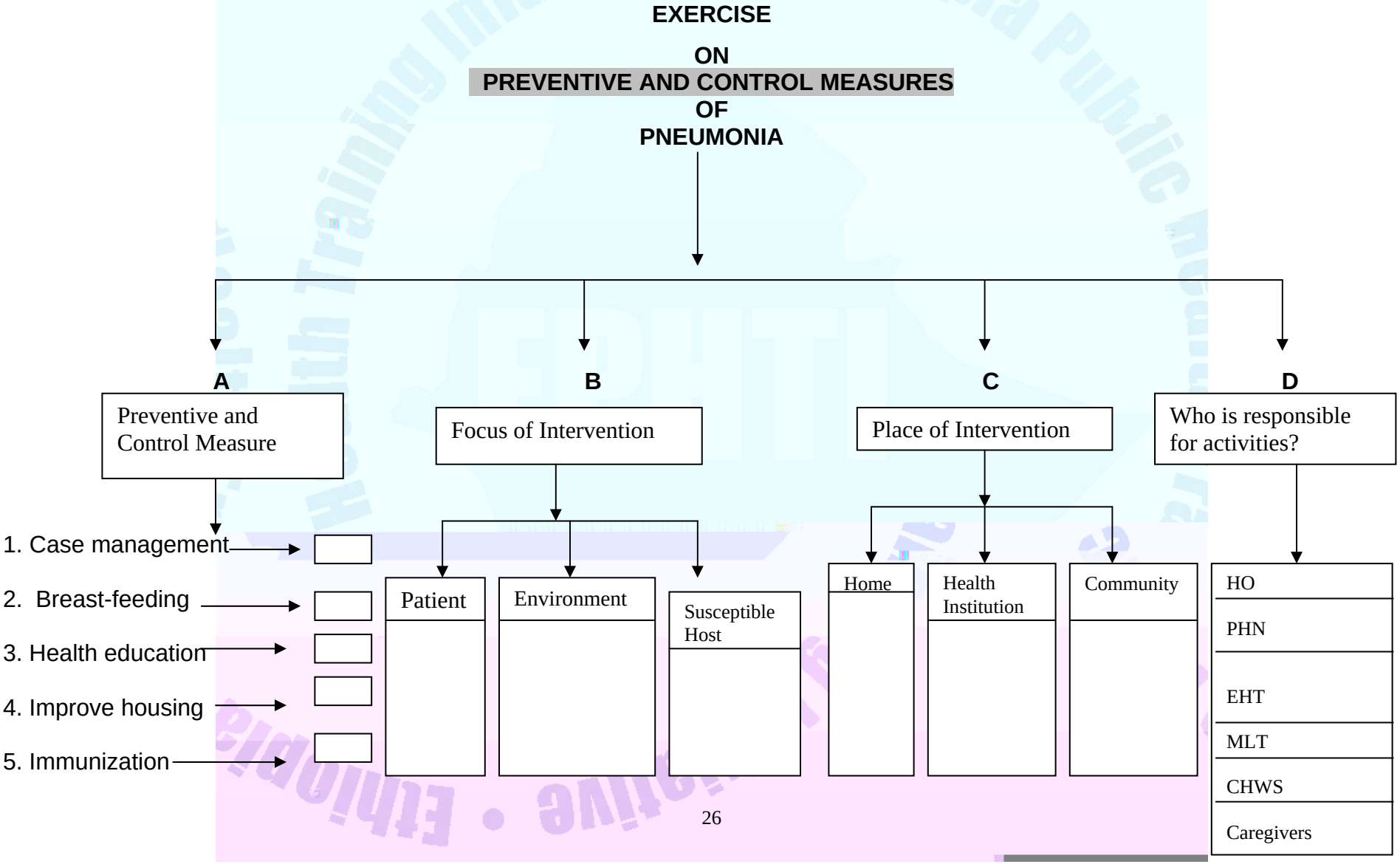
Read the following instructions to do the exercises on prevention & control measures of pneumonia

1. **Divide** yourselves into five subgroups of six to eight students;
2. Study and discuss on the flowchart of pneumonia, prevention and control **Part One and Two**;
3. **Part One** includes: **A** - preventive and control measure, **B** - Focus of intervention, **C** - Place of intervention, and **D** – Responsibility. **Part Two** activities are listed **(A, B, C, and D)**.
4. **Match** part **I A** by selecting activities from part **II A**, part **I B** to part **II B**, part **I C** to part **II C**, and part **I D** to part **II D**.
5. **Present** your answers to the whole group and discuss.

The exercise could be done by posting the two parts on the wall and writing the corresponding numbers from Part Two on the space provided on Part One using the same procedures as mentioned in the above.

