MODULE

Measles

For the Ethiopian Health Center Team

Dejene Hailu, Abrham Alano,

Abebe G/Mariam, Tesfaye Abicho

College of Health Science
Awassa

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UNIT ONE

INTRODUCTION

1.1 Purpose and Use of this Module

The use of modules in the education processes is increasing nowadays. This emanates from their importance in simplifying and easily disseminating information.

As such, this module puts all necessary efforts to present relevant, appropriate and more valuable methods and approaches by which the teaching-learning processes in the community and in higher health learning institutions can be simplified and made widespread. It is aimed at promoting the interaction between the instructors and students through two-way communication. It is also designed in such a manner to facilitate self-insructionssible so as to encourage the students to adopt the habit of using their own efforts to dig out and extract new information and concepts from the subject matter of a course. This module is meant to be used as a teaching aid for different categories of mid-level health professionals (Health Officers, Public Health Nurses, Environmental Health and Medical Laboratory Techniologists) with apparently matched levels of teaching about measles incidence and prevalence in Ethiopia.

Upon successful completion of this module the students are, therefore, expected to have acquired knowledge, skills, and attitudes with the view of being able to do surveillance of disease/health problems, diagnosis and management, control and prevention of measles at health care facility, family and community levels.

1.2 Direction for Using this Module

- Read the contents;

UNIT TWO

CORE MODULE (FOR ALL CATEGORIES OF HEALTH PERSONNEL)

2.1 Pre-test

Direction: Encircle all that are applicable

1. What is the infectious agent for Measles?
   a. Bacteria
   b. Virus
   c. Fungus
   d. Protozoa
2. Which of the following is a risk factor for higher mortality due to measles?
   a. Age
   b. Population Density
   c. Malnutrition
   d. Lack of measles vaccination
3. Factors that contribute to the differences in the mean duration of passively transferred maternal antibodies against measles in infants include?
   a. Geographic variability
   b . Genetic
   c. Efficiency with which children maintain passively acquired immunity
   d. Maternal nutrition
4. Which of the following symptoms/signs is/are pathognomonic (typical characteristic) for the diagnosis of Measles?
   a.

5. Which of the following conditions can be considered as missed opportunities for measles immunization?
   a. False contraindication
   b. Incorrect screening
   c. Vaccination unavailability
   d. Cancellation of schedules

6. Which of the following complications of measles is the most fatal?
   a. Diarrhea
   b. Pneumonia
   c. Otitis media
   d. Furuncles

7. One of the following basic methods is used to monitor the cold chain for maintaining vaccine potency.
   a. Temperature regulation between 0-8^{0}c
   b. Watching the indicator to monitor the cold chain

10. Which of the following can be potential solutions to increase measles vaccination coverage?
    a. Social mobilization
    b. Responding to community needs
    c. Refreshment course for health workers
    d. Information on health education

2.2 Significance and Brief Description about Measles

Measles (rubella) is among the leading causes of child morbidity and mortality worldwide. Despite remarkable progress in the control of measles, l measles still continues to claim the lives of millions of children every year around the world. The majority of this mortality takes place in the world's poorest countries, particularly in sub-Saharan Africa, where a combination of factors such as crowding, exposure at a younger age and malnutrition contribute substantially to the high case fatality rates.

Measles accounts for a significant childhood morbidity & mortality especially in third world countries. The WHO estimated in 1996 that the annual case burden amounted to 40 million cases of which about 1 million deaths occur every year, making it the most important killer of the vaccine preventable diseases. T

Measles results in huge costs that are measured in healthy years of life lost and loss of productivity. According to the routine reports of health facilities to the Ministry of Health of Ethiopia between 1980 and 1990, the measles incidence was very high in children under 15 years, particularly in the 1 to 4 years age groups.

2.3 Learning Objectives

At the completion of this module, the student should be able to:

- State the etiologic agent of measles;
-

thinking that the injection aggravates the condition. Ato Korie went to other households and saw many similar cases. He was alarmed and immediately reported to Won Ago Health Center (HC) ten cases and one death that have occurred before three days due to similar illness.

Sugale Peasant Association (PA) is one of the expanded programs on immunization (EPI) outreach sites of Wonago health center. Based on Ato Korie's report, the next day, the Head of the HC sent a team of health workers to conduct survey and detect cases. The team divided itself into two groups. One group assessed the child's condition and found out that Marta was acutely sick sitting on her mother's lap with high-grade fever, rash, cough and fast breathing. The team asked for her immunization card and found out that the child was not immunized for measles. The other group assessed the housing condition. The house is very small-a one roomed tukul without windows. Eight family members share it.

