



TRAINING MANUAL FOR FACILITATOR

COMMUNICABLE DISEASES

&

INFECTION PREVENTION CONTROL

IN PRIMARY HEALTHCARE SETTINGS



Khyber Pakhtunkhwa – Human Capital Investment Project (KP-HCIP) Health Department

Activity: Communicable Diseases and Infection Prevention & Control in Primary Healthcare Settings

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This Training Manual on Communicable Diseases and Infection Prevention in primary healthcare settings has been developed with the support of the Department of Health (DOH), Khyber Pakhtunkhwa and in collaboration with multiple technical and implementing partners. It serves as a comprehensive resource aimed at equipping public health professionals and primary healthcare workers with essential knowledge and practical skills to identify, report and manage communicable diseases effectively at both the community and facility levels.

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Introduction to the Manual

This Communicable Diseases and Infection Prevention & Control (IPC) Manual for Facilitators is designed to support trainers and health professionals in building the capacity of primary health care (PHC) workers to prevent, detect early and manage communicable diseases effectively. The manual provides practical, easy-to-understand guidance on common infectious diseases and essential IPC practices that protect both patients and healthcare providers in primary care settings.

The manual aligns with the World Health Organization (WHO) recommendations for strengthening infection prevention and control, as well as for improving communicable disease management in low-resource primary healthcare settings. It emphasizes cost-effective and evidence-based approaches for preventing disease transmission, ensuring safe healthcare delivery and responding quickly to infectious disease threats.

Using this manual, facilitators will be able to conduct interactive and participatory training sessions focused on:

- Understanding common communicable diseases and their modes of transmission
- Applying effective infection prevention and control (IPC) measures
- Promoting early detection, isolation and management of infectious cases
- Encouraging safe waste disposal, hygiene and handwashing practices
- Strengthening surveillance, reporting and referral systems for communicable diseases

The manual also promotes practical learning methods, such as group discussions, role plays and case studies, to enhance participants' skills in problem-solving, decision-making and safe clinical practice. Through this approach, primary healthcare workers will be better equipped to reduce infection risks, protect themselves and their communities and contribute to safer, more resilient health systems.

TRAINING MATERIAL:

- *Trainers Manual:* A detailed guide (hard and soft copies) as how to conduct each session along with necessary training material will be provided to each facilitator.
- *Participants Manual:* This booklet will be provided to each participant (both hard and soft copies) containing all the necessary information for future reference.

How to Use This Manual

This Communicable Diseases and Infection Prevention and Control (IPC) Training Manual is designed to enhance the knowledge and practical skills of healthcare professionals involved in the prevention, early detection and management of communicable diseases. It aims to support the integration of communicable disease control and IPC practices within the primary healthcare system, while promoting a proactive, patient-centered and community-based approach to reducing infection risks and improving health outcomes in Khyber Pakhtunkhwa.

The manual serves as both a training guide and reference resource for healthcare trainers, supervisors and frontline workers. It is structured to encourage active learning through discussions, case studies and group exercises. Facilitators are encouraged to adapt the content to local contexts and use participatory training techniques to ensure maximum engagement and understanding.

1. Strengthen Knowledge of Communicable Diseases and IPC

This training will enhance participants' understanding of how communicable diseases spread, their types and key risk factors. It will focus on simple, evidence-based methods to prevent, control and manage infections within primary healthcare (PHC) settings. Participants will learn about the importance of infection prevention and control (IPC) practices in reducing disease transmission among patients, healthcare workers and the community.

2. Improve Early Detection and Case Management

Participants will build their skills in identifying, diagnosing and managing communicable diseases using standard treatment protocols and national guidelines. The session will emphasize the

importance of early detection, proper case management, timely referral and continuous follow-up to ensure better patient outcomes and reduce the spread of infection.

3. Promote Hygiene, Immunization and Risk Reduction

The training will equip healthcare providers with the knowledge and tools to educate communities about hygiene, sanitation, safe water, food safety and vaccination. It will also focus on communication and counseling techniques to promote healthy practices that reduce infection risks at both household and community levels.

Who Should Attend the Training

The training is designed for:

- **Primary Healthcare Workers:** Medical Officers, Medical Technicians, Lady Health Visitors (LHVs) and Lady Health Supervisors (LHSs)
- **Health Managers:** District and provincial program managers involved in communicable disease control and IPC
- **Partner Organizations:** Representatives of NGOs and other agencies working in primary healthcare and public health programs

Expected Outcomes

By the end of the training, participants will be able to:

- Clearly understand the basic concepts of communicable diseases, their modes of transmission and prevention methods.
- Apply effective infection prevention and control (IPC) measures in healthcare facilities to protect both patients and staff.
- Detect and manage common communicable diseases promptly and appropriately, following national and WHO-recommended guidelines.
- Educate individuals and communities about hygiene, vaccination and preventive health practices.

Training Agenda

Complete details for each block and its sub sessions with information about methodology, different interactive activities and resource materials required are listed in detail. In this manual, Participatory techniques are adapted to make learning as hands-on as possible. The training agenda has been made flexible for the trainers. The training agenda is set for 2 days for healthcare providers working in primary settings including BHUs, RHCs, Civil Dispensaries, Category-C and Category-D hospitals.

A. Facilitation Methods

Trainers should apply adult learning principles while considering the participants' varying levels of experience in the healthcare delivery system. An effective trainer will leverage the skills and personalities within the group to create an engaging and productive workshop. The following participatory training methods can be beneficial:

i. Power Point Presentation

The facilitator should present information in a way that encourages group interaction, promoting an interactive learning environment. To enhance presentations, the facilitator can use anecdotes, humor, handouts, PowerPoint slides, audio-visual materials and ask questions to engage participants.

ii. Brainstorming

Brainstorming encourages quick, collaborative discussions on a topic, fostering creativity and generating ideas swiftly. It's particularly useful for building consensus around contentious issues, with points raised during the session often recorded on a flip chart.

iii. Real Life Experience Sharing

This method allows selected participants or guest speakers to share relevant life experiences that connect to the topics being discussed, adding a personal touch to the content. It's important to ensure that speakers stay on topic and adhere to their allotted time.

iv. *Small Group Discussion*

The primary goal of small group discussions is to maximize participation and foster new insights among participants. Groups of four or five are ideal, as they allow for more personal interaction, reduce intimidation and encourage idea exchange. Considerations for group work include the topic, objectives, assigned tasks, desired participation level, available resources, time management, group composition (including gender) and seating arrangements. Each group should have a chairperson and a note-taker, with key points recorded on a flip chart for reporting back to the larger group. The facilitator should then synthesize and clarify any emerging issues.

v. *Case Study*

In this method, participants analyze a real or fictional case in small groups before discussing it with the larger group. The facilitator presents the case details and invites participants to propose solutions and share their opinions without dictating the best answer or critiquing contributions.

B. Logistic Support:

Training arrangements should be made well in advance and all necessary equipment and supplies should be arranged. Required training equipment include:

- Laptop, projector & un-interrupted power supply
- Flip Flowcharts with Stand
- Colored Markers, Sticky Notes
- Necessary Stationary Required for participants (Writing pad, pen, pencil etc)
- Required No. of pre-test and post-test questionnaires copies
- Required No. of participants handouts

C. Preparatory Checklist for the trainer

The trainer should:

- ✓ Thoroughly understand the training manual's content.
- ✓ Review the training objectives, session outlines and activities for each session, including learning goals, time, resources and trainer instructions as detailed in the manual.
- ✓ Familiarize themselves with the session slides, particularly those with presentations.
- ✓ Review the pre/post-test and course evaluation forms and prepare copies for all participants.
- ✓ Make copies of handouts, role-play scenarios and checklists to ensure all audio-visual equipment is functional.
- ✓ Check the training venue, including seating arrangements, lighting and fans or air conditioning (for summer).
- ✓ Create flip flowcharts as needed for the sessions .

MODULE ONE

BASICS OF COMMUNICABLE DISEASES



MODULE ONE

INTRODUCTION TO EPIDEMIOLOGY AND PATTERNS OF DISEASE OCCURRENCE

Time: 60 Minutes

Materials: PowerPoint Presentation, flip charts, markers, charts showing the epidemiologic triad and disease occurrence patterns, handouts

Session Objectives

By the end of this session, participants will be able to:

1. Define epidemiology and explain its importance in communicable disease prevention and control.
2. Describe the components of the epidemiologic triad and how diseases spread.
3. Differentiate between endemic, epidemic, sporadic and pandemic diseases.
4. Explain the concept of communicable and contagious diseases.
5. Describe nosocomial, opportunistic and iatrogenic infections.

1.0 Introduction

Epidemiology is the foundation of public health practice. It helps health workers understand how and why diseases occur, how they spread and what can be done to stop them. Communicable diseases are illnesses that can be transmitted from one person to another, from animals to humans, or through environmental sources such as water, food, or air. They are caused by harmful microorganisms including bacteria, viruses, fungi and parasites.

In Pakistan, particularly in Khyber Pakhtunkhwa, challenges such as overcrowding, poor sanitation, unsafe water and limited healthcare access increase the risk of infectious disease spread. Primary healthcare workers play a vital role in detecting, reporting and controlling these diseases early to prevent outbreaks.

This session provides basic knowledge to help participants understand how diseases occur and spread and how they can use this understanding to control and prevent communicable diseases effectively.

Activity 1.1: Introducing the Session and its Objectives

Trainer's Instructions:

1. Briefly introduce the session and its objectives.
2. Ask participants to share examples of communicable diseases common in their communities.
3. Link their responses to the objectives of the session.
4. Address any questions or expectations from the participants.

Activity 1.2: Understanding Epidemiology

Trainer's Instructions:

1. Ask participants what they think “epidemiology” means.
2. Note responses on a flip chart.
3. Present and explain the definition below in simple terms.

Trainer's Notes:

Epidemiology is the study of how diseases are distributed in a population (who, where and when) and the factors that determine this distribution (why and how).

In simple words, epidemiology helps us understand:

- **Who** is getting sick
- **When** they get sick
- **Where** the disease occurs
- **Why** people are getting infected
- **How** the infection can be prevented or controlled

Example:

During a measles outbreak in a village, an epidemiologist studies the affected age group, vaccination status and living conditions to find the cause and stop the spread.

Application in Public Health:

Epidemiology helps health workers to:

- Detect and investigate outbreaks
- Identify risk factors
- Plan and evaluate control measures (like vaccination and hygiene promotion)
- Make evidence-based decisions

Activity 1.3: Understanding the Epidemiologic Triad**Trainer's Instructions:**

1. Draw the epidemiologic triad on a flip chart or display slide.
2. Explain each component with practical examples from local settings.
3. Ask participants to give one example of how they can break the chain of infection.

Trainer's Notes:

The Epidemiologic Triad explains how communicable diseases occur — through the interaction of three key elements:

Component	Description	Example
Agent	The microorganism that causes the disease (bacteria, virus, parasite, or fungus).	<i>Mycobacterium tuberculosis</i> causing TB
Host	The person or animal that can get the disease.	A person with weak immunity is more likely to get TB
Environment	External factors that help the disease spread.	Overcrowding, poor sanitation, stagnant water

Key Message:

If any part of this triad is interrupted — for example, through vaccination or improved sanitation — disease transmission can be prevented.

Activity 1.4: Exploring Patterns of Disease Occurrence

Trainer's Instructions:

1. Ask participants if they have heard terms like “epidemic” or “pandemic.”
2. Allow short discussion on examples they know (e.g., COVID-19, dengue).
3. Present and explain the following table.

Term	Definition	Example
Endemic	Constant presence of a disease within a particular area or population.	Malaria in some tropical areas
Epidemic	Sudden increase in disease cases beyond what is expected in a community.	Measles outbreak in a district
Pandemic	An epidemic that spreads across countries or continents.	COVID-19 pandemic
Sporadic	Diseases that occur occasionally and irregularly.	Tetanus cases in rural areas

Trainer's Notes:

- **Endemic** diseases are always present in a community.
- **Epidemics** occur when many people get sick suddenly.
- **Pandemics** affect large regions or the entire world.
- **Sporadic** cases appear randomly and infrequently.

Activity 1.5: Understanding Communicable vs. Contagious Diseases

Trainer's Instructions:

1. Ask participants to give examples of diseases they think are contagious.
2. Clarify misconceptions using the table below.

Communicable Disease	Contagious Disease
Caused by an infectious agent and can spread directly or indirectly (through air, food, water, or vectors).	Easily spreads through direct person-to-person contact.
Example: Malaria (spread by mosquito bite).	Example: Measles, Influenza, Scabies.

Trainer's Notes:

All contagious diseases are communicable, but not all communicable diseases are contagious.

Activity 1.6: Discussing Nosocomial, Opportunistic and Iatrogenic Infections

Trainer's Instructions:

1. Divide participants into three small groups.
2. Assign each group one of the following topics: Nosocomial, Opportunistic, or Iatrogenic infections.
3. Ask them to discuss what it means and share one example.
4. Conclude with the trainer's summary.

Trainer's Notes:

Type	Definition	Example / Explanation
Nosocomial (Hospital-acquired)	Infection acquired while receiving care in a hospital or clinic. It may appear after discharge.	Surgical wound infection, Hepatitis B, Urinary tract infection.
Opportunistic	Occurs when the immune system is weak and pathogens take advantage.	TB or oral thrush in HIV/AIDS patients.
Iatrogenic	Caused unintentionally by medical procedures or treatments.	Infection from contaminated instruments or reaction to a drug or vaccine.

Key Message:

All these infections can be prevented through good infection prevention and control practices in healthcare facilities.

Activity 1.7: Reflection and Summary**Trainer's Instructions:**

1. Review key points of the session.
2. Ask participants the reflection questions below.
3. Discuss responses briefly and clarify where needed.

Reflection Questions:

1. What is the main goal of epidemiology in public health?
2. How does breaking the epidemiologic triad prevent disease?
3. Give one example each of an endemic, epidemic and pandemic disease.

Key Takeaways:

- Epidemiology helps identify, understand and control disease spread.
- The epidemiologic triad (agent, host and environment) is essential to understanding how infections occur.
- Diseases can be sporadic, endemic, epidemic, or pandemic.
- Strengthening infection prevention measures and public health surveillance can break the chain of transmission.

SESSION 1.2

MEASURES OF DISEASE FREQUENCY AND DYNAMICS OF INFECTION

Time: 1 hour 30 minutes

Materials Needed: Flip charts, markers, PowerPoint slides, sample data handouts, graph/chart showing iceberg phenomenon

Session Objectives

By the end of this session, participants will be able to:

1. Define and differentiate between incidence and prevalence.
2. Explain attack rate, secondary attack rate and case fatality rate.
3. Understand the iceberg phenomenon of disease.
4. Identify index, primary and secondary cases and their roles in transmission.
5. Apply these measures to examples from their own community practice.

1. Introduction

Understanding how many people are sick and how fast a disease is spreading helps public health workers detect outbreaks, plan responses and allocate resources effectively.

As primary healthcare (PHC) workers, you use these measures to:

- Detect and investigate disease outbreaks early.
- Assess how well control measures (like vaccination or hygiene campaigns) are working.
- Prioritize and plan health interventions for the community.

Two key measures form the basis of disease monitoring: incidence and prevalence.

2. Measures of Morbidity

Activity 2.1: Introducing Incidence and Prevalence

Trainer Instructions:

1. Ask participants:
 - “If 5 people in your village develop diarrhea this week, what does that tell us?”
 - “What if 100 people are living with diabetes right now?”
2. Guide participants to see that one example shows new cases (incidence) and the other shows existing cases (prevalence).
3. Present the explanations below.

A. Incidence

Definition:

Incidence measures the number of new cases of a disease that develop in a population during a specific time period.

Formula:

$$\text{Incidence Risk} = \frac{\text{Number of new cases of disease in a specified period of time}}{\text{Number of disease-free persons at the beginning of that time period}}$$

Example:

If 40 new cases of Hepatitis A occur in a population of 10,000 during one year:

$$\text{Incidence} = 40/10,000 \times 100 = 0.4\%$$

Use in PHC Settings:

- Detect sudden increases → early warning of an epidemic.
- Assess effectiveness of preventive measures like vaccination or sanitation campaigns.

B. Prevalence

Definition:

Prevalence measures the total number of people (new + old cases) who have a disease in a population at a specific time.

Formula:

$$\text{Point Prevalence} = \frac{\text{Number of cases in a defined population at one point in time}}{\text{Number of persons in a defined population at the same point in time}}$$

Example:

If 200 people out of 10,000 are living with TB:

$$\text{Prevalence} = 200/10,000 \times 100 = 2\%$$

Use in PHC:

- Shows the burden of chronic diseases like TB, HIV, diabetes.
- Helps plan long-term care, drug supply and health education services.

Trainer's Summary Table: Comparing Incidence and Prevalence

Feature	Incidence	Prevalence
Definition	New cases during a time period	All existing (new + old) cases at a given time
Time Factor	Over a period of time	At a specific time or period
Indicates	Risk of developing the disease	Burden of disease in population
Useful For	Acute diseases, outbreak detection	Chronic diseases and long-term care
Example	New cholera cases this month	All TB cases in the district this year

3. Attack Rates and Case Types

Activity 2.2: Understanding Attack Rates

Trainer Instructions:

1. Explain that attack rates are used in outbreak investigations to identify how many exposed people became sick.
2. Draw a simple diagram showing people exposed at a party or event.
3. Explain *primary*, *secondary* and *index cases* through examples.