The whole exercise should not take more than one hour and fifteen minutes.

Part I


EXERCISE
ON
PREVENTIVE AND CONTROL MEASURES
OF
PNEUMONIA
A
Preventive and Control Measure
1. Case management
2. Breast-feeding
3. Health education
4. Improve housing
5. Immunization
B
Focus of Intervention
Patient
Environment
Susceptible Host
C
Place of Intervention
Home
Health Institution
Community
D
Who is responsible for activities?
HO
PHN
EHT
MLT
CHWS
Caregivers

Part-II

A **B** **C** **D**

A:1. Natural immunity

UNIT THREE

SATELLITE MODULES

3.1

HEALTH OFFICER

FOR

STUDENTS

1.0 INTRODUCTION

1.1 Purpose

This satellite module is prepared for health officer students. The module emphasizes only specific areas that were not covered by the Core Module.

1.2 Instructions For Using The Satellite Module

Students must study the Core Module before going to the satellite module. It is also advisable to refer to the Core Module wherever indicated. The health officer students may also study the satellite module prepared for laboratory technician students.

1.3 Learning Objectives

At the end of the session you will be able to:

1. Appreciate the burden of deaths that is attributed to pneumonia in under-five children
2. Develop the skill of diagnosing pneumonia.
3. Describe the management of pneumonia.
4. List the complications of pneumonia.

1.4 Case study: learning activity 1

Upon further inquiry into the history of Senait the following information was extracted.

Her mother is alive and well. There is no family history of bronchial asthma or allergic skin lesion. No history of contact with a known tuberculosis patient. She is not from malarious area nor has history of recent travel to malarious area. There is no history of skin rash or pain during urination. There is no history of ear pain or discharge. History of diarrhea and vomiting is not present.

She is fully immunized for her age and has received vitamin A capsules recently. She was exclusively breast fed for four months and weaning food was introduced at four months of age. She is able to transfer objects from hand to hand and say "baba" and "mama". She has started to crawl recently. She is the third child for the family. Her pre and post- natal history was uneventful. Both parents are teachers, and are healthy.

Questions

1. State why the history included statements about asthma, tuberculosis, skin rash, malaria, ear problem, and urinary symptoms?
2. What is the importance of knowing the status of vaccination and vitamin A supplementation particularly in pneumonia?
3. Explain why the antenatal, delivery postnatal, and developmental history are included?
4. What do you need to classify the disease?
5. What are the first things you do during your observation?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Based on the above findings, answer the following questions

1. *What are the most important physical findings that help you to make the diagnosis?*
2. *What was the reason for making a systematic physical examination?*
3. *Do you think it is a severe disease? Yes____ No_____*
4. *What criteria have you used to say "yes" or "no" to question number 4?*
5. *What actions would you take to manage the case?*
6. *What role could the mother play during the management of her child's problem?*
7. *List the preventive actions that should have been taken to protect the child from developing the disease or its complications.*

1.5 Etiology

Besides the major causes of pneumonia as mentioned in the Core module, there are other causes depending on the age, immune and nutritional status of the child.

For example,

a) Neonates

- Gram negative enteric Bacilli – Escherichia coli
- Group B streptococcus (streptococcus agalactae) (important pathogen in developed countries)

b) Immuno-compromised (children with HIV/AIDS)

- Pneumocystis carinii
- Tuberculosis
- Staphylococcus aureus

- Gram negative bacteria such as Klebsiella and Pseudomonas

c) Protein Energy Malnutrition

- Gram negatives such as Pseudomonas and Klebsiella
-

1.7. Epidemiology

In developing countries, acute lower respiratory infections account for 19% of all deaths in under-five children and 8.2% of all disability occurring in the under-fives. In developing countries three million children die each year.

1.8. Diagnosis

1. Assessment: history and physical examination (see Core Module)
2. Laboratory investigations contribute very little to the diagnosis

Viral

The non specific laboratory tests (ESR, WBC) are nonspecific and have minimum contribution for the diagnosis of viral pneumonia.

Prognosis

Most previously well children with viral pneumonia will recover. Infants may develop some complications. RSV characterized by thick tenacious secretions, hacking cough, and irritability. Unless treated cautiously, may lead to complications.

Bacterial

History and physical examination

1. The non-specific laboratory tests (ESR, WBC) do not help to differentiate bacterial from viral pneumonia.
2. Chest X-ray (if available). If asthma is prevalent chest x-ray should be avoided unless there is strong suspicion of pneumonia.

1.9 Case Management

Study the pneumonia management flowchart (Annex I).