The team then brought Marta to Won ago Health Center for further investigation and management.

2.5 Definition

Measles is a highly contagious acute viral disease characterized by fever, coryza (runny nose), cough, irritability, conjunctivitis/ lacrimation, enanthema (Koplik's spots) on the buccal and labial mucosa; and maculo-papular rash appearing in a shower distribution over a period of 3 days, first erupting successively over the head, neck & face then progressing to involve the body (trunk), arms & legs progressing down wards to reach the feet on the third day and accompanied by a high fever.

2.6 Etiology and Pathogenesis

The pathogenic organism causing measles is called measles virus. Measles virus (MV), a negative-sense enveloped RNA virus, is a member of the Morbillivirus genus in the

Measles virus (MV) is an efficient pathogen that persists when a population is large enough to support it., Nevertheless, it is able to cause acute infection in any individual only once in his/her life time.

2.7 Epidemiology

Prior to widespread immunization, measles was common in childhood. It is ubiquitous (present everywhere), and a highly contageous disease affecting nearly 90% of susceptible household contacts. Few persons went through life without an attack. Measles is endemic in urban areas, attaining epidemic proportion usually every other year. With effective childhood immunization programs, such as in Europe and North America, Measles cases have dropped markedly and are generally limited to older age groups. However, it still remains to be common in countries with low immunization coverage, such as sub-Saharan Africa. Approximately 30 million measles cases are reported annually to World Health Organization. Most reported cases are from Africa. In 1998, the reported cases of measles per 100,000 total population reported to the World Health Organization was 1.6 in the Americas, 8.2 in Europe, 11.1 in the Eastern Mediterranean region, 4.2 in South East Asia, 5.0 in the Western Pacific region, and 61.7 in Africa. In these areas relatively younger children and infants are affected frequently. Measles epidemics occur every 2-3 years in population with large susceptible groups.

Transmission is primarily person-to-person via droplet spread; direct contact with nasal or throat secretions of infected persons and less commonly by articles freshly soiled with nose and throat secretions. Human beings are the only reservoir of the measles virus.

Risk Factors for Increased Fatality

Age at infection: The measles case fatality rate (CFR) is usually highest among the youngest children. Age-specific attack rates may be highest in susceptible infants

younger than 12 months. This is because complications such as otitis media, bronchopneumonia, laryngotracheobronchitis (ie, croup), and diarrhea occur more commonly in young children. It has been indicated that in many children measles mortality can be particularly high if many children contract measles at an early age. Infants have the highest risk of death.

Malnutrition: Several community-based studies have shown higher mortality among children with protein-energy malnutrition and micronutrient deficiency, particularly vitamin A. Malnutrition is a major factor in case fatality rate (CFR)

Type and severity of complications: differences in the incidence of potential complicating conditions like pneumonia, otitismedia, diarrhea, protein- energy malnutrition, vitamin A deficiency, reactivation of preexisting diseases like Tuberculosis, and HIV/AIDS may account for some of the variation in severity of measles.

Lack of immunization services: is the most important risk factor for measles.

Maternal Immunity: maternal antibodies usually protect children of immune mothers at least to the age of 6 months. Antibody studies indicate that many children under 6 months develop sub-clinical infection when exposed to a sibling with measles. As maternal antibodies disappear, susceptibility increases.

Vaccine Induced Immunity: It has been commonly believed that measles vaccine would produce lifetime immunity similar to natural infection. The large number of cases of measles in vaccinated children observed in developing countries have, therefore, been explained as natural vaccine failure (about 15% in children vaccinated at 9 months age), due to interference from maternal antibodies, & vaccine failure due to cold chain breaks (improper storage & transportation out of the proper range of temperature, and exposure of reconstituted vaccine to sun light.)

2.8 Clinical Manifestations

Typical measles has three clinical stages: an incubation stage, a prodromal stage with enanthem (koplic spots) and mild symptoms, and a final stage with a maculopapular rash accompanied by high fever.

The incubation period lasts 7-14 days (average 10-12 days) to the first prodromal symptoms & another 2-4 days to the appearance of the rash.