A. Key Case Definitions

Term	Definition	Example
Index Case	First case that comes to the attention of health authorities.	First reported case of cholera in a village.
Primary Case	Person who first brings the infection into a population.	Traveler who introduces dengue virus.
Secondary Case	Person infected by the primary case.	Family members who get dengue after exposure.

Trainer Note: The index case may or may not be the primary case—it is simply the first *detected*.

B. Types of Attack Rates

i. Primary Attack Rate (PAR)

Definition:

Proportion of **primary cases** among those exposed to the source.

Formula:

$$\text{PAR} = \frac{\text{Number of primary cases}}{\text{Total number of susceptible exposed}} \times 100$$

Example:

At a party, 60 people ate a contaminated dish. 10 developed gastroenteritis.

$$\text{PAR} = \frac{10}{60} \times 100 = 16.6\%$$

Use:

Applied in foodborne disease investigations or outbreaks linked to common exposure.

ii. Secondary Attack Rate (SAR)

Definition:

Proportion of contacts who develop disease after exposure to a primary case.

Formula:

$$\text{SAR} = \frac{\text{Number of persons exposed to a primary case developing the disease}}{\text{Total number of exposed/ susceptible contact}} \times 100$$

Example:

In a household, 10 children were exposed to a measles case; 6 developed measles.

$$\text{SAR} = \frac{6}{10} \times 100 = 60\%$$

Use:

Indicates person-to-person transmission potential. SAR is often high in airborne diseases like measles or influenza.

C. Summary Table: Measures of Morbidity

Term	Definition	Purpose / Use	Example
Incidence	New cases in a specific time period	Measures risk of developing disease	50 new TB cases in a year
Prevalence	All existing cases at a given time	Shows total burden	300 people living with diabetes
Attack Rate	Cases among those exposed	Used in outbreak investigations	30% of people who ate contaminated food became ill
Secondary Attack Rate	Cases among contacts of primary case	Measures person-to-person spread	2 out of 5 family members infected (40%)

4. Measures of Mortality

Trainer Instructions:

Explain that mortality rates measure the severity or fatality of diseases and guide resource allocation and emergency planning.

Measure	Formula / Definition	Example / Use
Crude Death Rate (CDR)	$\text{Annual deaths (all causes)} \div \text{mid-year population} \times 1,000$	Overall community death rate
Age-Specific Mortality Rate (ASMR)	$\text{Deaths in a specific age group} \div \text{mid-year population of that age group} \times 1,000$	Under-5 or elderly mortality
Cause-Specific Mortality Rate (CSMR)	$\text{Deaths from a specific cause} \div \text{total population} \times 100,000$	Lung cancer mortality rate
Proportionate Mortality Rate (PMR)	$\text{Deaths from a cause} \div \text{total deaths} \times 100$	20 cancer deaths out of 80 total = 25%
Case Fatality Rate (CFR)	$\text{Deaths among diagnosed cases} \div \text{total cases} \times 100$	9 rabies deaths among 10 cases = 90%

Trainer Note:

High CFR indicates a severe or poorly managed disease; it helps identify where urgent intervention is needed.

5. The Iceberg Phenomenon of Disease

Trainer Instructions:

1. Show a diagram of an iceberg (visible tip vs submerged part).
2. Ask participants to give examples of diseases where many cases go undetected.

Explanation:

The iceberg phenomenon describes diseases where only a small visible portion (symptomatic cases) is seen, while many subclinical or mild cases remain hidden.

Example:

In Hepatitis A, most infections in children are mild and unreported — only severe cases reach health facilities.

Why It Matters:

- The “hidden” cases can still transmit infection.
- Surveillance must include both apparent and inapparent infections.

6. Dynamics of Infection Spread

Disease spread depends on four key factors:

1. ***Source of infection:*** Where the pathogen lives and multiplies (humans, animals, environment).
2. ***Mode of transmission:*** Direct (person-to-person) or indirect (air, water, vector).
3. ***Susceptible host:*** People with low immunity or poor health conditions.
4. ***Environment:*** Conditions that favor the agent’s survival (crowding, humidity, sanitation).

Trainer Tip: Draw a simple diagram linking these four elements to show how infection dynamics work.

7. Group Exercise: Community Data Analysis**Scenario:**

During Eid holidays, 40 people attended a family feast. Two days later, 16 developed severe diarrhea.

Data:

- Total exposed = 40
- Number sick = 16

Task:

Calculate the **Attack Rate**.

$$AR = 16/40 \times 100 = 40\%$$

Discussion Questions:

- What does this tell us about the outbreak?
- Which foods or drinks could be the source?
- What control measures should be taken next time?

8. Key Takeaways

- ✓ Incidence = new cases → shows risk.
- ✓ Prevalence = all cases → shows burden.
- ✓ Attack rates are vital for outbreak investigations.
- ✓ Secondary attack rate measures spread within families or close contacts.
- ✓ Iceberg model reminds us that many infections are invisible but important for control.
- ✓ Understanding index, primary and secondary cases helps trace and break transmission chains.

SESSION 1.3

UNDERSTANDING VIRULENCE AND DISEASE TRANSMISSION

Introduction

Effective prevention and control of communicable diseases require a sound understanding of how infections occur and spread within communities. Every infectious disease follows a predictable pattern — beginning with the entry of a pathogen into a host and ending with its transmission to others.

This session introduces essential concepts such as *infection*, *infectivity*, *pathogenicity* and *virulence*, explaining how these characteristics influence disease outcomes. Participants will also learn about the *chain of infection* and *modes of disease transmission*, supported by examples from primary healthcare settings.

By understanding these principles, Primary Health Care (PHC) workers can identify critical points where interventions can “break the chain” — preventing infections before they spread. The session combines basic theory with practical group exercises to help participants apply these concepts in their daily work within communities and health facilities.

Learning Objectives

By the end of this session, participants will be able to:

- Define key terms including infection, infectivity, pathogenicity and virulence.
- Explain the chain of infection and its components.
- Describe different modes of disease transmission with relevant examples.
- Identify practical ways to break the chain of infection in PHC settings.

1. Basic Concepts

An infection occurs when an infectious agent enters and multiplies in the body of a host. The ease with which this happens depends on the organism's infectivity, while its ability to cause disease is known as pathogenicity. The virulence of a pathogen determines how severe the resulting illness will be. Some organisms can produce toxins (they are toxigenic) and others stimulate immunity (immunogenicity).

For example, *Mycobacterium tuberculosis* infects the lungs, the measles virus is highly infectious, poliovirus causes paralysis in a small proportion of cases, while the rabies virus is extremely virulent and almost always fatal. *Corynebacterium diphtheriae* produces diphtheria toxin and the measles virus provides long-term immunity after infection.

Remember: All virulent organisms are pathogenic, but not all pathogenic organisms are equally virulent.

2. The Chain of Infection

The chain of infection explains how diseases spread from one host to another. It consists of several interconnected links — if any one link is broken, the spread of infection can be prevented.

1. **Infectious Agent:** The microorganism that causes the disease, such as a virus, bacterium, parasite, or fungus.

Control measure: Identify and treat carriers early.

2. **Reservoir:** The natural habitat where the agent lives and multiplies — this may be humans, animals, or the environment.

Control measure: Disinfection, pest control and proper waste disposal.

3. **Portal of Exit:** The route by which the infectious agent leaves the reservoir, such as through coughing, sneezing, feces, or blood.

Control measure: Covering mouth when coughing, using masks.

4. **Mode of Transmission:** The way the agent moves from one host to another — directly or indirectly.

Control measure: Hand hygiene, safe food and water, vector control.

5. **Portal of Entry:** The path through which the agent enters a new host, such as the respiratory tract or skin breaks.

Control measure: Use of protective equipment, wound care.

6. **Susceptible Host:** An individual who lacks immunity or resistance to the infectious agent.

Control measure: Immunization, good nutrition, health education.

3. Modes of Disease Transmission

Modes of transmission describe how infectious agents travel from one person to another. This may occur through direct contact or through an intermediate source such as air, water, objects, or vectors. In healthcare settings, transmission often happens through contaminated hands, instruments, or the environment.

A. Direct Transmission

This occurs when an infectious agent passes directly from an infected individual to a susceptible one. Examples include:

- **Direct contact:** Touching, kissing, or sexual contact may spread infections such as STIs and skin infections.

Prevention: Use of personal protective equipment (PPE) and practicing safe sex.

- **Droplet spread:** Coughing and sneezing can transmit infections like influenza and COVID-19.

Prevention: Use of masks, respiratory hygiene and physical distancing.

- **Transplacental transmission:** Some infections like HIV and syphilis can pass from mother to fetus during pregnancy.

Prevention: Antenatal screening and treatment (e.g., ART for HIV).

B. Indirect Transmission

In this type, the infectious agent is transmitted through an intermediate object, substance, or vector.

- **Airborne transmission:** Diseases like tuberculosis and measles spread through dust or droplet nuclei.

Prevention: Proper ventilation and use of N95 masks.

- **Vehicle-borne transmission:** Contaminated food, water, or utensils can cause infections such as cholera and hepatitis A.

Prevention: Safe food handling, clean water and handwashing.

- **Vector-borne transmission:** Mosquitoes, flies and ticks can spread diseases like malaria, dengue and typhoid.

Prevention: Vector control, insecticide use and bed nets.

- **Fomite-borne transmission:** Contaminated surfaces or objects can transmit pathogens such as COVID-19.

Prevention: Regular cleaning and disinfection.

- **Iatrogenic or nosocomial transmission:** Infections acquired in healthcare facilities.

Prevention: Strict adherence to infection prevention and control (IPC) protocols.

4. Breaking the Chain of Infection – Role of PHC Workers

Primary Health Care workers play a crucial role in preventing the spread of infection at each stage of the chain. They can:

- Control the infectious agent by ensuring prompt treatment and proper disinfection of equipment.
- Eliminate reservoirs through waste management, pest control and maintaining clean environments.
- Block portals of exit by promoting cough etiquette and mask use.
- Interrupt transmission through hand hygiene, safe injection practices and sterilization.
- Protect portals of entry by using gloves and maintaining proper wound care.
- Protect the host by encouraging immunization, good nutrition and hygiene education.

5. Practical Activity – Mapping the Chain of Infection (Group Work):

Participants will choose one disease, such as tuberculosis, cholera, **or** dengue fever and identify each link in the chain of infection for that disease.

Discussion Questions:

- How does the infection spread in your community or facility?
- What are the weak points in the chain where interventions can be most effective?
- What actions can PHC workers take to prevent transmission?

6. Key Takeaways

- Virulence determines the severity of disease, while infectivity describes how easily it spreads.
- The chain of infection explains how diseases move from their source to a new host.
- Transmission can occur through direct or indirect routes.
- Breaking the chain of infection through preventive actions is the foundation of effective Infection Prevention and Control (IPC) at the primary healthcare level.

SESSION 1.4

DISEASE SURVEILLANCE SYSTEMS IN KHYBER PAKHTUNKHWA

Introduction

Early detection and control of communicable diseases rely on strong and functional surveillance systems. Disease surveillance helps public health authorities monitor disease trends, detect outbreaks promptly and guide appropriate responses. In Khyber Pakhtunkhwa (KPK), several surveillance systems operate under the Department of Health to ensure timely reporting and rapid action against potential epidemics. This session provides participants with an understanding of disease surveillance concepts, systems and their practical applications in the province.

Learning Objectives

By the end of this session, participants will be able to:

1. Define disease surveillance and describe its main purposes.
2. Identify the types and components of a surveillance system.
3. Explain the Integrated Disease Surveillance and Response (IDSR) and Disease Early Warning System (DEWS) in Pakistan.
4. Understand the roles and responsibilities of PHC workers in disease reporting.
5. Recognize the importance of timely reporting in outbreak detection and response.

1. What is Disease Surveillance?

Disease surveillance is the systematic and continuous process of collecting, analyzing, interpreting and disseminating health data. The purpose of this process is to guide planning, implementation and evaluation of public health interventions. In simpler terms, surveillance means keeping a constant watch over diseases in a community to detect early warning signs of outbreaks and take preventive action.

For example, continuous monitoring of fever cases in a community can help identify an outbreak of dengue or malaria before it spreads widely.

2. Objectives of Surveillance

Surveillance systems serve several important functions in disease prevention and control. These include:

- ✓ Detecting and monitoring trends in disease occurrence.
- ✓ Identifying outbreaks at an early stage to ensure timely response.
- ✓ Evaluating the effectiveness of public health control programs.
- ✓ Providing reliable evidence for decision-making and health policy development.
- ✓ Strengthening coordination among healthcare facilities, laboratories and health authorities.

Through these objectives, surveillance supports proactive public health action rather than reactive crisis management.

3. Components of a Surveillance System

A functional surveillance system consists of several interconnected components that ensure effective monitoring and response.

Component	Description
Data Collection	Routine and systematic gathering of information related to diseases from health facilities and communities.
Data Analysis	Summarizing and interpreting collected data to identify unusual patterns, clusters, or sudden increases in disease cases.
Information Dissemination	Sharing analyzed information with relevant stakeholders, such as district health offices and policymakers, for action.
Public Health Response	Implementing interventions like vaccination, isolation, treatment, or field investigation.
Evaluation	Assessing the performance of the surveillance system and identifying areas for improvement.

Each component plays a critical role in ensuring timely action to prevent and control disease outbreaks.

4. Types of Surveillance

There are several types of disease surveillance systems used in public health. These vary based on the source of data, method of case detection and the level of activity involved.

Type	Description	Example
Passive Surveillance	Routine reporting of diseases from health facilities without active search for cases.	Monthly reports submitted through the DHIS-2 platform.
Active Surveillance	Health workers actively search for or verify disease cases in the field.	Field investigations during a suspected cholera outbreak.
Sentinel Surveillance	Selected health facilities monitor specific diseases to detect trends and alert authorities.	Influenza surveillance at sentinel hospitals.
Event-Based Surveillance	Rapid collection of information from communities, media, or social networks about unusual health events.	Reports of sudden deaths or clusters of unknown illness.

5. Disease Surveillance in Pakistan and KPK

Pakistan operates multiple surveillance systems coordinated at both federal and provincial levels. In KPK, these systems are managed primarily by the Department of Health in collaboration with partners such as the World Health Organization (WHO).

a. Integrated Disease Surveillance and Response (IDSR)

The IDSR system was developed following WHO guidelines to streamline and integrate various surveillance systems under a single framework. It focuses on priority communicable diseases such as malaria, tuberculosis, dengue, measles and cholera. The main goals of IDSR include strengthening data collection, ensuring prompt analysis and enabling rapid response at district and facility levels. PHC workers play an important role in reporting and responding to suspected cases under this framework.

b. Disease Early Warning System (DEWS)

The DEWS was initially designed to detect and respond to outbreaks during emergencies such as floods or displacement crises. It collects weekly data from sentinel sites and PHC facilities and provides alerts when abnormal increases in cases are detected. Rapid Response Teams (RRTs) are then deployed to verify and control the outbreak. In KPK, DEWS is jointly managed by the Department of Health and WHO.

c. District Health Information Software (DHIS-2)

DHIS-2 is an electronic reporting platform used throughout KPK. It compiles monthly data on communicable diseases, maternal and child health indicators and facility performance. This system helps health managers monitor disease trends, plan preventive actions and allocate resources effectively.

6. Priority Notifiable Diseases in KPK

All healthcare facilities in KPK are legally required to report certain diseases immediately upon suspicion or confirmation. These diseases are grouped into categories based on transmission type and epidemic potential.

Category	Diseases / Conditions
Vaccine-Preventable	Polio, Measles, Diphtheria, Pertussis
Vector-Borne	Malaria, Dengue, Leishmaniasis
Waterborne	Cholera, Typhoid, Hepatitis A & E
Respiratory	COVID-19, Tuberculosis, Influenza
Other Epidemic-Prone	Meningitis, Crimean-Congo Hemorrhagic Fever (CCHF)

Immediate notification of these diseases allows public health teams to investigate quickly and initiate control measures to prevent further spread.

7. Roles and Responsibilities of PHC Workers

Primary Health Care (PHC) workers are at the frontline of the surveillance system. Their vigilance and timely action are vital in detecting and preventing outbreaks.

Responsibility	Description
Case Detection	Identify suspected or confirmed cases based on standard case definitions.
Data Recording	Accurately document cases in registers and reporting forms.
Reporting	Submit timely reports through DHIS-2 or directly to the Communicable Disease Control Cell (CDCC) or EPI office.
Outbreak Notification	Report any sudden increase in cases or deaths immediately to supervisors or district health officers.
Community Awareness	Educate the public about preventive and control measures.
Collaboration	Work with Rapid Response Teams (RRTs), EPI teams and district health authorities for coordinated action.