1.10 Prevention and control

In addition to what is listed in the core module, **i**mmunization against *Streptococcus pneumoniae* and *Hemophilus influenzae type b* is a possibility in developing countries in the future. Vaccine against *Hemophilus influenzae type b* is already in practice in the developed world.

Questions

1. List the questions that you would like to ask the mother.
2. How do you assess the child's problem?
3. What laboratory tests would you request?
4. What measures would you take?

3.2

SATLLITE MODULES

FOR

PUBLIC HEALTH NURSE

1.0 INTRODUCTION

1.1 Purpose

This satellite module is prepared for public health nurse students to help them manage, control and prevent pneumonia in under-five children effectively.

1.2 Instructions

Students must read the Core Module before goi


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- Give antipyretics

4. Encourage mother to breast-feed the child.
5. If the child has already

- Note a landmark for the location of the house, it will be helpful to you in case you miss the direction
- Make an appointment and plan home visit with family
-

1.10. Nursing Process At Home Level

1.10.1. Establish rapport

1.10.1.1 Assess:

1. The presence of similar or febrile illness in the family
2. Culture and beliefs of t2. Culture abfumo0uS5rile illne23 Tc[4s/TT8 1.5 530.ble 8tlou

- Pneumonia: how it is caused, danger signs, importance of early treatment and visit to health workers
- Feeding of children especially breast feeding
- Ventilation
- Growth monitoring (weight for age)

1.11 Methods

- Demonstration weaning food preparation, proper ventilation, etc.
- Health talks and discussions

1.12 Evaluation

- Check whether caregiver and family have understood what you have talked about or demonstrated through observation, asking questions and by inviting them to re-demonstrate

NOTE

Exercise

1. Identify all factors in the family that predispose the children to pneumonia.
2. List down the family focused nursing diagnoses related to pneumonia.
3. Identify the plan for each of the

1.0 INTRODUCTION

1.1. Purpose and Use of the Satellite Module

This satellite module is prepared for environmental health technician (sanitarian) students.

1.4. Screening

- Home and kindergarten visits to screen for febrile cases.
- Inspect ventilation of living & working rooms and kindergartens.

1.5 Prevention And Control Of Pneumonia

Improve ventilation of houses

- Presence of sufficient oxygen in the house i.e. People are at ease in breathing.
- Reduction of bad odor in the house.
- Living rooms are not shared with domestic animals.
- Separate kitchen from living room.
- Adequate number of doors & windows for good air circulation in the house.

1.6 Health Education

1. Understand the importance and role of health education in the prevention and control of pneumonia.

2. Increase the communities' awareness/knowledge and practice on
   - Proper ventilation of house
   - Breast-feeding
   - Immunization
   - Vitamin A Supplementation
   - Early detection of pneumonia symptoms and reporting to health institution

3. Participate and facilitate community mobilization on immunization and Vitamin A Supplementation

1.7. Learning Activity: Improved Ventilation Of Houses

A. Location Of Windows In Rectangular Houses

1) Through ventilation

2) Cross-ventilation

B. Location Of Windows In Circular Houses

a) Through ventilation

b) Cross-ventilation

Note

- Through ventilation system has better ventilation than cross ventilation system.
- The total area of windows and doors should be 15 -20% of the total floor area in the same house.

3.4
SATELLITE MODULE
FOR
MEDICAL LABORATORY
TECHNICIAN STUDENTS


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- Pleural fluid (effusion or empyema) analysis
  - Effusion
    a) Color→ turbid
    b) Differential cell count→ Polymorphs > 1000/µL
  - Empyema
    a) Color → Frank pus
    b) Differential cell count → Polymorphs >10000/µL

Respiratory secretions are frequently collected to diagnose infection of the lower respiratory tract such as pneumonia. Respiratory secretion samples are difficult to collect without contamination from saliva. Therefore Bartlett's classification is used to assess the respiratory secretion samples.

1.3.2. Bartlett's Classification

a) Number of Neutrophils/Low Power Field	**Grading**
<10/LPF	0
10-25/LPF	+1
>25 /LPF	+2
Mucus	+1
b) Number of squamous epithelial cells	
10-25/LPF	-1
>25/LPF	-2
----------	----------
Total scoring	

Scores ≤ 0 =lack of inflammation or presence of saliva.

Note that:

1. If there are > 25 Neutrophils and <10 squamous epithelial cells per Low Power Field (LPF), it indicates purulent respiratory secretion.
2. Respiratory secretion is indicated by predominance of alveolar macrophages, and columnar cells.
3. If there are >25 squamous epithelial cells per LPF, it indicates oral secretion.
4. Borderline samples indicate combination of these results.

It is recommended that all sputum specimens containing purulent secretions should be processed where as those containing oral secretions should be *recollected*.