Patients usually have no symptoms. Some may experience symptoms of primary viral spread (fever, spotty rash and respiratory symptoms due to virus in the blood stream) within 2-3 days of exposure.

The onset of the disease is characterized by symptoms of the initial catarrhal (prodromal) phase that usually lasts 3-5 days and is characterized by:

- Low or moderate fever (38-39^{o}C)
- Red eyes/lacrimation
- Runny nose/ Coryza
- Cough

These symptoms nearly always precede the appearance of koplik Spots, the pathognomonic sign of measles, which appears usually on the buccal mucosa. Koplik's spot appear as 1 to 2 mm grayish white spots, usually as small as grains of sand, on bright red background typically located on the buccal mucosa opposite the lower molars but may spread irregularly over the rest of buccal mucosa.They appear & disappear rapidly, usually with in 12-18 hours.

- Reddish (erythematous), maculopapular rash typically occurs in cephalo-caudal (top-bottom) progression. The skin rash appears by the third day after the onset of fever, cough & coryza. The fever classically rises, often reaching 40^{0}C,with the appearance of the rash. The rash usually starts as faint macules on the upper lateral parts of the neck, behind the ears, along the hairline, and on the posterior parts of the neck. The individual lesions become increasingly maculopapular as

- Mouth ulcer
- Catabolic state of illness
- Diarrhoea loss

Á Measles infection during pregnancy increases the risk of premature labour and delivery, and fetal loss. There is also a risk of maternal death.

On examination, look for signs of late complications after the rash has disappeared, such as:

Á Pneumonia; one of the most common complications in measles, particularly in infants and is the main cause of death from the disease

Á Corneal clouding

Á Deep or extensive mouth ulcers.

Á Dehydration from diarrhea

Á Stridor due to measles croup

Á Severe (but often insidious) malnutrition (PEM)

Á Worsening active tuberculosis or reactivation of latent mycobacterium infection due to suppression of delayed hypersensitivity (Cell Mediated Immunity, CMI)

Á Acute encephalitis (considered as an autoimmune disease)

2.9 Diagnosis

Typical measles may be suspected in any patient with generalized maculopapular rash & fever and one of the following: cough or red eyes (conjunctivitis) or runny nose (coryza).

Evidence of rash, which is considered as a definitive diagnosis is made by identifying Koplik's spot.(although pathognomonic, its diagnostic usefulness is limited once the rash appears since these enanthmatous spots are transient signs that disappear well before the rash appears).This is followed by high grade fever, malaise and the characteristics rash in cephalo-caudal progression. Laboratory confirmation is rarely needed.

- The rash is fine goose flesh or sand paper like and not characterized by head to feet (cephalo-caudal) progression as for measles.

Á ***Diphtheric croup***

- Ė Severe croup, sometimes descending, but mainly localized process.
- Ė Hoarseness, stridor,dyspnea,croupy cough.
- Ė A gray membrane is visible in the throat.
- Ė Relative lack of fever
- Ė Absence of typical measles rash.

Á ***Acute laryngotracheobronchitis/Croup syndrome/***

Á ***Erythema infectiosum(5th disease)***

Symptoms of mild respiratory tract infection

Rash_

Skin rash-red blanching macula's or maculopapular characteristically on ankle, wrists or lower leg.

- ***Infectious mononucleosis:***

  Pharingitis

  lymphadenopathy

  Splenomegaly

  Atypical lymphocytes

  Rash –not typical for measles

2.10 Case Management

General Approach:

- Properly organized hygienic conditions for the patient
- Careful nursing care
- Protection from secondary infection
- Continuous feeding giving more fluids than usual
- Control fever
- Watching (actively anticipating for) complications.

Measles cases are hospitalized when:

- They have severe and complicated measles.
- Unsatisfactory home condition or not possible to arrange proper Nursing care.

Treatment:

There is no specific anti viral therapy

Treatment is mainly symptomatic and supportive:

- Antipyretics (acetaminophen) for fever
- Bed rest
- Maintenance of an adequate fluid intake
- Keep the room comfortably warm.

- Protect patients from exposure to strong light
- Continue breast-feeding, if possible more often for several weeks.

Appropriate anti-microbial therapy for secondary bacterial infections like pneumonia, otitismedia & other infections.