Reporting Timelines

- **Immediate (within 24 hours):** Epidemic-prone diseases such as cholera, measles and CCHF.
- **Weekly:** Routine notifiable diseases through DEWS.
- **Monthly:** General health indicators through DHIS-2.

8. Local Laws, Policies and Regulations

Disease surveillance and reporting in KPK operate under national and provincial laws that make disease notification mandatory. These include:

1. Pakistan Public Health (Surveillance and Response) Act, 2018
2. Khyber Pakhtunkhwa Public Health Act, 2017
3. National Institute of Health (NIH) Notification Guidelines
4. Integrated Disease Surveillance and Response (IDSR) Strategy 2020–2025
5. Department of Health KPK – Communicable Disease Control Cell (CDCC) Protocols

These laws empower health authorities to take necessary public health measures and ensure coordination among various stakeholders during outbreaks.

9. Key Takeaways

- ✓ Disease surveillance is a continuous process of data collection and action.
- ✓ PHC workers are essential for early disease detection and timely reporting.
- ✓ The IDSR, DEWS and DHIS-2 systems are key surveillance mechanisms in KPK.
- ✓ Timely, accurate reporting ensures quick outbreak detection and response.
- ✓ Strong legal frameworks support mandatory disease notification and coordinated public health action.

MODULE TWO

COMMUNICABLE DISEASES



Introduction

Communicable diseases, also known as infectious diseases, remain one of the major public health concerns in Pakistan and globally. Despite significant advances in prevention and treatment, these diseases continue to cause substantial morbidity and mortality, particularly in low- and middle-income countries. In Khyber Pakhtunkhwa (KPK), a large proportion of the health burden in primary health care (PHC) facilities is attributed to infections such as tuberculosis, malaria, dengue, diarrheal diseases, acute respiratory infections and vaccine-preventable illnesses.

Communicable diseases are caused by microorganisms—bacteria, viruses, fungi, or parasites—that can be transmitted from one person to another, from animals to humans, or through contaminated environments. Their spread depends on several factors, including the nature of the infectious agent, the level of population immunity, environmental conditions and the effectiveness of disease-control programs. In communities with limited access to clean water, sanitation and immunization, these diseases can spread rapidly, leading to outbreaks or even epidemics.

Understanding the epidemiology, transmission dynamics and prevention strategies for communicable diseases is essential for PHC workers, who serve as the first line of defense in detecting and managing infections. Their role includes early identification of cases, implementation of infection prevention and control (IPC) practices, community education and timely reporting through established surveillance systems such as IDSR, DEWS and DHIS-2.

This module aims to strengthen the knowledge and skills of PHC workers in the prevention, control and management of communicable diseases at the community and facility levels. It builds upon the foundational concepts discussed in Module One—epidemiology, disease transmission and surveillance—and moves toward practical application and disease-specific interventions.

Through interactive discussions, group work and real-world examples, participants will learn how to recognize common communicable diseases, understand their modes of spread and apply evidence-based preventive measures. Emphasis will also be placed on community engagement and multi-sectoral coordination, both critical for sustainable disease control.

Learning Outcomes of Module Two

At the end of this module, participants will be able to:

- ✓ Explain the burden and importance of communicable diseases in primary health care.
- ✓ Describe the common communicable diseases prevalent in KPK and their epidemiology.
- ✓ Apply the principles of infection prevention and control to reduce disease transmission.
- ✓ Conduct early case identification, management and referral.
- ✓ Participate effectively in disease surveillance and outbreak response activities.
- ✓ Educate communities about prevention, hygiene and vaccination practices.

This module is divided into several sessions. The first session (2.1) introduces the classification and burden of communicable diseases, setting the stage for disease-specific discussions in subsequent sessions.

CLASSIFICATION AND BURDEN OF COMMUNICABLE DISEASES

A communicable disease is an illness caused by a specific infectious agent or its toxic products that can be transmitted from one host to another. Transmission may occur directly through physical contact, droplets, or indirectly via contaminated water, food, air, vectors, or objects.

Unlike non-communicable diseases (such as diabetes or hypertension), communicable diseases often occur suddenly, can spread rapidly and may affect large populations in a short period if not controlled promptly. Effective prevention therefore requires community-wide awareness, timely case reporting and coordinated public health action.

2. Classification of Communicable Diseases

Communicable diseases can be classified based on several criteria such as causative agent, mode of transmission, or system affected. The following table summarizes the major categories.

Basis of Classification	Category / Example	Illustration / Description
By Causative Agent	Bacterial (e.g., Tuberculosis, Cholera)	Caused by pathogenic bacteria that multiply within the body.
	Viral (e.g., Measles, COVID-19, Hepatitis B)	Caused by viruses that invade host cells and replicate.
	Parasitic (e.g., Malaria, Leishmaniasis)	Caused by protozoa or helminths transmitted via vectors or contaminated soil/water.
	Fungal (e.g., Candidiasis, Ringworm)	Caused by fungi affecting skin, nails, or mucous membranes.
By Mode of Transmission	Airborne (e.g., Tuberculosis, Measles)	Spread through droplets or dust in the air.
	Waterborne (e.g., Cholera, Typhoid)	Transmitted by consumption of contaminated water.
	Vector-borne (e.g., Malaria, Dengue)	Spread by mosquitoes, flies, or ticks.
	Contact-borne (e.g., Scabies, STIs)	Spread through direct or indirect physical contact.
By System Affected	Respiratory (e.g., Pneumonia, COVID-19)	Primarily involve lungs or airways.
	Gastrointestinal (e.g., Diarrhea, Hepatitis A)	Affect digestive system and liver.
	Neurological (e.g., Rabies, Meningitis)	Affect brain or nervous tissue.

SESSION 2.1: DIRECT TRANSMISSION

SUB-SESSION 2.1.1: CONTACT TRANSMISSION

Session Objectives

By the end of this session, participants will be able to:

1. Define contact transmission and explain how it contributes to the spread of communicable diseases.
2. Differentiate between direct and indirect contact transmission.
3. Identify common diseases transmitted through contact in the context of Khyber Pakhtunkhwa (KP).

1. Introduction

Contact transmission is one of the most frequent modes through which infectious diseases spread in communities, households and healthcare facilities. It involves either the direct or indirect transfer of infectious agents from one host to another.

In resource-limited settings like Khyber Pakhtunkhwa, contact transmission plays a central role in outbreaks of skin infections, diarrheal diseases and sexually transmitted infections (STIs). Contributing factors include overcrowding, poor sanitation and inadequate infection prevention practices. These factors not only facilitate disease transmission among community members but also increase the risk of infection among healthcare workers (HCWs).

Understanding the pathways of contact transmission allows primary healthcare (PHC) workers to design effective preventive strategies, including hand hygiene, proper disinfection, use of personal protective equipment (PPE) and patient education.

2. Overview of Direct Transmission

Definition:

Direct transmission refers to the immediate spread of an infectious agent from an infected person to a susceptible individual without an intermediate object or vector.

Mechanisms include:

Skin-to-skin contact

Mucosal contact (mouth, eyes, genital areas)

Sexual contact

Vertical (mother-to-child) transmission

Key Feature:

Direct transmission requires close physical proximity between individuals, resulting in the immediate transfer of infectious material such as blood, secretions, or excretions.

3. Subtypes of Contact Transmission

A. Direct Contact Transmission (Person-to-Person)

Definition and Mechanism:

Direct contact transmission occurs when infectious agents pass immediately from an infected person to another through physical interaction. This may happen via touching, kissing, sexual contact, or during childbirth and breastfeeding.

Common Routes of Direct Contact

Form of Contact	Mechanism of Transmission	Examples of Diseases
Skin-to-skin contact	Transfer via infected skin, wounds, or lesions	Scabies, Impetigo, Cellulitis
Kissing/oral contact	Spread through saliva and mucous membranes	Herpes simplex (HSV-1, HSV-2), Cytomegalovirus, Epstein-Barr Virus
Sexual contact	Exchange of bodily fluids and mucosal contact	HIV, Syphilis, Gonorrhea, Chlamydia, HPV
Vertical transmission	From mother to child during delivery or breastfeeding	HIV, Herpes simplex, Hepatitis B

Facilitator Note:

Encourage participants to discuss which of these forms of contact are most common in their working areas and what cultural or behavioral factors may influence their spread.

B. Indirect Contact Transmission

Definition:

Indirect contact transmission occurs when infectious agents are transferred through contaminated surfaces or objects (fomites) rather than direct human contact.

Mechanism:

1. An infected person contaminates a surface or object.
2. The pathogen survives on that surface for a certain period.
3. A susceptible person touches the surface and then touches their mouth, nose, or eyes, leading to infection.

Key Points:

- ❖ **Common fomites:** door handles, bed rails, stethoscopes, mobile phones, medical instruments, toys, clothing.

❖ Persistence:

- *Norovirus* – survives up to two weeks on hard surfaces.
- *MRSA* – survives for hours to days.
- *C. difficile* spores – survive for weeks to months and are resistant to many disinfectants.
- *Hands as main vectors*: unwashed hands often act as the bridge between contaminated objects and mucous membranes, highlighting the need for rigorous hand hygiene.

4. Summary Table

Transmission Subtype	Definition	Typical Examples	Infection Control Focus
Direct Contact	Immediate person-to-person physical contact	Scabies, Herpes, STIs, Impetigo	Isolation, treatment, behavior change education
Indirect Contact	Transmission through contaminated surfaces or objects	MRSA, Norovirus, <i>C. difficile</i>	Hand hygiene, surface disinfection, PPE use

5. Common Contact-Transmitted Diseases in Khyber Pakhtunkhwa

Contact transmission contributes significantly to the disease burden in Khyber Pakhtunkhwa, particularly in densely populated and low-resource communities. The following examples highlight key diseases commonly reported in the province.

Disease	Mode of Contact Transmission	Public Health Context (KPK)
HIV/AIDS	Sexual contact, blood exposure	Stigma and limited access to testing and counseling result in underreporting, especially in rural and peri-urban areas.
Scabies	Prolonged skin-to-skin contact	Common in overcrowded homes, refugee settlements and schools where close contact is unavoidable.
Herpes Simplex Virus	Mucosal or sexual contact	Often asymptomatic but highly contagious; limited awareness and late diagnosis are major challenges.

Facilitator Note:

Invite participants to share examples of these or similar diseases they have managed in their facilities. Discuss how infection prevention measures were implemented and what barriers were encountered.

6. Practical Activity – Identifying Contact Transmission Pathways**Group Work:**

Divide participants into small groups and assign each a disease (e.g., scabies, impetigo, HIV, or MRSA). Each group will:

1. Map the steps of transmission within a household or clinic.
2. Identify points where the chain of transmission can be interrupted.
3. Suggest practical preventive measures suitable for their PHC context (e.g., handwashing, PPE use, safe sexual practices, or patient isolation).

After group discussions, each team will present their findings to the class.

6. Key Takeaways

- Contact transmission is one of the most frequent and preventable routes of disease spread.
- Direct contact involves immediate person-to-person transfer, while indirect contact occurs through contaminated objects or surfaces.
- Hand hygiene, environmental cleaning and use of PPE are essential to prevent indirect contact transmission.
- PHC workers must identify potential contact transmission routes in healthcare and community settings and take proactive measures to “break the chain” of infection.

SESSION 2.1: DIRECT TRANSMISSION

SUB-SESSION 2.1.2: DROPLET TRANSMISSION

Purpose of the Session

This session aims to help participants understand the mechanism of droplet transmission, how it contributes to the spread of respiratory communicable diseases and how to prevent infection through appropriate infection prevention and control (IPC) measures in both community and clinical settings.

Facilitators should guide participants in recognizing the distinction between droplet and airborne transmission, identify high-risk settings and discuss locally relevant examples from Khyber Pakhtunkhwa (KP).

Session Duration: 60 minutes

Learning Objectives

By the end of this session, participants will be able to:

1. Define droplet transmission and distinguish it from contact and airborne transmission.
2. Identify common diseases spread through droplet transmission.
3. Explain factors influencing droplet spread and outbreak occurrence.
4. Apply practical IPC measures to minimize droplet transmission.
5. Identify high-risk groups and environments in KP vulnerable to droplet-borne infections.

Facilitator Preparation

Before the session:

- Prepare flip charts or slides showing how droplets spread during coughing or sneezing.
- Arrange surgical masks or tissue for demonstration of cough etiquette.
- Review local outbreak data on influenza, COVID-19, or diphtheria.

Materials Needed:

- Marker, flip charts and whiteboard
- Projector or visual aids ()
- Surgical masks and tissues for demonstration
- Hand sanitizer and posters on respiratory hygiene

1. Introduction**Facilitator Activity:**

Start with an interactive question:

“When someone sneezes or coughs near you, what happens to the tiny droplets coming out of their mouth or nose?”

Encourage participants to share their thoughts and personal experiences. Explain that this session focuses on droplet transmission, a major route of disease spread in communities and health facilities across KP.

Key Message:

Droplet transmission occurs when respiratory droplets containing infectious agents are expelled during coughing, sneezing, or talking and land on another person’s mucous membranes (eyes, nose, mouth) within 1–2 meters.

2. Key Concepts**Definition:**

Droplet transmission happens when large respiratory droplets (>5 microns) carrying infectious agents travel short distances and directly infect nearby individuals or contaminate surfaces.

Facilitator Explanation:

Highlight that these droplets differ from airborne particles, which are smaller, stay in the air longer and require special precautions (like N95 masks).

Demonstration:

Ask one participant to pretend to sneeze or cough (using water spray or hand gesture). Show how droplets can reach nearby people within 1–2 meters.

3. Discussion: Droplet vs. Airborne Transmission

Feature	Droplet Transmission	Airborne Transmission
Particle size	$>5\ \mu\text{m}$	$\leq 5\ \mu\text{m}$
Distance	Up to 1–2 meters	More than 6 meters
Duration in air	Seconds to minutes	Hours
Example diseases	Influenza, COVID-19, Mumps, Diphtheria	Tuberculosis, Measles, Chickenpox
Control measures	Surgical mask, hand hygiene, distancing	N95 mask, negative-pressure rooms

Facilitator Note:

Use this table to engage participants in comparing the two transmission modes. Ask them:

“Which type do you think is more difficult to control in your facility and why?”

4. Examples of Droplet-Transmitted Diseases

Discuss the following diseases with examples from KP:

- **Influenza and COVID-19:** Spread by coughing and sneezing in close contact.
- **Pertussis (Whooping Cough):** Common in unvaccinated children.
- **Meningococcal Meningitis:** Seen in overcrowded living spaces and refugee settings.
- **Diphtheria and Rubella:** Re-emerging due to incomplete vaccination.

Facilitator Tip:

Link discussion to local data. Ask participants if they have encountered these cases in their practice.

5. Risk Factors and Local Context

Facilitator explains that droplet transmission is enhanced by:

- Overcrowding and poor ventilation in homes and facilities.
- Lack of mask use and poor cough etiquette.
- Limited awareness about vaccination.
- Inadequate hand hygiene after contact with infected individuals.

Activity:

Divide participants into small groups. Ask them to identify at least three local situations in their area where droplet transmission is likely (e.g., school classrooms, outpatient waiting areas, family gatherings). Discuss how these can be mitigated.

6. Infection Prevention and Control (IPC) Measures**At Healthcare Facilities:**

- Maintain at least 1–2 meters between patients.
- Use surgical masks for staff and symptomatic patients.
- Enforce hand hygiene before and after patient contact.
- Clean and disinfect high-touch surfaces frequently.
- Ensure **good** ventilation in waiting and examination areas.

At Community Level:

- Promote cough etiquette (covering mouth/nose when coughing or sneezing).
- Encourage mask-wearing in public spaces during outbreaks.
- Educate communities about staying home when sick.
- Support routine **vaccination** (influenza, pertussis, diphtheria, COVID-19).

Facilitator Demonstration:

Show proper mask use and removal. Emphasize hand hygiene after touching the mask or any respiratory secretions.

7. Summary and Reflection

Facilitator Discussion Points:

- Droplet transmission is the main route for many respiratory infections.
- Preventable through basic measures: masking, distancing, ventilation and hygiene.
- PHC workers play a vital role in early detection, community education and outbreak prevention.

Ask participants:

“What one practice will you change or reinforce in your facility to reduce droplet transmission?”

Key Takeaways

- Droplet transmission occurs through respiratory droplets expelled during coughing, sneezing, or talking.
- These droplets travel short distances (1–2 meters) and cause infection by contacting mucosal surfaces.
- Simple, low-cost preventive measures such as mask use, hand hygiene, distancing and ventilation can drastically reduce transmission.
- Healthcare workers must model correct IPC behavior and educate communities regularly.

SESSION 2.1: DIRECT TRANSMISSION

SUB-SESSION 2.1.3: VERTICAL TRANSMISSION

Duration: 60 minutes

Methodology: Interactive presentation, group discussion, case study, question & answer

Materials Needed: Flipcharts, markers, projector (), case study handouts

Session Objectives

By the end of this session, participants will be able to:

1. Define *vertical transmission* and explain the different routes of transmission — during pregnancy, delivery and breastfeeding.
2. Identify common infections transmitted vertically and describe their health impacts.
3. Recognize major risk factors contributing to vertical transmission.
4. Describe practical prevention and control measures at the primary health care (PHC) level.