1.3.3. Procedures

i. Reagents required

- Crystal violet
- Gram's iodine
- Acetone-alcohol decolorizer
- Safaranin or diluted carbol fuschin

ii. Specimen: respiratory secretions (if available)

- Collection: proper specimen collection from the patient is essential.
- Container: clean container is required
- Type of specimen: deep coughed up sputum is usually lower respiratory secretion
- Rapid transport of the specimen to the laboratory for processing

iii. Steps

1. Label the slide: every slide should be labeled with the date, patient's name and number.
2. Making of smears: use a piece of clean stick to transfer the sputum and soak the stick in locally available disinfectant.
3. Drying smears: allow the smear to air - dry completely.
4. Fixing of dried smears.

Rapidly pass the slide, smear upper most three times through the flame of a spirit lamp or pilot flame of a Bunsen burner (alternatively as a fixator, add 95% methanol over the smear and air-dry).

Allow the smear to cool before staining.

2. The gram reaction of the bacteria.
3. The morphology of the bacteria
4. The presence of pus cells and the number

1.3.4. Variations in Gram Staining

False Negative Results

Gram positive organisms lose their ability to retain crystal violet and stain gram negatively. The following are among the reasons why this may happen:

1. Cell wall damage due to antibiotic therapy or excessive heat fixation of the smear.
2. Over decolorization of the smear.
3. Use of an iodine solution that is too old and therefore can not act as effective mordant.
4. Preparation of the smear from an old culture.

False Positive Results

Gram negative bacteria staining as gram positive

1. Smear is too thick and not fully decolorized.
2. Provision of minimal time for decolorization.
3. When the decolorizer is highly diluted.

1.3.5. Microscopic Appearance of Common Bacterial Etiologic Agents of Pneumonia

1. Hemophilus influenzae – gram negative rods or coccobacillus
2. Streptococcus pneumoniae – gram positive, elongated, lancet-shaped diplococcus
3. Streptococcus pyogenes – gram positive cocci in chains
4. Staphylococcus aureus – gram positive cocci in clusters

COMMUNITY HEALTH WORKERS

1.0 INTRODUCTION

1.1 Purpose and Use of the Module

This module is prepared for Community Health Workers i.e. Community Health agents and Trained Traditional Birth Attendants. For using the module translation into the local language is essential. The module could also be used as a resource for health professionals for training Community Health Workers and community members. The module provides only the most important aspects of pneumonia in under-five children. It emphasizes on the importance of early diagnosis, referral, and preventive actions for teaching caretakers and the community.

1.2 Directions for Using the Module

Before studying the module, attempt all the questions written in the section 1.3. This will help the learner to assess the level of knowledge about pneumonia in under-five children. This includes the values, experience and practice of the community, because Community Health Workers are also part of the community.

⇓

Then, read the learning objectives. The objectives focus on the goals of the module.

⇓

The objectives are followed by brief description about pneumonia in under-five children. This part will help the learner to study and think about the problem and also take action.

⇓

The case study provided has been presented as similar to what is really happening in the community. Some of the rituals and actions may be different in different communities depending on the cultural background. However, the picture is typical. Try to answer the questions that are based on the case study.

⇓

Study each task presented in the table. The tasks elaborate on the activities of the CHWs. This will strengthen the actions.

⇓

The last part is the post-test. The learner must go through the post-test. The questions are those provided as pretest at the beginning. The purpose is to help the CHW assess whether there was a benefit and real progress in studying the module. However, it is very difficult to measure the learning process with the ten questions that are presented.

⇓

If you do not understand, go back and review the module.

2.0 Pre-test

Attempt to answer all the questions

1. Is pneumonia a killer disease, especially in children?

   a) Yes b) No

2. The cause of pneumonia in under-five children is

   a) Evil eye

   b) Smelling bad odor

   c) Washing the body in the river

6. Pneumonia could be effectively treated by a local healer

a) True b) False

7. What will be the responsibility of a mother concerning pneumonia?

a) To buy drugs from a local pharmacy and give to the child
b) Recognize the symptoms of pneumonia
c) Take the child to a health institution or community health worker
d) Observe the child until he develops severe symptoms
e) Only b and c

8. Which of the following factors will <u>not</u> help a child to be protected from pneumonia?

a) Immunization
b) Breast-feeding and initiation of weaning at 4-6 months
c) Protecting children from being exposed to smoke from cooking areas
d) Giving antibiotics to children when they get common cold
e) Exposing small infants to sunshine

9. As a community health worker, which signs of pneumonia do you consider as the most important indicators?

a) Running nose
b) On and off fever
c) Fast breathing
d) Chest in-drawing (abnormal movement of the chest with symptoms of respiratory problem
e) Only c and d