- Vitamin A Prophylaxis:(to be given immediately)
  - Á Less than 6 months: 50,000 IU
  - Á 6 – 12 months: 100,000 IU
  - Á 12 months to 5 years: 200,000 IU given orally reduced morbidity and mortality (recent study showed) in malnourished African children with severe measles.

Therapy:

Children with ophthalmic evidence of vitamin A deficiency should be given additional doses the next day and 4 weeks later.

Measles pneumonia should be treated in compliance with the general rules adopted in pediatrics, i.e.,

- Á Proper antibiotics
- Á Oxygen therapy
- Á Intravenous infusions of glucose and electrolyte containing fluids, when deemed necessary
- Á Post measles malnutrition needs to be prevented or treated by aggressive frequent feeding of affected infants and children for several months until child regains lost weight.

2.11 Measles Prevention and Control

The patient may transmit the virus by the 9^{th}-10^{th} day after exposure & occasionally as early as 7^{th} day before the illness can be diagnosed.

Isolation precautions, especially in hospitals & other institutions should be maintained from the 7^{th} day after exposure until 5 days after the rash has appeared.

Measles immunization strategies in developing countries:

The expanded program on immunization (EPI) recommends immunization with a single dose of attenuated live measles vaccine at the age of 9 months in developing countries. Due to maternal antibodies, not more than 80-90% may get immunity at this age. In developed countries, measles vaccination is delayed to the age of 15 months or later in order to prevent interference from maternal antibodies.

Measles control is defined as decreasing measles mortality and morbidity to a level at which measles is no longer a major public health problem; that is, achieving reduction by 90% of morbidity and 95% mortality. Ethiopia with measles vaccination coverage of less than 60% and high mortality(CFR >4%),has adopted the measles control goals of reduction of morbidity & mortality through efforts to increase immunization coverage, especially in areas of poorest coverage,

3.4. Vaccine not available

3.5. Mother too busy

3.6. Family problem including illness of mother

3.7. Child-ill not brought

3.8. Long waiting time

Possible causes of missed opportunities for immunization:

1. Workers do not know policy on expanded program on immunization (EPI)
2. Workers screen but tell patients to return later
3. While not immunizing the

Phases of Measles Control

There are four sequential phases for Measles immunization programs.

1. Measles Control Phase: The aim of this phase is to achieve high levels of coverage (> 80%) and reducing measles incidence and lengthening the intervals between outbreaks. Supplemental measles vaccinations will be conducted in the selected high-risk areas in order to improve the measles coverage. This phase has two steps. Mortality reduction and accelerated measles control activities.

2. Measles Outbreak Prevention Phase: Once measles has been drastically and persistently reduced through sustained immunization coverage, implementing of the second phase will commence. This phase is aiming at the prevention of periodic outbreaks. These strategies include:

- Improving surveillance in order to understand the changing epidemiology of the disease (changes in age distribution of cases, environmental setting for measles transmission, etc.) in order to identify population at higher risk.
- Predicting of outbreaks and preventing them by timely immunization of susceptible individuals in populations at higher risk.
- Increasing the levels of measles coverage in the population
- If an outbreak is anticipated, supplementary immunization activities may be considered.

3. Measles Elimination Phase: Maintain the number of the susceptible individuals in the population below the critical number that is required to sustain transmission of the virus at low leveles. This effort is to eliminate indigenous transmission of the virus.

4. Measles Eradication phase: It is a global effort of halting the transmission of the measles virus. Measles eradication phase is the sum of successful elimination efforts in all countries. It is the sum of successful elimination efforts in all regions.

In summary, to achieve the above-mentioned targets:

1. Immunize children in the first year of life.
2. Reduce missed opportunities, like
    2.1. False contraindications
    2.2. Incorrect screening
    2.3. Unavailability of vaccine
    2.4. Cancellation of schedule
    2.5 Inconvenient time
    2.6 Health workers should open a vial even for a single child/use of smaller dose vial as needed.

Immunization is one of the most powerful and cost-effective weapons of modern medicine.

Without immunization, an average of three out of every one hundred children will die from measles. Therefore, it is crucial to immunize children if they are found un immunized after the age of 9 months.

The main approaches for delivery of immunization services include:

Static: The health staff of the health units as part of the routine activities performs immunization.

UNIT THREE

SATELLITE MODULES

3.1 Health Officer Students

3.1.1 Purpose and use of this Module

This satellite module is designed to further identify and determine the specific roles of a Health Officer student. BY enhancing the acquisition of knowledge, attitudes and skills through an interactive and self-learning processes s/he can effectively and efficiently carry out interventions that can significantly reduce morbidity child and mortality due to measles in Ethiopia.