1. Introduction

Facilitator Notes:

Begin by asking participants:

- “How can a mother pass an infection to her baby?”
- “What do we mean by *mother-to-child transmission*?”

Then summarize: Vertical transmission, or mother-to-child transmission, refers to the spread of infection from a mother to her baby during pregnancy (in utero), childbirth (intrapartum), or after birth (through breastfeeding).

It is a major cause of infant illness and mortality in many developing regions, including Khyber Pakhtunkhwa (KP). Limited antenatal care, lack of maternal immunization and poor delivery practices increase the risk.

Facilitator Tip: Emphasize that PHC workers play a key role in early detection, counseling and prevention of vertical transmission.

2. Routes of Vertical Transmission

Facilitator Notes:

Use a simple diagram showing mother → placenta → baby → breast milk to visualize the routes.

Vertical transmission can occur in three main ways:

A. In Utero (Transplacental Transmission)

Occurs when infectious agents cross the placenta and infect the fetus during pregnancy.

- Common examples: *Rubella, Toxoplasmosis, Cytomegalovirus (CMV)*
- Possible outcomes: *Congenital defects, miscarriage, stillbirth, growth restriction*

B. Intrapartum Transmission (During Labor and Delivery)

Happens when the baby passes through the birth canal and is exposed to infected blood or secretions.

- Common examples: *HIV, Hepatitis B, Herpes Simplex Virus, Group B Streptococcus*
- Risk factors: *Prolonged labor, ruptured membranes, untreated infection*

C. Postpartum Transmission (Through Breastfeeding)

Occurs after birth when infectious agents are passed through breast milk.

- Common examples: *HIV, CMV, HTLV*
- Note: Exclusive BF while on ART significantly reduces HIV transmission risk.

Route of Transmission	Example Infections	Possible Outcomes
In Utero	Rubella, Toxoplasmosis	Congenital malformations
During Delivery	HIV, Hepatitis B	Neonatal infection, chronic disease
Breastfeeding	HIV, CMV	Postnatal infection, chronic illness

3. Common Infections Transmitted Vertically

Facilitator Notes:

Present this table and discuss each disease briefly, highlighting its public health relevance in KP.

Infection	Transmission Route	Possible Outcomes in Baby
HIV	In utero, delivery, breastfeeding	Perinatal HIV infection, poor growth, immune suppression
Syphilis	Transplacental	Stillbirth, congenital syphilis, rash, deformities
Rubella	Transplacental	Congenital Rubella Syndrome (CRS): cataracts, hearing loss
Toxoplasmosis	Transplacental	Brain and eye damage, hydrocephalus
CMV	Transplacental/delivery	Hearing loss, developmental delay
Hepatitis B	During delivery	Chronic liver infection, risk of liver cancer
Herpes Simplex Virus	During delivery	Severe neonatal infection
Zika Virus	Transplacental	Microcephaly, neurological issues

Facilitator Tip: Ask participants to identify which of these infections are part of *routine maternal screening* in their area.

4. Health Impact and Significance

Facilitator Discussion Points:

- Vertical transmission leads to congenital infections, infant deaths and lifelong chronic illnesses.
- Mothers may experience worsened infections due to reduced immunity during pregnancy.
- In Khyber Pakhtunkhwa, key contributing factors include:
 - Low antenatal screening coverage
 - Home deliveries without infection control
 - Low vaccination rates (especially Rubella and Hepatitis B)

Encourage discussion on how PHC staff can address these challenges.

5. Timing of Transmission and Risk Factors

Timing	Description	Key Risk Factors
In Utero	Infection crosses placenta	Early pregnancy infection, maternal viremia
During Delivery	Exposure to infected secretions	Prolonged labor, untreated infection
Postnatal	Transmission through breast milk	No ART, cracked nipples, poor feeding hygiene

Facilitator Tip: Emphasize the importance of early screening, clean delivery and safe breastfeeding counseling.

6. Case Study: Rubella Outbreak in KP

Facilitator Activity:

Read aloud the following scenario and divide participants into small groups to discuss the guiding questions.

Case Summary:

A rural district in KP reports multiple infants born with hearing loss and cataracts. Investigation reveals the mothers had rash and fever during early pregnancy—consistent with Rubella infection. None were vaccinated prior to pregnancy.

Discussion Questions:

1. What could have prevented this outbreak?
2. What are the key lessons for PHC workers?
3. How can maternal immunization programs be strengthened?

Facilitator Key Points:

- Vaccinate women of childbearing age.
- Strengthen antenatal screening and follow-up.
- Improve community awareness about rubella and antenatal care.

7. Prevention and Control at Primary Health Care Level

A. Antenatal Care

- Screen all pregnant women early for HIV, Syphilis, Hepatitis B.
- Ensure maternal immunizations (Rubella, Tetanus).
- Educate mothers about infection prevention (e.g., safe food, hygiene, avoiding contact with sick individuals).
- Promote early and regular antenatal visits.

B. Delivery and Postnatal Care

- Encourage institutional deliveries with infection control.
- Use sterile techniques and protective equipment.
- For Hepatitis B–positive mothers, ensure newborn vaccination and HBIG within 12 hours.
- Continue ART for HIV-positive mothers and counsel on safe breastfeeding.
- Support routine infant immunization and monitor growth and development.

Stage of Care	Key PHC Actions	Examples
Antenatal	Screening, immunization, counseling	HIV testing, Rubella vaccination
Delivery	Infection prevention, safe handling	Use sterile gloves, safe cord care
Postnatal	Breastfeeding advice, infant prophylaxis	HBV vaccine, ART adherence

8. Key Takeaways

- Vertical transmission can occur before, during, or after birth.
- Common infections: HIV, HBV, Syphilis, Rubella, HSV.
- Prevention through screening, immunization, safe delivery and education is essential.
- PHC workers are crucial in reducing transmission by:
 - Early identification of risk factors
 - Maternal counseling
 - Prompt referral and follow-up

Facilitator Closing Discussion

Ask:

- “What can we do at our health facilities to reduce vertical transmission?”
- “Which infections are most common in your area?”

Encourage participants to share examples and best practices.

SESSION 2.2: INDIRECT TRANSMISSION

SUB SESSION 2.2.1A: AIRBORNE DISEASES

Duration: 60 minutes

Methodology: Interactive lecture, group discussion, demonstration, case study

Materials Needed: Flipcharts, markers, posters on airborne transmission, multimedia, N95 mask sample

Learning Objectives

By the end of this session, participants will be able to:

1. Define airborne diseases and explain how airborne transmission occurs.
2. Identify key characteristics and environmental factors that promote airborne spread.
3. Recognize major examples of airborne diseases and their public health importance.
4. Describe preventive and control strategies at both individual and community levels.
5. Apply infection prevention and control (IPC) measures in primary health care settings.

1. Introduction

Facilitator Notes:

Begin with an engaging question to the participants:

- “Can an infection spread even if you never touch the sick person?”
- “What comes to your mind when you hear ‘airborne disease’?”

Then explain:

Airborne diseases are among the most contagious infections, capable of spreading through the air—especially in closed, poorly ventilated and crowded areas such as clinics, schools and public transport.

2. Definition

Facilitator Key Points:

- Airborne diseases are caused by bacteria, viruses, or fungi transmitted through airborne particles (droplet nuclei <5 microns).
- These particles can:
 - Remain suspended in the air for long periods.
 - Travel long distances with air currents.
 - Be inhaled deep into the lungs.

Examples: Tuberculosis (TB), Measles, Chickenpox, Influenza, COVID-19.

Facilitator Tip: Demonstrate how sneezing spreads small particles — use spray bottle demonstration or a simple animation .

3. Mechanism of Airborne Transmission

Use this **step-by-step table** to explain the process from source to infection:

Stage	Explanation
Source	Infected person releases droplets while coughing, sneezing, talking, or breathing.
Droplet Nuclei Formation	Large droplets fall quickly; small droplets (<5 µm) dry and remain airborne.
Suspension & Travel	Droplet nuclei stay suspended and travel with air currents.
Host Exposure	Another person inhales the contaminated air, leading to infection.

4. Simplified Step-by-Step Mechanism

Facilitator Notes: Explain these five simple steps using visuals or gestures for clarity:

1. **Release** – Pathogens are emitted by an infected person.
2. **Evaporation** – Droplets shrink into smaller droplet nuclei.
3. **Suspension** – The particles float in the air.
4. **Inhalation** – A nearby person breathes them in.
5. **Infection** – The microorganisms settle in the lungs and multiply.

5. Characteristics of Airborne Particles

Feature	Public Health Implication
Size <5 microns	Easily inhaled deep into lungs
Light and dry	Stay airborne for long periods
Travel >1–2 meters	Spread beyond close contact
Low infectious dose	Few organisms can cause infection

Facilitator Discussion Prompt:

Ask participants to think about how small and light these particles must be and why ventilation matters in preventing transmission.

6. Environmental Factors Affecting Transmission

Factor	Effect on Transmission
Ventilation	Poor ventilation allows pathogen accumulation.
Humidity	Low humidity speeds up droplet evaporation.
Airflow Direction	Can spread infection between rooms.
Crowding	Increases exposure risk.
Exposure Duration	Longer exposure = higher infection probability.

Facilitator Notes:

Discuss common settings in KP where these factors are a concern (e.g., small clinics, classrooms, transport vehicles).

7. Aerosol-Generating Procedures (Healthcare Settings)**Facilitator Notes:**

Explain that some healthcare procedures produce aerosols that increase airborne infection risk.

Examples include:

- Endotracheal intubation
- Nebulizer therapy
- Bronchoscopy
- Open suctioning
- Cardiopulmonary resuscitation (CPR)

Precautions:

- Always wear N95 respirators.
- Use negative-pressure rooms .
- Limit personnel during such procedures.

Facilitator Tip: Show an N95 mask, demonstrate proper wearing and sealing technique.

8. Difference Between Droplet and Airborne Transmission

Feature	Droplet Transmission	Airborne Transmission
Particle size	>5 µm	<5 µm
Travel distance	<1 meter	>1 meter
Air suspension	Falls quickly	Stays suspended for hours
Example Diseases	Influenza, COVID-19 (droplet form)	TB, Measles, Varicella, COVID-19 (aerosols)

Facilitator Discussion Prompt:

Ask participants to categorize diseases they know under these two modes.

9. At-Risk Populations and High-Risk Settings

A. At-Risk Populations:

- Healthcare workers (especially in ICUs and TB wards)
- Children and elderly persons
- Immunocompromised individuals (HIV, cancer)
- Residents of overcrowded homes
- Workers in closed spaces (mines, factories, prisons)

B. High-Risk Settings:

- Hospitals and health centers
- Schools, daycares
- Prisons, refugee camps
- Public transport
- Elderly care facilities

Facilitator Tip: Link these examples with local settings in KP (e.g., overcrowded wards, poor ventilation).

10. Public Health Impact

Airborne diseases cause:

- Rapid community spread and large-scale outbreaks (e.g., COVID-19).
- High burden on health systems due to hospitalization surges.
- Severe illness and mortality in vulnerable groups.
- Economic and social disruption during epidemics.

Facilitator Note: Relate to recent local experiences—TB and COVID-19 are relatable examples.

11. Public Health Strategies

Strategy	Rationale/Explanation
Use of N95/FFP2 masks	Filters particles <5 µm.
Isolation rooms (negative pressure)	Prevents contaminated air from spreading.
Improved ventilation	Dilutes airborne pathogens.
Vaccination programs	Reduces infection reservoir.
Outbreak investigation	Rapid detection and containment.

Facilitator Tip: Emphasize simple actions possible at PHC level — e.g., opening windows, mask use, screening.

12. Surveillance and Response

Facilitator Key Points:

Primary health facilities play a vital role in early detection and reporting.

Core actions include:

- Early case detection (symptom screening, testing)
- Contact tracing and follow-up
- Rapid outbreak investigation
- Reporting through IDSR or eDEWS surveillance systems

Activity: Ask participants how surveillance works in their district and discuss barriers to timely reporting.

13. Summary Table: Public Health Priority Airborne Diseases

Disease	Vaccine Available	High Transmission Risk	Severe Outcomes	Isolation Needed
TB	Yes (BCG – partial)	Yes	Yes	Yes
Measles	Yes	Very High	Yes	Yes
Chickenpox	Yes	High	Yes (in adults)	Yes
COVID-19	Yes	High	Yes	Yes
Influenza	Yes	High (seasonal)	Yes	Sometimes
Diphtheria	Yes	Moderate	Yes	Yes
Hantavirus	No	Low	Yes	No
Aspergillosis	No	Low	Yes	No

14. Global and Local Examples

Region	Example	Key Points
Global	COVID-19 Pandemic	Highlighted role of ventilation and mask use.
Pakistan	Measles Outbreaks	Linked to low vaccination coverage.
South Asia	Tuberculosis	High burden of multidrug-resistant TB.

Facilitator Discussion Prompt:

Encourage participants to share examples of airborne disease outbreaks in their own areas.

15. Key Takeaways for PHC Workers

- Airborne diseases can spread without direct contact.
- Prevention requires ventilation, masks and vaccination.
- Early recognition, isolation and reporting prevent community spread.
- Promote cough etiquette and community awareness.
- Always use PPE during aerosol-generating procedures.
- Participate in disease surveillance and outbreak response.

Facilitator Closing Discussion**Ask participants:**

- “Which airborne diseases are most common in your community?”
- “What simple steps can we take to reduce transmission in our health facilities?”

SESSION 2.2: INDIRECT TRANSMISSION

SUB SESSION 2.2.1B: MAJOR AIRBORNE DISEASES

Learning Objectives

By the end of this session, participants will be able to:

1. Identify and describe the major airborne communicable diseases and their causative agents.
2. Explain how these diseases are transmitted and recognize their key epidemiological features.
3. Recognize common symptoms and understand diagnostic methods used in primary care.
4. Discuss public health importance and prevention strategies.
5. Apply practical control and infection prevention measures in healthcare and community settings.

Facilitator Introduction

Facilitator Note:

Begin by revisiting the previous session on *Airborne Transmission Mechanisms (2.2.1A)*. Ask participants:

“Can someone briefly explain how airborne transmission occurs?”

Allow a few responses and link the discussion to this session:

“Excellent! Now that we understand *how* airborne transmission occurs, let’s explore *which diseases* are transmitted this way and how we can prevent them.”

1. Introduction

Airborne diseases are highly contagious infections that spread through small particles suspended in air. These pathogens can remain infectious for long periods and are capable of traveling significant distances in enclosed, poorly ventilated areas.

For primary healthcare workers (PHCWs), understanding the transmission, recognition and prevention of airborne diseases is crucial to protect both patients and health staff.

Facilitator Discussion Point:

Ask:

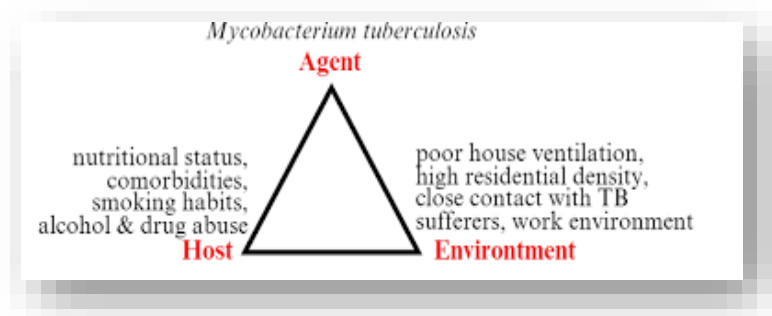
- “What are some examples of airborne diseases common in our area?”
- “Why do you think these infections spread more quickly in overcrowded environments?”

Record responses on the board or flipchart.

2. Tuberculosis (TB)

Causative Agent: *Mycobacterium tuberculosis*

Transmission: Inhalation of droplet nuclei expelled by infected individuals through coughing, sneezing, or talking.



Key Clinical Features:

- Persistent cough lasting more than 2 weeks
- Fever, night sweats and weight loss
- Blood in sputum (hemoptysis)

Diagnosis:

- Sputum microscopy or GeneXpert test
- Chest X-ray

Epidemiological Notes:

- Common in South Asia and Sub-Saharan Africa
- Often linked with HIV, poverty and overcrowding
- MDR-TB (multidrug-resistant TB) is a growing concern

Prevention and Control:

- BCG vaccination for infants
- DOTS strategy (Directly Observed Treatment, Short-course) for treatment adherence
- Improve ventilation and isolate infectious cases
- Promote respiratory hygiene (covering mouth while coughing, mask use)

Facilitator Discussion Question:

- “Why is early detection and completion of TB treatment so important?”

Activity 1: Case Study

Amina’s Story — Understanding Tuberculosis Risk Factors

Amina is a 32-year-old mother of three who lives in a crowded neighborhood on the outskirts of Peshawar. Her family of six shares a small, poorly ventilated two-room house. Amina works at a local garment workshop where many women sit close together for long hours.