10. If you find a child who is sick of pneumonia during home visiting, what will be your

c) Advice the mother to isolate the child for protecting other children not to get infected

d) Give antipyretic and observe the child for one or two days

e) Advise the mother that the disease is self-limiting

2.1. Learning Objectives

1. *To understand the cause of pneumonia.*
2. *To describe the factors associated with pneumonia.*
3. *To make early diagnosis and to take the appropriate measures without delay.*
4. *To increase the awareness of mothers, care givers, families and communities on pneumonia through health education.*
5. *To encourage home visiting.*
6. *To help CHWs believe that pneumonia is a killer disease.*

2.2. Significance and Brief Description of the Problem

Pneumonia is an infectious disease of the lung and one of the main killers of children in Ethiopia. It is more dangerous for malnourished children.

There are many factors that contribute to the existence of this disease. One is common cold. Most coughs and colds get better without any special medicine. But sometimes colds turn into pneumonia. Too many children die of pneumonia every year.

If proper care is given in time, pneumonia is treatable and curable. To tackle such a killer disease, community health workers should know how to diagnose, manage, control and prevent pneumonia.

Therefore, based on this principle this guiding note is prepared for community health workers (Community Health Agents/or Traditional Birth Attendants).
The trainees can use this learning material in the training of community health workers after translating it into local languages.

2.3. Case Study: Learning Activity

Semegnew and His Fate

W/o Mastewal is living in the rural area of Dembia District about sixty kilometres (six hours walking distance) from the main town, Kolla Duba.
She has one son, whom she got after much praying. Semegnew, her beloved and only son, is now five months old. The mother mostly keeps him away from the evil eye ''Buda'' by covering him with cloths and not to be seen by anybody.
When she was preparing to celebrate his sixth month birthday, Semegnew was seriously sick. He had developed unexpected fever, running nose, cough, and vomiting.

The poor mother is shocked by his condition and took him to the local healer,''Awakie''. Shah Abdro, the known traditional healer, chewing his ''chat'' observed the poor baby. Then he went to the back of his house and returned with some leaf and root. He ordered the mother to rub him by the leaves and fumigate him with the burning roots. She tried to treat her son as ordered but without improvement.
She was restless and could not control herself. Seeing her condition, her neighbour advised her to take him to another witch.

Memrie Mentesnot is famous for ''opening books'' to tell the fate of anybody. So W/o Mastewal took her son to this person. After putting some amount of money in front of Memrie, she asked about Semegnew.

Memrie asked the name of the son and opened his known book. Within a matter of five

minutes he ordered the mother to kill for him a ‘’red hen’’ and give him the liver, which should be chewed first.

After borrowing money from her neighbor, W/o Mastewal bought the hen and applied as ordered. But Semegnew could not take the chewed liver; he vomited and his condition was worsening.

W/o Mastewal could not control herself and was crying loud. At this time all the


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3. Check for fever

- Measure the child's temperature
- If it is greater than 37.5^{o}c, it should be taken as febrile.
- ***Try to feel the fever of the child by using your hands if thermometer is not available***

2.5. Prevention and control

1. Advice mothers/ caregivers on breast feeding/weaning practice/well feeding

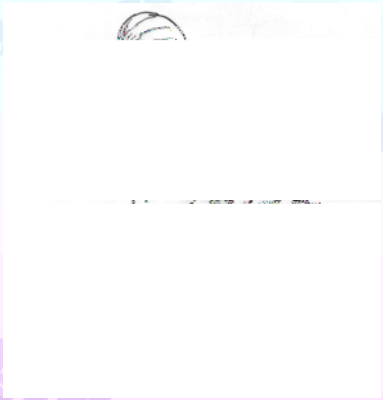
2. Educate mothers/ care givers /families/community on

- Proper nutrition
- Do not expose children to smoke from cooking areas or from cigarette
- Vitamin A supplementation
- Pneumonia must be treated with out delay

4. Program of home visiting

Vaccination

A house with good ventilation



Feed the child

Take the child to the nearest health institution

2.6. Tasks of Community Health Workers

The CHWs should perform the following activities at each level to control and prevent pneumonia

Level	Activities
Health Post	♦ Secure the availability of - Drugs, such as antipyretics, ORS, etc - Posters & leaflets for Health Education ♦ Early diagnosis & early referring of cases ♦ Programming of the different health services such as home visit, health education etc. ♦ Defaulter tracing on immunization program
Home	♦ Frequent home visiting ♦ Increase the awareness of mother/caregivers through health education ♦ Encourage mothers/caregivers on breast- feeding, weaning food, ORS, immunization, etc. ♦ Health education about proper housing, ventilation, environmental sanitation, child care, etc ♦ Advise mothers (caregivers) on immediate reporting of illness in their children
Community	♦ Disseminate information about immunization, defaulters tracing ♦ Health education on proper housing and ventilation ♦ Encourage to have an active & strong health committee

2.7. Post-test

Refer to the pretest.