3.1.2 Direction for using this module:

Refer to core module

Before reading this satellite module, the reader is advised to go through the core module

3.1.3 Epidemiology

Besides what is stated in the Core Module under the Epidemiology Section, a Health Officer student has to know the following features of epidemic process: In the absence of rational control measures, particularly in areas of low immunization coverage, measles has a tendency to spread with great

the civil war in 1990-91 in Ethiopia. Most cases were reported from Gondar, Tigray, Wollo, and Addis Ababa. In the 1982 community based study in Peasant Associations (PAs) of the Konso area in Gamu Gofa region during a measles epidemic, mortality rates between 7.1% and 20.9% were report

3.1.4 Pathogenesis

Measles virus enters through inhalation invades the respiratory epithelium and spreads via the bloodstream to the reticuloendothelial system, from which the virus infects all types of white blood cells thereby establishing infection of the skin, respiratory tract, and other organs. These infected sites are manifested by rash & classic symptoms of cough,conjunctivitis & coryza. Generalized damage to the respiratory tract with loss of cilia predisposes to secondary bacterial infection such as pneumonia and otitismedia. Immune reaction to virus in the endothelial cell of dermal capillaries plays a role in the development of Koplik's spot and skin rash. In measles encephalitis pathological changes include focal hemorrhage, congestion and perivascular demyelination. Direct invasion of T-lymphocytes may play a role in transient immunity depression.

3.1.5 Prevention and Control of Measles

Besides what is stated in the core module under prevention and control section, a Health Officer student should be able to understand and implement Improved management and potential solutions:

- Improve managerial skills on promotion of immunization coverage by organizing and administering in-service training and conducting supervision;
- Design innovative ways to Improve immunization coverage;
- Develop mechanisms to provide effective and efficient immunization services so as to minimize the problem of long waiting of clients in the health facility;
- Enable the health facilities to plan their catchments areas and target population, who are supposed to get the immunization service.
- Improve planning, organization, implementation, monitoring and evaluation processes concerning immunization program.
- Facilitate cold-chain maintenance and monitoring to ensure vaccine efficacy.
- Make requisition of vaccine based on the actual need of vaccines so as to ensure adequate availability and minimize vaccine wastage.

- Go through the case management, prevention and control of measles;
- Do the post-test to check the gain after learning the satellite module and check your answers from Answer Keys in the Annex.

3.2.4 Pre-Test

Direction: Choose the letter of correct answer and encircle it.

1. Measles vaccine is administered via:
   a. Intradermally
   b. Intramuscularly
   c. Subcutaneously
   d. Intravenously
2. The appropriate dose of measles vaccine to be administered is:
   a. 0.01ml
   b. 0.05ml
   c. 0.5ml
   d. 0.1ml
4. Which one of the following types of nursing care is given for measles patient?
   a. Palliative
   b. Supportive
   c. Rehabilitative
   d. Terminal
4. Appropriate temperature for cold chain maintenance of the measles vaccine is 2-8 ^{0}

1. Assessment

History taking

- History of present illness
- Nutritional history
- Developmental history
- About immunization
- Any information about measles epidemic particularly in under five children

Physical examination

- Pertinent physical examinations
- Integumentary system
- Respiratory system assessments
- Nutritional and developmental assessment (growth, muscle size, arm circumference, head circumference)
- Fluid and electrolyte status
- Mental status
- Vital signs
- Community survey about the status of herd immunity and disease distribution

2. Nursing Diagnosis

- Alteration in comfort due to pain
- Fever
- Fluid volume and electrolyte deficit less than body requirement
- Alteration in nutrition
- Alteration in coping mechanism

3. Planning/Goal

- Improve comfort
- Reduce body temperature
- Maintain fluid electrolyte balance
- Improve knowledge status of the parents
- Improve coping mechanism
- Stabilize vital signs

4. Implementation

In most cases, the management is supportive:

- Providing antipyretics or controlling body temperature by cold compress/es;
- Maintenance of hydration by frequent p.o intake of ORS if tolerated.
- Monitoring vital signs especially body temperature;
- Protecting the patient from secondary infection by maintaining the cleanliness of the patient and his/her immediate environment;
- Administering of antibiotics as prescribed;
- Administering Vitamin A orally;
- Encouraging nutritional intake; if breast feeding, advising the mother to maintain it;
- Instructing Mother or Care taker Education about the cause, and case management, preventive aspects;
- Participating in the treatment of complications like pneumonia;
- Administer intravenous glucose and other electrolyte containing fluids if ORT not tolerated or as prescribed.
- Advice on importance of maintaining good diet until premeasles weight is regained.
- Advise care takers to immediately bring back to health facilities if the child has:
  - Convulsions
  - Drowsiness
  - Rapid or difficult breathing
  - Chest in drawing
  - Refusal to drink or eat
  - Painful or dry eyes.

3.2.7. Prevention and Control of Measles

The nurse should actively be involved in measles prevention. Therefore, he/she shall do the following activities:

Á

NB: Give appropriate dose at appropriate site for appropriate child:

Áƒ Age of child 9 months

c. Subcutaneous Ely

d. Intravenously

2. The appropriate administered dose for measles vaccine is:

a. 0.01ml

b. 0.05ml

c. 0.5ml

d. 0.1ml

3 Which one of the following types of nursing care is given for measles patient?

a. Palliative

b. Supportive

c. Rehabilitative

d. Terminal

4 Appropriate temperature for cold chain maintenance of the measles vaccine is 2-8 ^{0}C. This can be assured by monitoring the temperature of the refrigerator. How many times a day should the nurse check the thermometer?

a. Four times

b. Two times

c. Three times

d. Six times

5. The target group for measles vaccine under normal circumstances includes:

a. All children below five years

b. All children below one year

c. All children

d. All mothers between 15-49 years

6. Which one of the following could be the actual nursing diagnosis of patient with measles?

a. Alteration in body temperature

b. Alteration in fluid and electrolyte

c. Lower respiratory tract infections

d. A and B e. All

3.3. Satellite Module for Environmental health Professionals

3.3.1. Introduction

Immunization of vulnerable segment of population is one means that greatly contributes towards prevention of infectious childhood diseases. Provision of such basic health service to people at risk of infection is the responsibility of all health professionals working at different levels. Each category of health professionals therefore, has some important role to play in order to prevent and control communicable diseases. Environmental Health professionals are expected to share the largest portion of disease prevention activities including immunization programs. This satellite module is thus prepared with the aim of emphasizing and presenting specific practical activities that the Environmental Health professionals should perform in the prevention and control of measles in Ethiopia.

3.3.2. Directions for using this Satellite Module:

1. Before studying this satellite module, make sure that you have completed the core module prepared for all health professionals.
2. Do the pre-test questions before proceeding to the satellite module.
3. Study the satellite module following the sequence in which the items are presented in the table of contents of this satellite module;
4. Refer to the core module sections when indicated or otherwise.
5. Do the post-test after completing the satellite module and check your answers from the answer keys in the appendix.

3.3.3. Pre-test:

Instruction: Four alternatives are given to the following multiple-choice questions. Choose the best answer and write the letter of your choices on a separate paper.

1. Which of the following can be source (s) of infection for measles?
    a. Naso-pharyngeal discharges of cases.
    b. Infected mother with measles during the last trimester
    c. Contaminated foods
    d. Freshly soiled (contaminated) fomites with faecal materials

2. Environmental factors associated with transmission of measles include:
    a. Season of the year
    b. Overcrowding
    c. Food
    d. Waterods

6. Which of the following is irrelevant to the success of Immunization programs?
    a. Involvement of the local community leaders
    b. Involvement of the local religious leaders
    c. Education of the community about benefit of immunization programs
    d. Forcing mothers reluctant to bring their children to immunization sites.

3.3.4. Learning Objectives

Up on the completion of the module, the students will be able to:

- Identify the role and responsibilities of Environmental Health Professionals in surveillance, prevention and control of measles;
- Plan and implement the preventive and control methods of measles through environmental health measures;
- Evaluate and monitor the environmental interventions.