Over the past two months, Amina has experienced persistent coughing, mild fever, weight loss, and night sweats. At first, she thought it was a simple flu, but her condition worsened. When she visited the nearby health center, the doctor ordered a sputum test — which confirmed that Amina had pulmonary tuberculosis (TB).

Further discussion with the health worker revealed several risk factors:

- Her husband had been treated for TB a year earlier but did not complete his medication.
- The family lives in an overcrowded space with poor ventilation.
- Amina’s long working hours in a poorly ventilated workshop increased her exposure.
- Her diet was limited in protein and essential nutrients, weakening her immunity.

Amina started treatment through the Directly Observed Treatment, Short-course (DOTS) program at the local clinic. The health team also screened her family members for TB and provided counseling on infection prevention — such as covering the mouth when coughing, improving ventilation, and completing the full course of medication.

Discussion Questions for Trainees

1. What were the key risk factors that increased Amina’s chances of developing TB?
2. Which public health measures helped prevent further spread of TB in her family and community?
3. How can health workers promote early detection and treatment adherence in similar communities?

3. Measles

Causative Agent: *Measles virus (Paramyxoviridae)*

Transmission: Airborne; highly contagious via droplets from coughing or sneezing.

Symptoms:

- Fever, cough, runny nose and conjunctivitis
- Koplik spots in the mouth
- Generalized rash starting from the face and spreading downward

Epidemiology:

- Extremely high transmission potential ($R_0 = 12-18$)

Common outbreaks in areas with low MMR vaccination coverage

-

Public Health Importance:

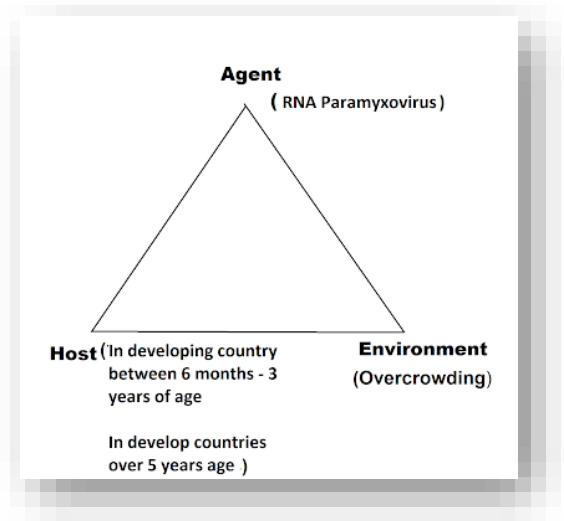
- Major cause of childhood mortality where immunization coverage is poor
- May lead to pneumonia, encephalitis and malnutrition

Prevention:

- MR vaccine (two doses)
- Vitamin A supplementation to prevent severe complications
- Rapid outbreak response through case finding and immunization drives

Facilitator Question:

- “What community-based strategies can we use to increase measles vaccination coverage?”



4. Chickenpox (Varicella)

Causative Agent: *Varicella-zoster virus*

Transmission: Airborne and direct contact with fluid from blisters.

Symptoms:

- Fever, malaise and itchy vesicular rash (appears in crops).
- Rash begins on the trunk and spreads to the face and limbs.

Epidemiology:

- Mostly affects children, but can be severe in adults and pregnant women.
- Contagious until all lesions crust over.

Prevention and Control:

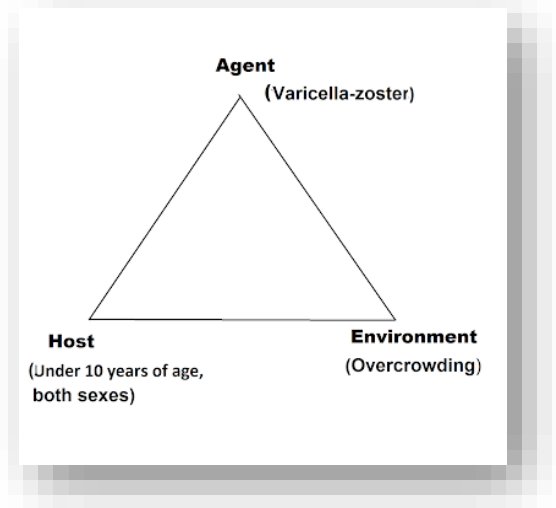
- Varicella vaccination for children and high-risk adults.
- Isolation of cases until lesions dry.
- Post-exposure prophylaxis for immunocompromised individuals.

Facilitator Tip:

Show a visual chart comparing skin rashes of measles, chickenpox and rubella for differentiation.

Discussion Question:

“Why is varicella more severe in adults and pregnant women?”



5. COVID-19 (Coronavirus Disease 2019)

Causative Agent: *SARS-CoV-2*

Transmission: Airborne and droplet spread; increased in crowded, poorly ventilated settings.

Symptoms:

- Fever, dry cough, sore throat
- Loss of taste or smell
- Difficulty breathing in severe cases

Epidemiology:

- Declared a global pandemic in 2020
- Major outbreaks in urban, densely populated areas
- Increased mortality among elderly and comorbid patients

Prevention:

- Vaccination and booster doses
- Mask use, ventilation and hand hygiene
- Isolation and quarantine measures for confirmed and suspected cases

Facilitator Discussion Point:

Ask participants to reflect:

“What lessons did our health system learn from the COVID-19 pandemic that can apply to other airborne diseases?”

6. Influenza (Flu)

Causative Agents: *Influenza A and B viruses*

Transmission: Airborne droplets and aerosols.

Symptoms:

- Sudden fever, headache, cough, sore throat and muscle pain.
- Symptoms typically last 5–7 days but can lead to complications in high-risk individuals.

Public Health Importance:

- Annual seasonal epidemics cause 3–5 million severe cases and up to 650,000 deaths globally.

Prevention:

- Annual influenza vaccination, especially for healthcare workers, elderly and pregnant women.
- Antivirals for treatment and outbreak control.
- Health education campaigns on cough etiquette and hygiene.

Facilitator Question:

“How can PHC workers contribute to influenza prevention each year?”

7. Summary Table: Comparison of Major Airborne Diseases

Disease	Causative Agent	Transmission	Key Symptoms	Vaccine Available	Key Prevention Measures
Tuberculosis	<i>Mycobacterium tuberculosis</i>	Airborne droplet nuclei	Chronic cough, fever, weight loss	Yes (BCG)	DOTS, ventilation
Measles	<i>Measles virus</i>	Airborne	Fever, rash, Koplik spots	Yes (MMR)	Vaccination, vitamin A
Chickenpox	<i>Varicella-zoster virus</i>	Airborne & contact	Vesicular rash, fever	Yes	Vaccination, isolation
COVID-19	<i>SARS-CoV-2</i>	Airborne & droplet	Fever, cough, loss of smell	Yes	Vaccination, masks
Influenza	<i>Influenza A & B</i>	Airborne	Fever, muscle pain, cough	Yes	Annual vaccination

8. Key Takeaways for Facilitators

- Airborne diseases spread easily; early detection, isolation and vaccination are critical.
- Reinforce infection prevention and control (IPC) practices in PHC settings.
- Educate communities on respiratory hygiene and vaccine importance.
- Encourage reporting of suspected outbreaks through surveillance systems.
- Demonstrate PPE use and cough etiquette during practical sessions.

Facilitator Wrap-Up

End the session by summarizing key messages:

“Airborne diseases remain among the most preventable communicable diseases through vaccination, hygiene and timely case management. As primary healthcare providers, your vigilance and preventive actions can protect your communities and prevent outbreaks.”

Quick Review Questions:

1. Which airborne disease has the highest basic reproduction number (R_0)?
2. What is the difference between TB and influenza in terms of transmission control?
3. How can PHC workers strengthen community trust in vaccination programs?

6. Diphtheria

Causative Agent: *Corynebacterium diphtheriae*

Transmission: Droplets from infected throat/nose.

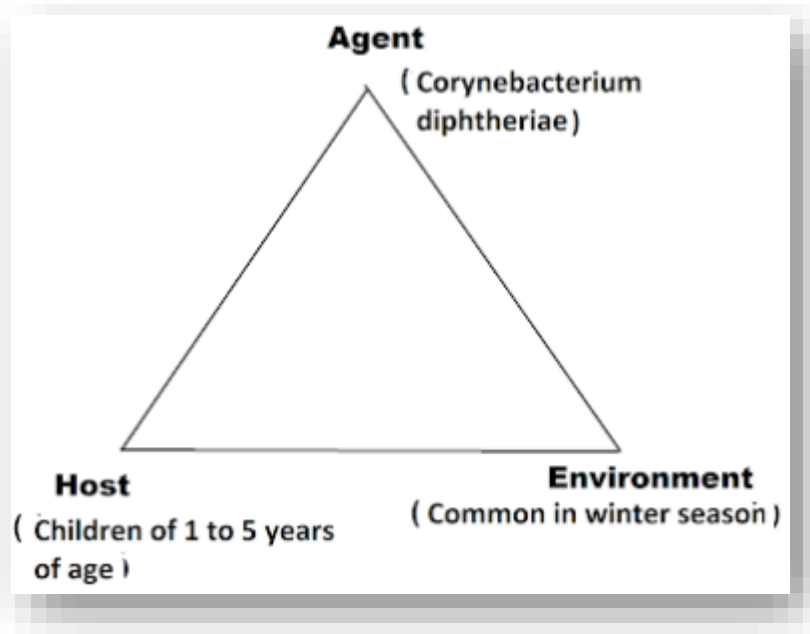
Symptoms: Sore throat, low-grade fever, thick gray membrane on tonsils.

Epidemiology:

- Re-emerging where vaccination is low.

Prevention:

- DPT vaccination, case isolation, contact prophylaxis.



7. Aspergillosis

Causative Agent: *Aspergillus* species (fungi)

Transmission: Inhalation of airborne fungal spores.

Symptoms: Allergic or invasive lung disease.

Epidemiology:

- Occurs mainly in immunocompromised patients (transplants, cancer).

Prevention:

- Air filtration, construction dust control, antifungal prophylaxis.

SESSION 2.2: INDIRECT TRANSMISSION

SUB SESSION 2.2.2: VEHICLE-BORNE TRANSMISSION

Session Objectives

By the end of this session, participants will be able to:

1. Explain the concept of vehicle-borne transmission and its role in spreading infectious diseases.
2. Identify common vehicles (water, food, blood, instruments) that can transmit diseases.
3. Describe how contamination, survival and transmission of pathogens occur through vehicles.
4. Recognize the major waterborne diseases, their symptoms, diagnosis and public health significance.
5. Understand environmental and behavioral factors contributing to vehicle-borne disease transmission.

Facilitator Notes

- Begin the session by revising indirect transmission from the previous discussion to build continuity.
- Use real-life examples (e.g., cholera outbreak, food poisoning incidents) to make the session relatable.
- Encourage participants to share local experiences of outbreaks related to contaminated water or food.
- Use charts, visuals and short videos to reinforce understanding.

1. Introduction to Vehicle-Borne Diseases

Vehicle-borne diseases are those transmitted through contaminated materials such as food, water, blood, or medical instruments. These are especially common in resource-limited settings where sanitation and hygiene are poor.

Waterborne transmission, a major subtype, occurs when people drink or use water contaminated with infectious microorganisms such as *Vibrio cholerae* or *Hepatitis A virus*.

Facilitator Discussion Points:

- Ask participants:
 - “What are some common diseases in your area that may be caused by contaminated food or water?”
 - “Can you recall any recent outbreak or incident linked to poor sanitation or unsafe medical practices?”
- Summarize their answers and link them to the concept of vehicle-borne diseases.

2. Understanding Vehicle-Borne Transmission

Vehicle-borne transmission is an **indirect mode** where pathogens are carried from an infected source to a susceptible host through contaminated substances known as vehicles. A vehicle can be food, water, blood, or a medical instrument that delivers pathogens into the body through ingestion, injection, or contact.

Facilitator Tip:

Draw a simple flow diagram on the board showing:

Source → Contamination → Vehicle → Host → Infection.

Ask participants:

- “What are some ways blood or instruments can become contaminated in healthcare settings?”
- “Why is this type of transmission particularly dangerous in resource-limited areas?”

3. Common Types of Vehicles

Type of Vehicle	Examples	Common Diseases
Water	Contaminated drinking or bathing water	Cholera, Typhoid, Hepatitis A & E
Food	Undercooked meat, unwashed vegetables, unpasteurized milk	Salmonellosis, E. coli infection, Botulism
Blood and Blood Products	Unsafe transfusions, organ transplants	HIV, Hepatitis B/C, Syphilis
Medical Equipment	Reused needles, catheters, surgical tools	Sepsis, Hepatitis, Prion diseases
Air (via aerosols from water systems)	Contaminated air-conditioning, humidifiers	Legionnaires' disease

Facilitator Activity:

- Divide participants into small groups.
- Assign each group one type of vehicle.
- Ask them to identify real-world examples from their own settings and list preventive measures on flipcharts.
- Each group presents for 3–4 minutes.

4. Mechanism of Vehicle-Borne Transmission

Vehicle-borne transmission occurs in four main stages:

Stage 1: Contamination of the Vehicle

Vehicles become contaminated through contact with infectious agents.

- Example: Food contaminated by feces, water contaminated by sewage, or blood contaminated during transfusion.

Stage 2: Survival and Multiplication of Pathogens

Some pathogens multiply in vehicles, increasing infection risk.

- Example: *Clostridium botulinum* in canned food, *Legionella* in standing water tanks.

Stage 3: Transmission to the Host

Transmission occurs through ingestion, injection, implantation, or mucosal contact.

Stage 4: Infection

Once inside the host, pathogens multiply and cause disease, depending on dose and host immunity.

Facilitator Questions:

- “At which stage do you think primary healthcare workers can intervene most effectively?”
- “What practical measures can break the transmission chain at each stage?”

5. Real-World Case Studies

Case Study	Description	Key Lesson
Haiti Cholera Outbreak (2010)	Contaminated river water led to over 800,000 cases after <i>V. cholerae</i> introduction.	Importance of clean water and sanitation infrastructure.
South Africa Listeriosis (2017–18)	Contaminated processed meat caused the largest recorded foodborne outbreak.	Need for food safety monitoring and public awareness.
Flint Water Crisis (USA, 2014–16)	Poor water treatment caused Legionella infections and lead poisoning.	Regular water testing and system maintenance are vital.

Facilitator Tip:

- Read out one case briefly, then ask:
 - “What public health systems failed in this example?”
 - “What measures could have prevented this outbreak?”

Optional Activity:

Role-play an outbreak investigation team identifying the vehicle and source of contamination.

6. Public Health Challenges

Vehicle-borne transmission remains a major challenge, particularly in developing regions. Common challenges include:

- Poor water and food quality control systems.
- Inadequate lab capacity for pathogen detection.
- Weak surveillance and outbreak response mechanisms.
- Unsafe blood transfusion and medical practices.
- Low public compliance with hygiene measures.

Facilitator Discussion Points:

- Ask participants to brainstorm:
 - “What are the most common barriers to preventing waterborne or foodborne diseases in your community?”
 - “How can PHC staff contribute to safer food, water and medical practices?”

7. Summary and Key Takeaways

- Vehicle-borne transmission involves pathogens carried by contaminated vehicles such as food, water, blood, or medical instruments.
- Preventive measures focus on safe water, food hygiene, sterilization and blood safety.
- PHC workers play a vital role in health education, early detection and reporting of outbreaks.

8. Suggested Learning Activities

Activity Type	Description
Group Discussion	Identify local examples of vehicle-borne diseases and discuss contributing factors.
Case Study Analysis	Review the Haiti or Flint case and identify lessons for PHC.
Role Play	Simulate outbreak response to a foodborne illness.

Facilitator Closing Notes

- Reinforce the importance of community awareness and safe practices to prevent vehicle-borne diseases.
- Encourage participants to think about practical actions they can take in their health facilities and communities.
- Link this session to upcoming discussions on vector-borne and fomite-borne transmission to show continuity in transmission pathways.

A: WATERBORNE TRANSMISSION

Session Objectives

By the end of this session, participants will be able to:

1. Explain the concepts of waterborne and foodborne transmission.
2. Identify the major diseases spread through contaminated water and food.
3. Understand the mechanisms and contributing environmental and behavioral factors.
4. Describe prevention and control measures at individual, household, community and system levels.
5. Recognize the vital role of primary healthcare workers in early detection, management and community education.

Facilitator Notes

- Begin the session by reviewing the previous topic on vehicle-borne transmission and linking it to water and food as major disease vehicles.
- Use visuals (charts or diagrams) to show how contamination and transmission occur.
- Encourage participants to share local examples of outbreaks (e.g., diarrhea after floods, food poisoning at weddings).
- Highlight that waterborne and foodborne diseases are largely preventable through simple hygiene and sanitation measures.

1. Definition

Waterborne diseases are caused by microorganisms transmitted through contaminated water, usually by the fecal-oral route. Fecal matter from infected humans or animals contaminates water sources used for drinking, cooking, or washing, allowing pathogens to infect new hosts. These infections typically cause diarrhea, vomiting, dehydration and in some cases affect the liver (Hepatitis A/E), nervous system (Polio), or other organs.