Key

2.1.6.1	Yes, because the child will have respiratory distress that may lead to death, failure to take food and breast milk lead that to malnutrition and weakness and high fever leading to dehydration, etc.
2.1.6.2	E
2.1.6.3	E
2.1.6.4	D and E
2.1.6.5	A
2.1.6.6	B
2.1.6.7	E
2.1.6.8	D
2.1.6.9	E
2.1.6.10	A

Take Home Message For Mothers (Caregiver)

About Pneumonia In Under-Five Children

- Many children die of pneumonia.
- Germs cause pneumonia.
- These germs are very small particles that could not be seen with out a microscope.
- As a caregiver of children, you are the most important person to fight against pneumonia and save the lives of children.
- Learn to recognize the signs of pneumonia in children.

Recognize the signs of pneumonia

1. Is the child breathing fast (compare with previous breathing conditions)?

   ⇒ ***If there is fast breathing the child has pneumonia***

2. Does the child have chest indrawing (an abnormal chest movement associated with difficult breathing or cough)?
3. Do you hear stridor when the child is calm?

Also ask and look

4. Is the child breast-feeding or feeding?
5. Is the child vomiting everything?
6. Does the child have convulsion or seizure?

⇒ ***The signs number 2 to 6 remind you that the child is very seriously sick***

Actions

- If any of the above signs are present rush your child to the nearest health institution or to the health post.
- Give the prescribed drugs to the child
- If the instructions of the health professional are not clear, *ASK for clarification*
- Observe the child. If there is no improvement or there is deterioration, re-visit the health institution.
- Continue to feed the child and offer water frequently.

Protect your child from pneumonia

- *Start and complete the immunization schedule*
- *Breast-feed the child*
- *Initiate weaning at 4-6months of age, the weaning food should be nutritious (ask a health professional)*
- *Make sure the child takes vitamin A capsules*
- *Expose the infant to direct morning sunshine*
- *Protect the child from smoke coming out of kitchen or cooking areas*
- *Do not allow cigarette smokers to smoke in the same room where the child is kept*
- *Keep the child in a ventilated room*

UNIT FOUR

ROLE AND TASK ANALYSISBASED ON LEARNING OBJECTIVES AND ACTIVITIES

Table 1: ***Practice Objectives For Caregivers And Community Health Workers***

Learning objectives	Activities	
	Mother (caregiver)	**Community Health Worker**
Practice Breast-feeding and Weaning	- Exclusive breast feeding in the first 4-6months - Continue Breast feeding - Avoid bottle feeding - Start weaning at 4-6 months of age	- Encourage and teach mothers to breast feed and to start weaning at 4 to 6 months - Discourage bottle feeding
Increase Immunization coverage in the catchment area	- Attend the EPI schedule regularly - Keep the vaccination card properly - Report to the CHA about any missed immunization	- Disseminate information about immunization in public meetings, home visits - Mobilize the community for immunization schedules - Participate in vaccination (e.g. measles) - Trace defaulters
Improve housing condition and ventilation	- Separate kitchen from the main house - Ventilate the house by opening windows and doors	- Give HE about the benefit of ventilation
Make appropriate diagnosis early	- Recognize the danger signs - Take prompt and appropriate	

Table 2: Practice objectives and activities for professional student

Learning objectives	Activities		
	Health officer	**PHNurse**	**Sanitarian**
Practice Breast feeding and Weaning	Provide HE about: -The importance of BF & weaning - Discourage bottle feeding	Demonstrate to the mother: - Proper practice of BF - Preparation of balanced diet for weaning foods - Follow up through home visiting	-Provide Health Education to mothers about: - The importance of proper practice of Breast Feeding
Increase Immunization coverage in the catchments area	-Plan, organize, coordinate and supervise EPI activities - Document and report EPI activities	-Administer vaccine properly to the target group - Schedule EPI program - Maintain cold chain during transportation to vaccination sites - Supervise EPI activities - Sterilize instruments (syringe & needle) - Recording & reporting	- Maintain cold chain - Schedule EPI program - Maintain refrigerators and equipment - Mobilize community
Improve housing condition & ventilation	- Organize health education activities on ventilation and proper housing to communities	- Provide health education about proper housing at community and home level	- Provide technical advice & support in planning during house construction - Advice on the construction of stove, kitchen and windows
Make early diagnosis	- Collect information through systematic history taking and physical examination - Diagnose & detect signs of pneumonia	-Communicate clearly with caregivers & the community - Diagnose & detect danger signs of pneumonia	- Screen and refer febrile children to the near by health institution - Home visit & visit to kindergarten
Treat pneumonia	- Treat the sick child with antibiotics - Correct fluid loss - Advise mother to continue breast feeding/weaning/ fluids - Refer to hospital if indicated	-Treat the child as prescribed - Correct fluid loss, control fever - Advise to continue BF/weaning - Explain to the mother about the treatment, danger signs & when to bring the child if condition gets worse	—