3.3.5. Case Study

Baraso , a sanitarian at Yirgachaffe Health Center, was only two months since he was

3.3.7. Epidemiology

The epidemiological approach to measles follows the consideration of agent factors, host factors, and environmental factors. For t

2. Measles control:

Ventilation: Ventilation of the indoor air in which the measles case is found helps to remove or dilute the atmosphere, which has become stagnant. It reduces the chance of infection of contacts (other health people). Good ventilation should be attained both in the health facilities and homes where the measles patient may be admitted. The sanitarian should, therefore, check whether the admission room maintains a minimum of 28 m^3 air volume per person, and keeping the windows open to allow adequate air movement in the room;

The Sanitarian should do regular, interval surveys on measles. S/he also designs area identification through mapping of the villages (Spot Mapping);

Concurrent disinfection: It involves the immediate destruction of the measles viruses from all articles soiled with nasal and throat secretions of the sick person through out the course of his/her illness.

Any of the following applicable disinfectants may be used:

- Physical disinfection:
- Burning
- Boiling
  - Steaming
  - Chemical disinfect ion:
- Lime
- Bleaching powder

3.3.9 Post-test:

Instruction: Four alternatives are given to the following questions. Choose the best answer and encircle the letter(s) of your choice.

1. Which of the following can be source (s) of infection of measles?
   a. Naso-pharyngeal discharge of cases
   b. An infected mother with measles during the last trimester
   c. Contaminated foods
   d. Freshly soiled fomites

2. Environmental factors associated with measles include:

a. Season b. Overcrowding

c. Food d. Water

3. Which one of the following is not the mode of measles transmission?

a. Droplet infection b. Droplet nuclei

c. Direct contact with an infected person

d. Consumption of water from unprotected sources

4. Basic measles preventive and control methods are:

a. Isolation of cases

b. Concurrent disinfect ion of soiled (contaminated) articles with nasopharyngeal discharge.

c. Immunization (active or passive).

d. Effective vector control measures.

5. Which one of the following is harmful custom/belief during measles illness?

a. Discouraging the case from taking shower or a bath

b. Never allowing the opening of doors and windows of the room in which the case resides.

c. Keeping all children with the case so that they soon get sick and immunized.

d. Never allowing the case to take any fluid until recovery.

3.4. Satellite Module for Medical Laboratory Technologists

3.4.1. Introduction

This module is designed with the purpose of equipping the Medical Laboratory technologists with the knowledge, attitudes and skills concerning laboratory diagnosis of measles by giving special attention to specimen types, their collection and transport.

3.4.2. Directions for using the Satellite Module

- Read the information in the core module
- Do the pre-test;

4. A positive test result for specific IgG antibodies indicate:

   A. Past infection with measles virus

   B.

days after rash onset. Keep urine at 4^{o} C and Process within 48 hours at the latest; and

- From Stool samples;

From Cerebrospinal fluid (CSF)

From serum

-To extract serum, at least 3 ml of blood should be collected

- For IgM serology, a single blood specimen collected 3 to 28 days after rash onset is Usually satisfactory

- For IgG serology, the first (acute) sample should be obtained as soon as possible after the onset of the rash, and in any event no later than 7 days afterwards. The second (convalescent) sample should be collected 10 to 20 days after the first sample. These paired sera must be tested simultaneously.

Note: blood samples can also be collected and send to virology labs by using special filter paper (dry blood sample collection method)

All the above specimens are collected according to the World Health Organization (WHO) standard procedures.

Note: Nasopharyngeal or throat swab or urine specimens should not be substituted for blood, which is required for serologic diagnosis.

Laboratory diagnostic methods for measles virus:

Measles virus can be diagnosed in the laboratory by:

- Isolation of the virus using human fetal kidney or other cell cultures and observing the specific cytopathic effects the virus causes, which is further confirmed by specific anti-sera, or PCR
- Electro microscopic examination of the virus directly from the clinical specimens;
- Serological tests**;**
- Histological examination **and** hybridization of ribonucleic acid (RNA).

Serological Tests for the Diagnosis of Measles Virus

Detecting measles virus specific antibody is more successful and easier than virus isolation from the clinical specimen.

-In acute, uncomplicated measles, a significant rise in measles-specific IgG antibodies between acute- and convalescent-phase serum specimens is generally considered diagnostic.

-A positive test result for specific IgG antibodies in a single serum specimen indicates past infection with measles virus or measles vaccination, but does not ensure protection from infection or re-infection.

-Detection of specific IgM antibodies in a single serum specimen collected with in the first few days of rash onset can provide a good presumptive diagnosis of current or recent measles virus infection.

-Therefore, Measles specific IgM serological test is the standard test of choice for routine diagnosis of measles.