Facilitator Discussion Point:

Ask participants:

- “What are some common waterborne diseases you encounter in your health facilities?”
- “What are the most common sources of unsafe water in your communities?”

2. Step-by-Step Mechanism of Waterborne Transmission

Step	Description	Example
1	Contamination of water source by feces, sewage, or animal waste	River contaminated by open defecation
2	Pathogen survival in water	Hepatitis A virus survives for weeks
3	Human contact or consumption	Drinking or cooking with contaminated water
4	Entry into human body	Pathogens enter through mouth or skin
5	Disease development	Diarrhea, vomiting, or fever
6	Pathogen shedding	Infected person excretes pathogens in stool
7	Amplification	Contamination spreads through shared sources

Facilitator Activity:

Draw this mechanism on a flip chart and ask participants to identify intervention points where transmission can be stopped (e.g., safe water, sanitation, hygiene).

3. Major Waterborne Diseases

Disease	Causative Agent	Transmission Route	Prevention & Control Measures
Cholera	<i>Vibrio cholerae</i>	Fecal contamination of water/food	Safe water, ORS, cholera vaccine, sanitation improvement
Typhoid Fever	<i>Salmonella Typhi</i>	Fecal contamination	Safe water, handwashing, food hygiene, typhoid vaccine
Hepatitis A & E	<i>Hepatitis A/E virus</i>	Fecal-oral route	Sanitation, safe food and water, Hepatitis A vaccine
Giardiasis	<i>Giardia lamblia</i>	Cysts in contaminated water	Boil/filter water, hygiene, sanitation
Amoebiasis	<i>Entamoeba histolytica</i>	Contaminated water/food	Safe water, food hygiene, prompt treatment
Cryptosporidiosis	<i>Cryptosporidium spp.</i>	Contaminated pools/water	Boil/filter water, hygiene education
Poliomyelitis	<i>Poliovirus</i>	Fecal-oral transmission	OPV/IPV, sanitation, hygiene

Facilitator Tip:

Emphasize the preventable nature of these diseases through WASH (Water, Sanitation and Hygiene) practices.

4. Environmental and Behavioral Factors

The spread of waterborne diseases depends on:

- Poor sanitation and open defecation
- Unsafe or unprotected water sources
- Inadequate water treatment (no chlorination/filtration)
- Flooding and seasonal contamination
- Poor hand hygiene
- Overcrowding and shared contaminated sources

Facilitator Questions:

- “Which of these factors are most common in your community?”
- “What community-led actions could help reduce these risks?”

5. Public Health Relevance

- Over 2 billion people globally consume fecally contaminated water.
- Diarrheal diseases remain among the top causes of death in children under five.
- Waterborne diseases impose huge economic and productivity costs.
- Inadequate WASH investment perpetuates disease cycles, especially in rural areas.

6. Prevention and Control Strategies**At the Individual Level**

- Drink boiled or treated water.
- Wash hands with soap after toilet use and before meals.
- Avoid raw or undercooked foods.

At the Household Level

- Use covered containers for storing safe water.
- Treat water (chlorine tablets, filtration).
- Dispose of waste safely (pit latrines, septic tanks).

At the Community Level

- Promote proper sanitation.
- Conduct water quality testing.
- Organize hygiene awareness campaigns.

At the System Level

- Strengthen WASH infrastructure and water supply systems.
- Maintain disease surveillance and outbreak response capacity.
- Ensure intersectoral coordination (health, water, local government).

7. Case Example: Cholera Outbreak in Flood-Affected KP District

After severe flooding, sewage overflow contaminated wells, causing an outbreak of acute watery diarrhea.

Response Actions:

- Emergency chlorination of water sources
- ORS and antibiotics distribution
- Awareness campaigns on boiling water
- Enhanced surveillance and reporting

Facilitator Discussion:

- “What weaknesses in water and sanitation systems led to this outbreak?”
- “What early actions by PHC staff could have reduced its spread?”

Role of Primary Healthcare Workers

PHC workers are central to waterborne disease prevention:

- Early case detection and reporting
- Providing ORS and zinc for diarrhea
- Conducting hygiene and sanitation education
- Coordinating with local authorities for water safety
- Supporting outbreak investigations and surveillance

SESSION 2.2: INDIRECT TRANSMISSION

SUB SESSION 2.2.3: VECTOR-BORNE TRANSMISSION

Session Duration: 60 minutes

Learning Objectives

By the end of this session, participants will be able to:

1. Define vector-borne transmission and distinguish between biological and mechanical modes.
2. Identify the major vectors and the diseases they transmit in Pakistan (especially KP).
3. Describe the ecology and risk factors for vector-borne diseases (VBDs), including environmental, behavioural and structural contributors.
4. Recognize recent local trends of vector-borne diseases in KP and Pakistan.
5. Outline prevention and control strategies (including integrated vector management) relevant to primary health care (PHC) settings.

Facilitator Preparation Notes

- Review local epidemiological updates (e.g., recent dengue or malaria outbreaks in KP).
- Prepare visuals or posters showing mosquito breeding sites, vector life cycles and community clean-up campaigns.
- Have flip charts and markers ready for group work.
- If possible, show short clips or photos from community vector control activities.

1. Introduction

Facilitator Input:

Begin by asking participants:

“When you hear the term *vector-borne disease*, what comes to your mind?”

Allow 2–3 participants to share examples (e.g., dengue, malaria).

Then summarize:

“Vector-borne diseases are transmitted by living organisms—like mosquitoes, ticks, or flies—that carry pathogens from one host to another. These are particularly important in our region, especially post-monsoon, when stagnant water and poor waste disposal allow vector breeding.”

Facilitator Note:

Link to participants’ experience — “Many of you may have seen dengue or malaria cases during your fieldwork. What community factors contributed to those outbreaks?”

Encourage short sharing.

2. Definition and Modes of Transmission

Facilitator Input:

Explain clearly:

“Vector-borne transmission occurs when a living vector carries pathogens from an infected host to another. There are two main modes — biological and mechanical.”

Mode	Description	Example
Biological	Pathogen undergoes part of its life-cycle inside the vector.	<i>Malaria via Anopheles mosquito</i>
Mechanical	Vector carries pathogen externally without biological change.	<i>Housefly spreading typhoid bacteria</i>

Facilitator Discussion Prompt:

“Why is it important to know whether a disease is transmitted biologically or mechanically?”

(Expected answer: It helps design control strategies — biological transmission requires lifecycle interruption, while mechanical transmission needs hygiene and vector barriers.)

3. Vectors and Major Diseases in Pakistan**Facilitator Input (show chart or slide):**

Vector	Disease(s)	Pathogen Type
Mosquitoes	Dengue, Malaria, Zika, Chikungunya	Parasites, Viruses
Sandflies	Leishmaniasis	Parasite
Ticks	Crimean-Congo Hemorrhagic Fever, Lyme Disease	Virus, Bacteria
Fleas	Plague, Murine Typhus	Bacteria
Houseflies	Typhoid, Cholera (mechanical)	Bacteria, Virus

Facilitator Note:

Emphasize local relevance — “In KP, dengue and leishmaniasis are two key vector-borne diseases seen almost every year.”

Discussion Question:

“Which vector-borne diseases are most common in your district? What challenges do you face in controlling them?”

Record responses on flip chart for group reflection.

4. Ecology and Risk Factors

Facilitator Input:

Explain how environmental and behavioral conditions determine vector-borne disease spread:

- Stagnant water (open drums, tyres, puddles)
- Poor sanitation and waste management
- Unscreened houses, sleeping outdoors
- Urban crowding and unplanned housing
- Rainfall and flooding patterns increasing breeding

Facilitator Activity (Group Work):

Divide participants into small groups (3–4 people).

Ask:

“List 3 environmental and 3 behavioral risk factors for vector-borne diseases you have observed in your area.” After 5 minutes, have each group share one key factor.

Summarize patterns (e.g., poor waste disposal, stagnant water, uncovered containers).

5. Public Health Importance

Facilitator Input:

Highlight key facts:

- Vector-borne diseases cause over 700,000 deaths annually worldwide.
- In Pakistan, dengue and malaria are major threats; cases spike post-monsoon.
- In KP, outbreaks often follow floods and displacement due to environmental instability.

Facilitator Reflection Question:

“Why do you think vector-borne diseases reappear every year despite ongoing campaigns?”
Encourage responses (possible answers: lack of sustained community engagement, poor waste management, limited resources).

6. Prevention and Control Strategies

Facilitator Input:

Introduce the concept of *Integrated Vector Management (IVM)*:

“IVM means using a combination of environmental, biological, chemical and educational methods to control vectors effectively and sustainably.”

Key Actions for PHC Workers:

- Educate communities to eliminate standing water.
- Promote mosquito nets and repellents.
- Support clean-up and waste disposal drives.
- Participate in fever surveillance and outbreak reporting.
- Coordinate with municipal and vector control teams.

Level	Main Action	Expected Outcome
Individual/Household	Use mosquito nets, wear long sleeves, remove stagnant water	Reduced exposure
Community	Clean-up campaigns, waste removal	Reduced breeding sites
Health System	Case detection, reporting, vector surveillance	Early outbreak response
Government/Environmental	Drainage, sanitation, urban planning	Long-term reduction in risk

Facilitator Discussion:

“Which of these actions can *you* take directly as a PHC worker and which need coordination with others?”

Encourage participants to differentiate between household, community and system-level roles.

Facilitator Activity:

Ask participants to design a “Mini Vector-Control Plan” for their community:

- Identify one high-risk behavior
- Suggest a feasible community action
- Identify one partner (school, local body, mosque committee) to support

Allow time for quick group brainstorming and sharing.

7. Key Takeaways**Facilitator Summary:**

- ✓ Vectors are living transmitters of disease — understanding their ecology is vital.
- ✓ KP and Pakistan face seasonal surges, especially dengue.
- ✓ Prevention depends on community participation and sustained hygiene practices.
- ✓ PHC workers play a dual role: clinical management and community mobilization.

MODULE THREE

INFECTION PREVENTION AND CONTROL (IPC)



SESSION 3.1

INTRODUCTION TO INFECTION PREVENTION & CONTROL

Session Overview

Duration: 60

Methodology: Interactive lecture, discussion, group work, role play

Materials Required: Flip charts, markers, projector/slides, posters on hand hygiene and PPE

Session Objectives

By the end of this session, participants will be able to:

1. Define *Infection Prevention and Control (IPC)*.
2. Define commonly used terminologies in IPC.
3. Explain why IPC is important in healthcare settings.
4. Outline the critical components of good IPC practices.
5. Discuss the benefits of implementing effective IPC practices.

Facilitator's Guide Notes

Key Tip for Facilitator: Begin by asking participants:

“What comes to your mind when you hear the term *infection prevention*?”

Write their responses on a flip chart — this will help assess their baseline understanding.

Emphasize:

IPC is *everyone's responsibility* — from doctors to cleaners — and is vital for *patient safety, worker protection and community trust*.

Introduction

Infection Prevention and Control (IPC) is a set of evidence-based practices aimed at preventing infections associated with healthcare delivery.

Purpose of IPC:

To ensure that healthcare is provided safely, minimizing risks to patients, healthcare workers and visitors. IPC is crucial, especially in Primary Health Care (PHC) settings, where limited resources, overcrowding and inadequate hygiene can increase infection risks.

Discussion Prompt

- “What are some infections that health workers or patients might acquire in your health facility?”
- “How can simple actions like handwashing make a difference?”

Common Terminologies in IPC

Term	Meaning	Example / Note
Infection Prevention and Control (IPC)	Combination of policies, procedures and practices that prevent infections in healthcare settings.	Example: Hand hygiene, sterilization, PPE use.
Healthcare-Associated Infections (HAIs)	Infections acquired while receiving treatment in a healthcare facility.	Example: Catheter-associated urinary tract infection.
Standard Precautions	Basic IPC measures applied to all patients, regardless of infection status.	Includes hand hygiene and PPE.
Transmission-Based Precautions	Additional measures for specific infectious diseases.	For TB, measles, etc.
Personal Protective Equipment (PPE)	Specialized gear used to protect health workers.	Gloves, masks, gowns.
Asepsis	Absence of disease-causing microorganisms.	Used in surgical procedures.

Facilitator Discussion Point

Ask:

“Why is it important to use the same precautions for every patient, even if they look healthy?”

Expected responses:

- Because not all infections show visible symptoms.
- It ensures consistency and safety for everyone.

Standard Precautions

These are the foundation of IPC and must be applied universally.

Key Components:

- Hand hygiene (before and after patient contact)
- Use of PPE (gloves, gowns, masks)
- Safe injection and use of sterile equipment
- Environmental cleaning and surface disinfection
- Safe waste disposal and sharps management
- Respiratory hygiene and cough etiquette

Activity 1: Demonstration

Objective: Reinforce correct handwashing technique.

Method:

- Ask one volunteer to demonstrate handwashing steps.
- Correct technique: Wet → Apply soap → Rub for 20 seconds → Rinse → Dry → Close tap with towel.

Follow-up Question: “When should you wash your hands during patient care?”

Transmission-Based Precautions

Applied in addition to standard precautions for specific transmission modes.

Type	Transmission Mode	Examples	Precautions
Contact Precautions	Direct/indirect contact with infected person or surface	MRSA, diarrheal infections	Gloves, gowns, cleaning surfaces, isolate patient if possible
Droplet Precautions	Large droplets from coughs or sneezes	Influenza, meningitis	Surgical masks, limit patient movement
Airborne Precautions	Fine particles that stay suspended in air	TB, measles, chickenpox	N95 masks, well-ventilated rooms, isolate patients

Activity 2: Matching Exercise

Provide cards labeled with “TB,” “Influenza,” “MRSA” and another set labeled “Airborne,” “Droplet,” “Contact.”

Ask participants to match diseases with their transmission route. Why Infection Prevention and Control is Needed

IPC is essential for ensuring safety and reducing healthcare-associated risks.

Main Reasons:

- Protects patients from avoidable infections
- Safeguards healthcare workers from occupational hazards
- Reduces treatment costs and length of hospital stay
- Prevents community outbreaks and antibiotic resistance

Discussion Questions

1. “What could happen if IPC practices are ignored in a health facility?”
2. “How can poor waste management lead to infections?”

Importance of IPC

Area	Impact of Good IPC
Patients	Prevents HAIs, ensures faster recovery
Health Workers	Reduces risk of infection exposure (e.g., HIV, Hepatitis)
Health Facilities	Lowers costs, improves care quality and reputation
Community	Builds trust, prevents spread of infectious diseases

Facilitator's Note

Stress that **poor IPC affects everyone** — even administrative staff — as infections can spread through surfaces, air, or contact.

Critical Components of Good IPC Practices

Component	Description
Training of Health Workers	Regular sessions on hygiene, waste management, disinfection, etc.
Identification of IPC Gaps	Assess availability of supplies and compliance with practices.
Developing Action Plans	Set goals, timelines and assign responsibilities.
Implementing SOPs	Standardize safety procedures across the facility.
Ensuring Resources	Maintain adequate PPE, disinfectants and water supply.
Monitoring and Supervision	Regular observation and feedback to improve adherence.
Surveillance of HAIs	Record and analyze data to identify infection trends.
Isolation of Infectious Patients	Prevent cross-infection when possible.

Activity 3: Group Work

Ask participants to:

- Divide into groups and identify three IPC gaps in their facility.
- Suggest simple, practical solutions (e.g., place hand sanitizer at entrance, assign IPC focal person).

Each group presents for 3–5 minutes.

Benefits of Good Infection Prevention and Control

For Patients:

- Safe, hygienic care, faster recovery, fewer complications.

For Health Workers:

- Protection from occupational risks and infections.

For Health Facilities:

- Reduced costs, improved service quality and reputation.

For Communities:

- Trust in the healthcare system and fewer disease outbreaks.

Facilitator Summary

Conclude the session by reinforcing: “Infection Prevention and Control is not an option — it is a duty and a shared responsibility.” Encourage participants to apply at least one IPC improvement in their own workplace after this training.

SESSION 3.2

HEALTHCARE ASSOCIATED INFECTIONS (HAIS)

Session Overview

Duration: 60 minutes

Methodology: Interactive lecture, discussion, group activity, case scenario

Materials Required: Flip charts, markers, PowerPoint slides, sample hospital infection data, posters showing disease transmission cycle

Session Objectives

By the end of this session, participants will be able to:

1. Define *Healthcare-Associated Infections (HAIs)*.
2. Describe the *burden and importance* of HAIs in healthcare settings.
3. Identify the *most common types* of HAIs and their *causative organisms*.
4. Explain *how infections spread* through the disease transmission cycle.
5. Discuss the *factors that make patients more vulnerable* to infections.
6. Understand the *impact of HAIs* on patients, health workers and the community.

Facilitator's Guide Notes

Key Tip: Begin by asking participants:

“Have you ever seen a patient develop a new infection while admitted or after a medical procedure?” Use this to introduce the concept of *Healthcare-Associated Infections (HAIs)*.

Emphasize: HAIs are *preventable*, yet they remain a major cause of illness, cost and even death in healthcare facilities — especially where infection control practices are weak.