***Note**: the task of Medical laboratory Technology technician students is to perform requested laboratory investigations*

Table 3: ***Attitude Objectives And Activities For Caregivers And Chws***

Learning objectives	Activities	
	Mothers (caregiver)	CHWs

Table 4: Attitude Objectives And Activities For Professional Students

Learning objectives	Activities			
	Health officer	**PHNurse**	**Sanitarian**	**Medical Laboratory Technology**
Give value to breast feeding & weaning	- Encourage exclusive breast feeding for the first 4-6 months and weaning starting 4-6 months - Use different methods such as counseling, health talks to change mothers feelings towards breast feeding & weaning	- Encourage breast feeding & weaning - Use different methods such as counseling health talks to change mothers feelings towards breast feeding & weaning	- Encourage breast feeding & weaning - Use different methods such as health talks to change mothers feelings towards breast feeding & weaning	- Encourage breast feeding & weaning - Use different methods such as health talks to change mothers feelings towards breast feeding & weaning
Help people believe that immunization reduce the risk of pneumonia	Convince people that immunization reduces the risk of acquiring pneumonia through HE and provision of immunization services	Convince people that immunization reduces the risk of acquiring pneumonia through routine provision of HE on immunization and immunization services	Convince people that immunization reduces the risk of acquiring pneumonia through HE and provision of immunization services	Convince people that immunization reduces the risk of acquiring pneumonia through HE and provision of immunization services
Help people believe that pneumonia is caused by micro organisms & transmitted through inhalation	Convince people through health education on the mode of transmission & causes of pneumonia	Convince people through health education on the mode of transmission & causes of pneumonia	Convince people through health education on the mode of transmission & causes of pneumonia	Convince people through health education on the mode of transmission & causes of pneumonia
Give value to ventilation	-Advise people on the importance of minimizing over-crowding and suffocation due to kitchen smoke	- Advise people on the importance of minimizing over- crowding and suffocation due to kitchen smoke	Convince communities about the importance of ventilation through demonstrations on how to improve ventilation, construct model houses	—
Believe in the caregivers role in treatment of pneumonia	- Respect mothers & tell their role - Make sure care givers understand their roles	- Respect mothers &tell their roles - Make sure that caregivers understand their roles	- Respect mothers - Communicate clearly - Make sure that care givers understand their roles	- Respect mothers - Communicate clearly - Make sure that care givers understand their roles

Table 5: Knowledge Objectives And Activities For Caregivers And Chws

Learning objectives	Activities	
	Mothers (caregivers)	**CHWs**
Describe the causes of pneumonia	Identify that pneumonia is caused by germs	Describe that pneumonia is caused by germs
Describe the diagnosis of pneumonia	Identify the danger signs of pneumonia such as fast breathing and chest in-drawing	Describe the main signs & symptoms of pneumonia
Describe the risk factors for pneumonia	Identify the most relevant risk factors for pneumonia such as malnutrition	Describe the most important risk factors for pneumonia
Describe the recommended treatment protocols	Give the medications to the child according to the instructions provided Understand the importance of giving fluid, food & breast milk	- Describe the recommended treatment including food & hydration - Describe the conditions for referring the child
Identify the preventive and control measures	Identify the preventive & control methods such as breast-feeding, immunization, and environmental control	Identify and teach the preventive & control methods

Table 6: Knowledge Objectives And Activities By Category Of Students

Learning objectives	Activities			
	Health officer	**PHNurse**	**Sanitarian**	**Medical Laboratory Technology**
Describe the causes of pneumonia	- Describe the causes of pneumonia	- Describe the major causes of pneumonia	- Describe the major causes of pneumonia	- Describe the principal micro-organisms and their characteristics
Identify the steps in the diagnosis of pneumonia	- Describe the clinical pictures of pneumonia in detail			

UNIT FIVE

GLOSSARY

Agent:	Substance or organism, which causes a disease or condition.
Alveolus:	Small cavity, such as one of the air sucks in the lungs (plural alveoli).
Antipyretic:	Drugs used to treat fever.
Arthritis:	Painful inflammation of a joint.
Bacteria:	Tiny organisms, many of them cause diseases. (Singular = bacterium).