-In the interpretation of serological tests, four-fold increase of specific anti-body titers in a serum taken 7-14 days interval is the basis for diagnosis.

A. General Principle of the test:

-Standardized measles antigen is commercially prepared to react with measles specific antibodies in serum.

-The reaction is made visible by different techniques, such as immune fluorescence techniques.

-Also ELISA and radioimmunoassay can demonstrate measles virus antigen from patient serum.

B. Procedures

The details of the testing procedure vary with the types of serological tests, but common to all is:

- Collecting venous blood
- Isolating the pure serum:
- Making serial dilutions of the serum with distilled water;
- Adding the measles antigen according to the manufacturer's instruction;
- Incubating according to the kit's instructions;
- Reporting the titer.

C. Result reporting

Report the highest dilution that gives a positive result, which is indicated by the manufacturer; usually a four-fold and above increase in titer between two samples (or paired), collected at interval of 7 to 14 days show a positive result.

D. Source of errors

- Using expired reagent kits;
- Wrong serial dilution;
- Improper incubation of specimen;

3.5.2 Pre-test Questions

Instruction: Encircle all the applicable answers

1. The causative agent for measles is:
   a. Germ
   b. Worms
   b. Water
   c. Evil spirit
2. The mode of transmission of measles is:
   a. By ingestion
   b. By inhalation/air droplet
   c. By contact
   d. Not known
3. Measles mostly affects:
   a. Children of all ages
   b. Children above 9 months
   c. All mothers and children
   d. No answer
4. Prevention of measles infection includes:
   a. Immunization
   b. Coffee ceremony
   c. Health education
   e. Treatment

3.5.3 Learning Objectives

Upon completion of this module, the community health workers will be able to:

- Define measles;
- Mention the causative agent;
- Describe distribution and determinants of measles;

- List common signs & symptoms of measles;
- Be familiar with the management of measles cases;
- Actively participate in preventive and control activities;

3.5.4 Definition

Measles is a highly infectious acute disease, which is caused by the measles virus (germ). It is characterized by fever, runny nose, cough, redness of eyes & rash.

3.5.5 Epidemiology

Measles predominantly attacks unimmunized children from age 9 months and above. Measles occurs in most parts of Ethiopia. The disease is spread from sick to healthy persons through air droplets from nose & throat. Measles virus is transmitted primarily person- to- person via droplet spread, direct contact with nasal or throat secretions of infected persons. Patients are contagious from one to two days before the onset of symptoms until four days after the appearance of the rash and it peaks during prodromal period. The mean interval duration from infection to the onset of symptoms and the appearance of rash are ten and fourteen days respectively.

Malnutrition and overcrowding in poorly ventilated environments are risk factors (conditions) that enhance measles infection.

3.5.6 Symptoms and Signs401 Tm( )TjEMC /P hgns 12 f1 0 0 Tw -25.ti

3.5.7 Management

- Á Good personal hygiene
- Á

c. All mothers and children

d. No answer

4. Prevention of measles infection includes

a. Immunization

b. Coffee ceremony

c. Health education

e. Treatment

3.6 Take Home Message for Caregiver

3.6.1 Definition

Caregiver means any person - woman or man, young or old- who acts as a first line person to provide service or care for the child who needs help.

3.6.2 Message for Caregiver:

Dear Caregiver, we would like to appreciate your participation and involvement in management and prevention aspect of measles. Always keep in your mind that the following points in measles:

- Measles is caused by germ called the measles virus
- Measles can be transmitted only from person to person
- Measles mostly affects children, particularly unimmunized children
- If a child has fever, rash and cough, bring him/her immediately to health facilities like health post, health center, or hospital
- Keep breastfeeding the child, give additional nutrition support
- Give additional fluids for the sick child
- Keep the child in a good personal hygienic condition
- Give special care and attention for the sick child
- Attend health institution's immunization programs

- Á Complete the immunization program, if you started
- Á Contact the local health agent or institution, if your child has any health problems
- Á Open windows and doors to ventilate the house
- Á Separately give care for sick child


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exclusively viral infection of the respiratory tract, especially of young children, in whom there may be a dangerous degree of obstruction either at the larynx or main air passages (bronchi) due to the thickness and stickiness of the fluid (exudates) produced by the inflamed tissues.

Missed opportunities - children and women who need immunization and visit the health institution, but who are not immunized by the health institution staff.

Morbidity - being diseased or suffering