Introduction

Healthcare-Associated Infections (HAIs) are infections acquired by patients while receiving treatment or care in healthcare facilities such as hospitals, clinics, or health centers. They may also affect healthcare workers and visitors if infection control practices are inadequate.

These infections can appear during treatment, shortly after, or even weeks following a procedure. Examples include:

- Surgical wound infections,
- Urinary tract infections after catheter use and
- Respiratory infections following ventilator use.

Sources of Infection:

- Patients themselves (endogenous microorganisms),
- Healthcare workers and
- The healthcare environment (equipment, surfaces, air, water).

Facilitator Discussion Prompt

“Think about your own health facility — what are some areas where infections could spread easily?” Possible responses: dressing rooms, wards, injection rooms, delivery areas, waste zones.

Definition of Healthcare-Associated Infections

Healthcare-Associated Infections (HAIs) — previously called *Hospital-Acquired* or *Nosocomial Infections* — are infections that develop as a result of receiving healthcare services.

They occur due to:

- Direct patient care (e.g., wound dressing),
- Use of contaminated medical devices or instruments, or
- Exposure to an infected environment or person within the facility.

Key Point:

The term *Healthcare-Associated Infection* is preferred because it includes *all levels of care* — from hospitals and clinics to home-based services.

Burden and Magnitude of HAIs

HAIs are a major global health challenge, affecting millions annually.

Indicator	Findings / Statistics
Developed Countries	3–10% of hospitalized patients develop HAIs
Developing Countries	2.5–14.8% of hospitalized patients are affected
ICUs (Worldwide)	Infection rates can reach up to 50%
African Studies	Tanzania: 14.8% prevalence; Uganda: 34% prevalence
Complication	Antimicrobial resistance makes treatment difficult and costly

Key Message:

Every year, millions of patients contract infections during care — many of which are preventable through proper IPC.

Facilitator Tip

Show a simple bar chart or poster comparing infection rates between developed and developing countries. Discuss reasons for higher rates in low-resource settings (e.g., poor hygiene, limited PPE, overcrowding).

Common Healthcare-Associated Infections and Their Causative Organisms

HAIs may involve different parts of the body. Each type is linked with specific germs.

Type of Infection	Common Causative Organisms
Wound Infections	Staphylococcus aureus, Pseudomonas aeruginosa, Proteus spp., Klebsiella spp.
Urinary Tract Infections (UTIs)	Escherichia coli, Klebsiella pneumoniae
Respiratory Tract Infections (RTIs)	Klebsiella pneumoniae, Streptococcus pneumoniae, Mycobacterium tuberculosis, RSV
Bloodstream Infections	Staphylococcus spp., E. coli, Klebsiella pneumoniae
Gastrointestinal Infections	Salmonella spp., Shigella spp., Clostridium difficile

Facilitator Discussion

Ask:

“Which of these infections have you observed most frequently in your facility?” Follow up with:
 “What factors might be contributing to these infections?”

Key Messages

- All categories of staff are at risk — not only doctors and nurses but also cleaners and technicians.
- Most HAIs are preventable through consistent IPC practices.
- Proper hand hygiene, disinfection and waste management save lives.

The Disease Transmission Cycle

For infection to occur, six essential elements must be present — known as the Chain of Infection.

Component	Description	Examples
Infectious Agent	Germ that cause disease	Bacteria, viruses, fungi, parasites
Reservoir	Where germs live and multiply	Humans, animals, instruments, water
Portal of Exit	How germs leave the source	Blood, urine, feces, droplets
Mode of Transmission	How germs spread	Contact, droplets, air, contaminated objects
Portal of Entry	How germs enter the next person	Cuts, mouth, eyes, nose, urinary tract
Susceptible Host	Person at risk	Sick, elderly, newborns, health workers

Facilitator Activity 1: Chain of Infection Game

Objective: Reinforce understanding of infection links.

Instructions:

- Give each participant a card with one chain component (e.g., “reservoir,” “mode of transmission”).
- Ask them to arrange themselves in order to form the correct chain.
- Then discuss how *breaking any one link* can stop infection.

Key Learning:

Breaking the chain through IPC practices (e.g., hand hygiene, PPE, disinfection) prevents HAIs.

Routes of Transmission

Germs spread in healthcare settings through several routes:

- ***Direct Contact:*** Physical transfer from person to person (e.g., touching wounds).
- ***Indirect Contact:*** Via contaminated objects, surfaces, or instruments.
- ***Airborne Transmission:*** Germs suspended in air (e.g., *Mycobacterium tuberculosis*).
- ***Droplet Transmission:*** Large droplets from coughing or sneezing (e.g., *Influenza*).
- ***Common Vehicle:*** Contaminated food, water, or medicine.
- ***Vector-Borne:*** Insects such as mosquitoes.

Remember:

- Hands are the most frequent route of transmission.
- Contact transmission is the leading cause of HAIs.

Facilitator Question

“Which route of transmission do you think is most common in your facility — and why?”

Factors Increasing Susceptibility to Infections

Certain patients are at higher risk of acquiring HAIs. Risk Factors Include:

- Weakened immunity due to illness (HIV, diabetes, cancer).
- Prolonged hospital stay or frequent admissions.
- Use of invasive devices (catheters, IV lines).
- Overcrowded or poorly ventilated wards.
- Poor hand hygiene or inadequate disinfection.
- Malnutrition or advanced age.

Facilitator Activity 2: Case Scenario Discussion

“A diabetic patient develops a wound infection after surgery. Identify possible causes and what IPC measures could have prevented it.” Encourage group discussion and note practical solutions on a flip chart.

Impact of HAIs

Stakeholder	Impact
Patients	Longer stays, more suffering, higher costs and complications.
Healthcare Workers	Increased occupational exposure risk.
Health Facilities	More workload, higher expenses, reduced reputation.
Communities	Spread of resistant infections and loss of trust in health services.

Key Takeaway

HAIs affect *everyone* in the healthcare system. Preventing them improves safety, reduces costs and strengthens community confidence.

Facilitator Summary

Summarize by reinforcing these key points:

- HAIs are preventable with consistent IPC practices.
- The chain of infection can be broken at multiple points.
- Hand hygiene is the *most effective single measure* to prevent HAIs.
- Every health worker — from clinicians to cleaners — plays a role in infection control.

SESSION 3.3

HYGIENE IN INFECTION PREVENTION AND CONTROL (IPC)

Session Overview

This session introduces participants to the fundamental concept of hygiene within Infection Prevention and Control (IPC). It emphasizes how maintaining proper hygiene at all levels — personal, environmental and equipment — helps break the chain of infection and ensures safe healthcare delivery. The facilitator should encourage participants to connect hygiene practices with their daily work routines.

Session Objectives

By the end of this session, participants will be able to:

1. Define hygiene and explain its role in Infection Prevention and Control (IPC).
2. Describe the main components of hygiene — personal, environmental and equipment hygiene.
3. Demonstrate correct hand hygiene techniques following WHO-recommended steps.

Facilitator Notes

- **Duration:** 60 minutes
- **Methodology:** Interactive lecture, demonstration, group discussion and practical exercises
- **Materials Needed:**
 - Flipcharts and markers
 - Soap, clean water and alcohol-based hand rub
 - Hand hygiene posters (WHO 5 moments, handwashing technique)
 - PPE (gloves, mask, gown) for demonstration
 - Cleaning materials (mops, buckets, color-coded cloths)

1.0 Introduction to Hygiene in IPC

Facilitator Explanation:

Begin by asking participants: “Why do you think hygiene is called the foundation of infection prevention?” Allow a few responses before emphasizing that hygiene is the simplest, most cost-effective and universally applicable measure to prevent Healthcare-Associated Infections (HAIs).

Explain that good hygiene practices can reduce contamination levels by up to 70% (WHO, 2022). In healthcare, hygiene is not only about cleanliness — it is about patient safety and professional accountability.

Discussion Point:

- How do hygiene practices differ between home and healthcare settings?

2.0 Components of Hygiene in IPC

Hygiene practices in healthcare settings are grouped into three main areas:

1. Personal Hygiene
2. Environmental (Facility) Hygiene
3. Hygiene of Equipment

Each plays a vital role in preventing infections and maintaining safe clinical environments.

2.1 Personal Hygiene**Facilitator Explanation:**

Personal hygiene involves maintaining the cleanliness of the body, clothing and professional appearance. For healthcare workers, this ensures that pathogens are not transmitted to patients.

Good Personal Hygiene Practices:

- Bathe daily and wear clean uniforms.
- Keep nails short and unpolished; avoid artificial nails.
- Keep hair tied back or covered with a cap.
- Maintain good oral and overall body hygiene.
- Avoid strong perfumes or scented lotions in clinical areas.
- Use Personal Protective Equipment (PPE) appropriately.

Hand Hygiene**Key Concept:**

Hand hygiene is the single most important measure in preventing infections in healthcare settings.

Explain the two main methods:

1. **Handwashing** – with soap and clean running water.
2. **Hand rubbing** – using alcohol-based hand rub when hands are not visibly dirty.

Key Points for Facilitator:

- Demonstrate friction and duration (at least 20 seconds).
- Highlight that drying hands is part of the hygiene process.
- Remind participants that all healthcare workers, patients and attendants should be encouraged and trained on proper hand hygiene.

2.2 The Five (5) Moments of Hand Hygiene (WHO)

Moment	When to Perform Hand Hygiene
1	Before touching a patient
2	Before clean or aseptic procedures
3	After exposure to body fluids
4	After touching a patient
5	After touching patient surroundings

Facilitator Tip:

Use posters or illustrations for visual reinforcement. Ask participants to give examples of each “moment” from their work routine.

2.3 Types of Hand Hygiene

Type	Purpose / Situation
Social / Routine	For general cleanliness — before and after patient contact, after using toilet, before eating.
Aseptic / Hygienic	Before performing aseptic procedures (e.g., dressing wounds).
Surgical Hand Scrub	Before surgical or invasive procedures.
Antiseptic Hand Rubbing	When hands are not visibly dirty, using alcohol-based hand rub.

Facilitator Note:

Explain that social handwashing is most common in primary healthcare, while surgical scrubbing applies to specialized units or hospitals.

2.4 Materials for Hand Hygiene

Ensure the availability of:

- Clean running water
- Soap (preferably liquid soap in dispensers)
- Towels (preferably disposable paper or single-use cloth)
- Alcohol-based hand rub

Activity:

Ask participants to list barriers to proper hand hygiene in their facilities and brainstorm practical solutions.

2.5 Selecting Hand Hygiene Products

Selection should be based on:

- Antimicrobial effectiveness
- Skin tolerance and user acceptance
- Cost and continuous availability

Encourage participants to discuss which products they currently use and their experiences with them.

3.0 Environmental (Facility) Hygiene

Definition:

Environmental hygiene ensures that all healthcare environments remain clean, safe and free from disease-causing microorganisms.

Purpose of Environmental Hygiene:

- To remove dirt and microorganisms.
- To prevent cross-contamination.

- To create a safe and comfortable environment for patients and staff.

Principles of Environmental Hygiene:

1. Clean from clean to dirty areas.
2. Avoid dry dusting and sweeping.
3. Use color-coded cleaning materials for different areas.
4. Clean and disinfect high-touch surfaces frequently.
5. Use appropriate disinfectants according to IPC standards.

Facilitator Activity:

Show color-coded mops or cloths (e.g., red for toilets, blue for wards). Ask participants to suggest a cleaning schedule for their facilities.

4.0 Hygiene of Equipment

Facilitator Explanation:

All medical instruments, reusable supplies and patient care equipment must be cleaned, disinfected, or sterilized depending on their use.

Three Key Processes:

Process	Purpose	Examples
Decontamination	Makes items safe to handle by killing pathogens like HIV or HBV.	Soaking used instruments in disinfectant.
Cleaning	Removes visible dirt, blood and fluids using detergent and water.	Washing thermometers, bedpans, etc.
Disinfection / Sterilization	Destroys or eliminates all microorganisms depending on the procedure.	Sterilizing surgical instruments.

Safety Tip:

Always use PPE (gloves, aprons, masks) when handling or cleaning contaminated equipment.

5.0 Practical Demonstration: Hand Hygiene**Objective:**

Participants will perform correct hand hygiene steps following WHO standards.

Demonstration Steps:

1. The facilitator demonstrates correct handwashing technique step by step.
2. Participants practice individually under supervision.
3. Provide feedback and correct errors.
4. Repeat the process using alcohol-based hand rub.

Facilitator Tip:

Encourage peer observation and constructive feedback during practice.

6.0 Key Messages

- Hand hygiene is the **most** effective and affordable method for preventing HAIs.
- Always perform hand hygiene at the five WHO moments.
- Avoid jewelry, long nails and loose sleeves.
- Keep hands clean and dry.
- Alcohol-based hand rubs are effective when hands are not visibly dirty.
- Good hygiene — personal, environmental and equipment — forms the foundation of quality healthcare and patient safety.

Facilitator Reflection Questions

- What challenges do healthcare workers face in maintaining good hygiene?
- How can we encourage a hygiene culture in our facilities?
- Which hygiene improvement will you personally commit to after this session?

SESSION 3.4

HEALTH CARE WASTE MANAGEMENT (HCWM)

Session Overview

This session introduces participants to the principles and practices of effective Health Care Waste Management (HCWM) as an essential part of Infection Prevention and Control (IPC). The facilitator will guide participants through the types of healthcare waste, the importance of proper management and each step of the waste management process — from segregation to final disposal. The session combines lecture, discussion and practical activities to ensure understanding and application at the facility level.

Session Objectives

By the end of this session, participants will be able to:

1. Define health care waste.
2. Explain the importance of proper health care waste management.
3. Identify and classify the main types of health care waste.
4. Describe key steps in health care waste management (HCWM).
5. Demonstrate correct segregation and handling of healthcare waste.

Facilitator Notes

- **Duration:** 60 minutes
- **Methodology:** Interactive lecture, group discussion, demonstration and practical exercise
- **Materials Needed:**
 - Flipcharts, markers and posters
 - Color-coded waste bins or liners (black, red, yellow, brown, grey)
 - Sharps containers
 - Sample PPE (gloves, aprons, masks, boots)
 - Pictures or visuals of good and poor waste management practices

Facilitator Tip:

Begin the session by asking participants: “What types of waste do you see daily in your health facility and how are they handled?”

Encourage short responses to assess their current understanding.

1.0 Introduction

Health care waste refers to all waste materials generated by health care activities, including diagnosis, treatment, immunization, research and laboratory work. It comprises both hazardous and non-hazardous materials. According to WHO, 10–25% of total healthcare waste is hazardous and about 1% of that is sharps waste.

Improper disposal of such waste can lead to infections, injuries and environmental pollution, putting patients, healthcare workers and the wider community at risk.

2.0 Importance of Managing Health Care Waste

Proper management of healthcare waste is not only an infection control requirement but also a legal, ethical and environmental responsibility.

Facilitator Explanation:

Explain that poor waste handling has led to outbreaks of hepatitis and HIV among health workers through needle-stick injuries and has contaminated water sources near health facilities.

Importance of HCWM:

- Prevents infection transmission to patients, staff and the community.
- Reduces injuries such as needle-stick accidents.
- Protects the environment by reducing soil, air and water contamination.
- Discourages pests such as flies, rodents and stray animals.
- Improves facility image and public confidence.

Discussion Point:

Ask participants:

“Can you share an example of an incident or risk caused by poor waste handling in your facility or community?”

3.0 Types of Health Care Waste

Health care waste is broadly classified into hazardous and non-hazardous categories. The facilitator should emphasize that correct segregation at the point of generation determines whether waste becomes a risk or remains safe.

3.1 Hazardous Waste

Hazardous waste poses biological, chemical, or radiological risks and must be handled with special precautions.

a) Infectious Waste

- Blood and body fluids (e.g., sputum, vomit)
- Anatomical waste (e.g., placenta, limbs)
- Pathological specimens
- Sharps (needles, scalpels, broken ampoules)

b) Other Types of Hazardous Waste

- ***Chemical Waste:*** Disinfectants, laboratory reagents, solvents.
- ***Pharmaceutical Waste:*** Expired or contaminated drugs.
- ***Radioactive Waste:*** Contaminated isotopes or lab materials.
- ***Genotoxic Waste:*** Cytotoxic drugs and contaminated items.
- ***Pressurized Containers:*** Gas cylinders, aerosol cans.
- ***Heavy Metals:*** Mercury-containing thermometers, batteries.

3.2 Non-Hazardous Waste

This waste does not pose infection or toxic risk and includes:

- Office waste (paper, packaging)
- Food waste, wrappers and plastic bottles

Facilitator Emphasis:

Explain that mixing non-hazardous waste with hazardous waste increases risk and cost. Correct segregation reduces the need for expensive treatment like incineration.

4.0 Key Steps in Health Care Waste Management

HCWM is a **step-by-step process** designed to minimize risks and ensure safety from the point of waste generation to final disposal.