Interstitial space:

Lethargy:

UNIT SIX
ABBREVIATIONS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UNIT SEVEN

REFERENCES

1. The Merck Manual, 16th edition, 1992, Rathway
2. Muhe L. Child health and acute respiratory infections in Ethiopia: Epidemiology for prevention and control. UMEA University, Dissertations, UMEA, 1994.

Annex-I Management flowchart (A*adopted from the WHO manual on IMCI)*

ASSESS AND CLASSIFY THE SICK CHILD AGE 2 MONTHS UP TO 5 YEARS

ASSESS **CLASSIFY** **IDENTYFIY TREATMENT**

ASK THE MOTHER WHAT THE CHILD'S PROBLEMS ARE

- Determine if this is an initial or follow-up visit for this problem
- If follow-up visit, use the follow-up instruction on TREAT THE CHILD chart.
- If initial visit, assess the child as follows:

USE ALL BOXES THAT MATCH THE CHILD'S SYMPTHOMS AND PROBLEMS TO CALSSIFY ILLINESS.

THEN ASK ABOUT MAIN SYMPTOMS:
Does the child have cough or difficult breathing?

IF YES, ASK: **LOOK, LISTEN, FEEL:**

- **For how long?** - Count the breaths in one minute.
  - Look for chest in drawing.
  - Look and listen for stridor.

CHILD MUST BE CALM

Classify COUGH or DIFFICULT BREATHING

SIGNS	**CLASSIFY AS**	**TREATMENT** (Urgent pre-referral treatments are in bold print.)
- Any general danger sign or - Chest indrawing or - Stridor calm child.	SEVERE PNEUMONIA OR VERY SEVERE DISEASE	- Give first dose of an app- appropriate antibiotic. - Refer URGENTLY to hospital.*
- Fast breathing	PHNUMONIA	- Give an appropriate antibiotic for 5 days. - Soothe the throat and relive the cough with a safe remedy. - Advise mother when to return immediately.

CARRY OUT THE TREATMENT STEPS IDENTIFIED ON THE ASSESS AND CALSSIFY CHART

TEACH THE MOTHER TO GIVE ORAL DURGS AT HOME

GIVE FOLLOW-UP CARE

Á PNEUMONIA

- Á Care for the child who return for follow-up using all the boxes that match the child's previous classifications,
- Á If the child has any new problem, assess, classify and treat the new problem as on the ASSESS AND CLASSIFY chart.

× **PNEUMONIA**

After 2 days:
Check the child for general danger signs.
Assess the child for cough or difficult breathing. See ASSESS & CLASSIFY Chart.
Ask:

- Is the child breathing slower?
- Is there less fever?
- Is the child-eating better?

Treatment:

- × **If chest in drawing or a general danger sign**, give does of second-line antibiotic or Intramuscular chloramphenicol. Then refer URGENTLY to hospital
- × **If breathing rate, fever, and eating are the same**, change to the second-line antibiotic and advise the mother to return in 2 days or refer. (If this child had measles with in the last 3 months, refer).
- × **If breathing slower, less fever, or eating better,** complete the 5 days of antibiotic.

TEACH THE MOTHER TO GIVE ORAL DRUGS AT HOME

Follow the instructions below for every oral drug to be given at home.
Also follow the instructions listed with the drug's dosage table.

× **Give Paracetamol for High Fever (> 38.5°c) or Ear Pain**

Answer Key

2.1.1 For All Categories

2.1.1.1 E

2.1.1.2 A

2.1.1.3 E

2.1.1.4 True

2.1.1.5 E

2.1.1.6 False

2.1.1.7 Fast breathing and chest indrawing

2.1.1.8 C

2.1.2 Health Officer

2.1.2.1 a) Bacterial causes

1. Streptococcus pneumoniae
2. Hemphilus influenzae
3. Streptococcus pyogenes
4. Staphylococcus aureus

2.1.2.2 False

2.1.2.3 E

2.1.2.4 E

2.1.2.5 E

2.1.2.6 False

2.1.2.7 Fast breathing and Chest indrawing

2.1.2.8 E

2.1.2.9 a) True b) False c) True d) True e) True

2.1.2.10 E


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2.1.5 Medical Laboratory Technicians

2.1.5.1 Gram staining of respiratory secretion

Blood film to rule out haemo-parasites

Pleural fluid analysis if there is para-pneumonic effusion or empyema

2.1.5.2 True

2.1.5.3 E

2.1.5.4 A

2.1.5.5 A

2.1.5.6 C

2.1.5.7 C

2.1.5.8 A

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