Step	Purpose
Waste Minimization	Reduce waste at source through careful procurement and rational use.
Segregation	Separate waste at the point of generation using color-coded bins.
Handling & Storage	Collect and store waste safely to prevent spillage and exposure.
Transportation	Move waste using designated trolleys or carts.
Treatment & Destruction	Neutralize or destroy hazardous waste.
Final Disposal	Ensure safe, environmentally sound disposal.

4.1 Waste Minimization

Encourage staff to:

- Buy supplies in appropriate quantities.
- Prefer reusable or recyclable materials when safe.
- Promote rational use of medicines and disposables.

Activity:

Ask participants to list two ways they can minimize waste in their work area.

4.2 Segregation of Waste

Segregation is done at the point of waste generation using color-coded containers.

Category of Waste	Examples	Color of Bin Liner
Non-Infectious	Paper, food, packaging	Black
Infectious	Blood, body fluids, contaminated materials	Red
Sharps	Needles, scalpels, broken ampoules	Yellow or puncture-proof sharps container
Chemical	Laboratory reagents, formaldehyde	Brown
Pharmaceutical	Expired or unused drugs	Grey
Radioactive	Contaminated isotopes	Special labeled container

Facilitator Tip:

Use visual aids — show participants the bins or liners . Reinforce that segregation at the source prevents contamination and injury.

4.3 Handling of Health Care Waste

Waste handlers should always use Personal Protective Equipment (PPE):

- Aprons
- Heavy-duty gloves
- Masks or goggles
- Protective boots

Safe Handling Practices:

- Use rigid, covered containers for waste collection.
- Avoid overfilling containers.
- Wash hands after handling waste.
- Never take protective clothing home.

4.4 Transportation of Waste

- Use dedicated, covered carts or trolleys.
- Keep waste segregated during transport.
- Clean and disinfect transport containers daily.
- Transport along designated routes to minimize exposure to patients or visitors.

Discussion Question:

“Who is responsible for transporting waste in your facility and what challenges do they face?”

4.5 Treatment and Destruction

Treatment neutralizes or destroys hazardous components before disposal.

Type of Waste	Recommended Treatment	Procedure
Microbiological (cultures, vaccines)	Autoclaving	121°C for 30 minutes; monitor efficiency.
Pathological (organs, tissues, blood)	Liming and burial	Alternate layers of waste and lime in a deep pit.
Highly infectious bodies	Burial in lime pit	Used for cases like Ebola.
Infectious fluids	Chemical disinfection	Add 1% chlorine solution; wait 10 minutes.

Facilitator Note:

Explain that incineration is preferred for infectious waste but must be done using approved, high-temperature incinerators.

4.6 Final Disposal of Health Care Waste

Type of Waste	Disposal Method
Non-Infectious	Community skips or municipal waste systems
Infectious	Incineration
Anatomical / Pathological	Burial in designated, fenced pits
Chemical	Small volumes flushed with water; large volumes neutralized
Cytotoxic	High-temperature incineration labeled “Cytotoxic”
Radioactive	Secure storage until collection by authorized agency (e.g., IAEA)

Facilitator Emphasis: Never burn waste in open pits — it releases toxic fumes and endangers health.

5.0 Practical Demonstration: Waste Segregation

Objective: Enable participants to correctly identify and segregate different types of waste using color-coded bins.

Materials Needed:

- Color-coded bins or liners
- Sample waste items (gloves, papers, syringes, vials, wrappers, cotton)
- Labels or tags

Procedure:

1. The facilitator displays waste items and asks participants to identify their categories.
2. Participants place each item in the correct color-coded bin.
3. Discuss any mistakes and clarify reasons for correct segregation.

Facilitator Tip: Reinforce the message — *“Segregate waste at the point of generation — not later.”*

6.0 Key Messages

- Health care waste management is a critical IPC function.
- Segregation at source is the foundation of safe waste management.
- Always use PPE when handling waste.
- Never mix hazardous and non-hazardous waste.
- Every healthcare worker shares responsibility for safe waste disposal.
- Proper HCWM protects health workers, patients, the community and the environment.

SESSION 3.5

DISINFECTION, STERILIZATION AND ASEPTIC TECHNIQUE

Introduction

Disinfection, sterilization and aseptic techniques are the backbone of infection prevention and control (IPC) in healthcare settings. They ensure that reusable medical devices, instruments and environments are safe for patient care. Disinfection eliminates most microorganisms; sterilization destroys all microorganisms including spores; and aseptic techniques prevent contamination of sterile materials during handling and procedures.

Together, these processes break the chain of infection and protect both healthcare workers and patients from preventable infections.

Session Objectives

By the end of this session, participants will be able to:

1. Define Disinfection, Sterilization and Aseptic Technique.
2. Discuss the indications for each process.
3. Describe the methods of achieving disinfection and sterilization.
4. Identify common types of disinfectants used in healthcare settings.
5. Demonstrate aseptic practices in handling sterile equipment.

1.0 Key Definitions

Term	Definition	Purpose / Examples
Disinfection	Destruction of most microorganisms (not spores) on inanimate objects using heat or chemicals.	Used for thermometers, bedpans, endoscopes.
Sterilization	Complete elimination of all microorganisms including spores.	Required for surgical instruments, catheters, needles.
Aseptic Technique	Practices that maintain sterility of items and environments during procedures.	Includes hand hygiene, sterile gloves and non-touch techniques.

2.0 Indications for Disinfection and Sterilization

The level of decontamination depends on the instrument's contact with the body. The Spaulding Classification helps determine which process to use:

Category	Examples	Required Process
Critical Items	Surgical instruments, catheters, needles	Sterilization
Semi-Critical Items	Endoscopes, thermometers, vaginal specula	High-Level Disinfection
Non-Critical Items	Stethoscopes, BP cuffs, bedpans	Cleaning / Low-Level Disinfection

Key Point: Always clean before disinfecting or sterilizing — organic matter reduces the effectiveness of both processes.

3.0 Processes and Methods of Disinfection and Sterilization

All decontamination follows three main steps:

1. Cleaning
2. Disinfection
3. Sterilization (if required)

3.1 Cleaning

Cleaning removes visible dirt, organic material and body fluids, preparing items for further processing. Steps include:

- Soak items in detergent and water.
- Scrub with a soft brush to remove residues.
- Rinse thoroughly with clean water.
- Dry completely before disinfection or sterilization.

Importance:

Cleaning prevents biofilm formation and increases the effectiveness of disinfectants and sterilization.

3.2 Disinfection Methods***A. Thermal (Heat) Disinfection***

- Effective for heat-resistant instruments.
- Achieved through boiling **or** steaming for at least 20 minutes.
- Referred to as High-Level Disinfection (HLD) when nearly all microorganisms are destroyed (except spores).
- Commonly used for scissors, forceps and vaginal specula.

B. Chemical Disinfection

Used for heat-sensitive equipment. The disinfectant type, concentration and contact time determine effectiveness.

Chemical Disinfectant	Common Use	Contact Time / Notes
Chlorine (1%)	Disinfecting surfaces, spills, instruments contaminated with blood	Prepare fresh solution daily.
Alcohol (70%)	Small equipment (stethoscopes, thermometers)	Quick-acting; evaporates fast.
Glutaraldehyde (2%)	Endoscopes, delicate instruments	Requires 20–30 minutes contact.
Hydrogen Peroxide / Peracetic Acid	Semi-critical items	Used for high-level disinfection.

Precautions:

- Wear gloves and masks when handling chemicals.
- Ensure good ventilation.
- Always rinse items after chemical disinfection (if required).

3.3 Sterilization Methods

Method	Description	Application
Steam Sterilization (Autoclaving)	Uses pressurized steam at 121–134°C for 15–30 min.	Most reliable; used for surgical instruments, gowns and drapes.
Dry Heat Sterilization	Uses hot air at 160°C for at least 2 hours.	For glassware, oils and powders.
Chemical Sterilization	Uses chemical agents for heat-sensitive equipment.	Suitable for plastics, endoscopes.
Gas Sterilization (Ethylene Oxide)	Uses ethylene oxide gas under pressure.	For delicate instruments and large quantities. Requires aeration post-process.

Key Point:

After sterilization, store items properly to maintain sterility until use.

3.4 Storage and Handling of Sterile Items

- Store in clean, dry, dust-free cupboards or shelves.
- Label and date all sterilized items.
- Use the FIFO (First In, First Out) system.
- Reprocess if packs are torn, wet, or opened.
- Handle sterile items using aseptic technique.

4.0 Aseptic Technique

Aseptic technique prevents contamination during medical or surgical procedures. It combines barrier precautions, environmental controls and non-touch methods to maintain sterility.

Principles of Aseptic Technique:

- Perform hand hygiene before and after procedures.
- Use sterile gloves, masks and gowns when necessary.
- Maintain a sterile field – only sterile items should touch sterile surfaces.
- Avoid unnecessary movement or talking over sterile areas.
- Replace contaminated instruments immediately.

Examples of Aseptic Procedures:

- Surgical operations.
- Catheter insertions.
- Wound dressing.
- Injection preparation.

5.0 Summary

Disinfection, sterilization and aseptic technique are essential in maintaining safe healthcare practices.

Key Takeaways:

- Always clean equipment before disinfection or sterilization.
- Choose the method based on the item's risk level (critical, semi-critical, non-critical).
- Use correct chemical concentrations and contact times.
- Maintain aseptic technique during and after sterilization.
- Store sterile equipment properly and safely.

6.0 Facilitator Activity & Demonstration Guide

Activity 1: Group Discussion – Identifying Items for Decontamination

Objective:

To help participants classify instruments based on required processing (cleaning, disinfection, or sterilization).

Procedure:

1. Divide participants into small groups.
2. Provide each group with a list or pictures of instruments (e.g., thermometers, syringes, gloves, catheters, endoscopes).
3. Ask them to classify each item as critical, semi-critical, or non-critical and state the required process.
4. Discuss answers together and correct misconceptions.

Duration:

Activity 2: Demonstration – Proper Disinfection Technique

Objective:

To demonstrate correct preparation and use of a disinfectant (e.g., 1% chlorine solution).

Materials Needed:

- Chlorine powder or bleach.
- Measuring jug, bucket and stirring stick.
- Gloves, mask, apron.

Steps:

1. Demonstrate how to prepare a 1% chlorine solution.
2. Explain correct contact time for surfaces and instruments.

3. Emphasize safety precautions (gloves, ventilation, labeling containers).
4. Invite participants to prepare the solution themselves.

Activity 3: Demonstration – Steam Sterilization (Autoclaving)

Objective:

To show how to load, operate and monitor an autoclave.

Procedure:

1. Show correct cleaning and packaging of items.
2. Demonstrate loading the autoclave (avoid overloading).
3. Explain temperature, pressure and time requirements.
4. Show how to use sterilization indicators (e.g., tape color change).
5. Discuss safe unloading and storage of sterile packs.

Activity 4: Role Play – Maintaining Aseptic Technique

Objective:

To reinforce correct aseptic practices during a minor procedure (e.g., wound dressing or catheter insertion).

Instructions:

- Two participants perform a simulated procedure using aseptic technique.
- Others observe and identify correct and incorrect practices.
- Discuss lessons learned as a group.

Facilitator Tips

- Encourage questions and real-life examples from participants' workplaces.
- Use visual aids such as color-coded bins, posters and PPE.
- Reinforce the link between poor practices and healthcare-associated infections.
- Conclude with a short quiz or recap of key messages.

SESSION 3.6

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Introduction

Personal Protective Equipment (PPE) refers to specialized clothing or equipment designed to protect healthcare workers from contact with potentially infectious materials. It serves as a physical barrier that minimizes the risk of exposure to blood, body fluids, or contaminated surfaces.

In healthcare settings—particularly in Primary Health Care (PHC)—PPE plays a critical role in infection prevention and control (IPC). Proper use of PPE not only protects health workers but also prevents the spread of infections to patients, colleagues, and the wider community.

Module Objectives

By the end of this module, participants will be able to:

1. Identify and describe commonly used PPE in healthcare settings.
2. Explain the indications and appropriate use of each type of PPE.
3. Demonstrate correct donning (putting on) and doffing (removing) of PPE.
4. Apply proper PPE practices in different healthcare scenarios to prevent self-contamination.

1: Introducing the Module

Purpose:

To familiarize participants with the topic and objectives of the PPE module.

Instructions:

- Listen carefully to the trainer's overview of the session.
- Share any personal experiences or questions related to PPE use.

Discussion Point:

Why is it important to use PPE correctly in healthcare settings?

2: Identifying Commonly Used PPE in Health Care Settings

Purpose:

To help participants recognize the different types of PPE used in healthcare facilities.

Instructions:

- In small groups, brainstorm the PPE items commonly used in your facility.
- A volunteer will record the responses on a flip chart.
- The trainer will then add any missing items.

Commonly Used PPE in Healthcare Settings

Category	Examples
Hand Protection	Gloves (sterile and non-sterile)
Body Protection	Gowns, Scrubs, Aprons, Clinical Coats
Head Protection	Caps, Head Gears
Eye/Face Protection	Goggles, Face Shields, Masks
Foot Protection	Gum Boots, Protective Footwear

Remember: The type of PPE required depends on the task being performed and the level of exposure risk.

3: Indications and Applications of PPE

Purpose:

To understand when and why each type of PPE should be used.

Instructions:

- Work in two groups:
 - *Group 1:* Discuss the first five types of PPE.
 - *Group 2:* Discuss the remaining PPE types.
- Present findings in plenary.

Table: Indications for Common PPE

PPE Type	Indications for Use
Gloves	When in contact with blood, body fluids, mucous membranes, or non-intact skin.
Gowns/Aprons	To protect skin and clothing during procedures likely to cause splashing.
Masks	During close contact with patients, particularly those with respiratory symptoms.
Goggles/Face Shields	When risk of splashing or spraying of infectious materials exists.
Caps/Head Covers	In operating rooms or during sterile procedures.
Footwear (Gum Boots)	In cleaning, waste disposal, or areas prone to contamination.

4: Appropriate Use of PPE

Purpose:

To reinforce correct and consistent use of PPE in daily healthcare practice.

Key Points:

- PPE must be put on before patient contact and removed immediately after the procedure.
- Avoid touching or contaminating surfaces that are not directly involved in patient care.
- Prevent self-contamination during both donning and doffing.
- Discard used PPE properly in designated waste containers.
- Remove and dispose of PPE before leaving the patient care area.
- Respirators should be removed outside isolation rooms after the door is closed.
- Reusable PPE (e.g., aprons, gum boots) should be decontaminated and cleaned after use.

Practice Tip:

Always assess the task and level of exposure before selecting PPE. Use the “right PPE for the right job.”

5: Donning and Doffing of PPE***Purpose:***

To ensure participants can safely put on and remove PPE without risk of contamination.

Correct Order of Donning (Putting On) PPE

1. Perform hand hygiene.
2. Put on gown or apron.
3. Put on mask or respirator.
4. Put on goggles or face shield.
5. Put on gloves.

Correct Order of Doffing (Removing) PPE

1. Remove gloves carefully without touching the skin.
2. Remove goggles or face shield.
3. Remove gown or apron and roll inside-out.
4. Remove mask or respirator (outside isolation area).
5. Perform hand hygiene immediately.

PPE Donning and Doffing Sequence Chart

Step	Donning (Before Patient Contact)	Doffing (After Procedure)
1	Hand Hygiene	Gloves
2	Gown/Apron	Goggles/Face Shield
3	Mask/Respirator	Gown/Apron
4	Goggles/Face Shield	Mask/Respirator
5	Gloves	Hand Hygiene

Practice Activity:

- Participants practice donning and doffing in pairs.
- Trainers observe and correct technique as needed.

Key Messages

- Always use PPE appropriate to the risk of exposure.
- PPE must be correctly donned and doffed to prevent self-contamination.
- Dispose of used PPE in the designated area—never carry it outside patient zones.
- Regularly practice PPE use to build confidence and consistency.
- Remember, PPE is the last line of defense—it complements but does not replace standard precautions.

6: Evaluating the Module

Purpose:

To assess understanding and reinforce learning.

Instructions:

- Answer short review questions posed by the trainer.
- Discuss any unclear points for clarification.
- Reflect on how PPE use can be improved in your workplace.

Review Questions:

1. What are the main purposes of PPE in healthcare?
2. List three examples of PPE and their uses.
3. What steps should you follow when removing PPE to avoid contamination?

SESSION 3.6

INJECTION SAFETY (DO NO HARM)

Introduction

Injections are among the most common invasive procedures performed in healthcare settings, particularly within primary health care facilities across Pakistan. While injections are an essential route for delivering medications and vaccines, unsafe practices can result in serious health risks — including the transmission of Hepatitis B, Hepatitis C and HIV. Injection Safety means administering injections in a way that does not harm the recipient, does not expose the provider to avoidable risk and does not generate hazardous waste that could endanger the community or environment.

It embodies the core healthcare principle of “Do No Harm.” Ensuring injection safety is therefore a vital part of Infection Prevention and Control (IPC) programs, promoting both patient and provider safety.

Facilitator Note:

Start this session with a brief discussion: “How common are injections in your daily work? What types of risks have you observed related to injection practices?”

Encourage participants to share local experiences before introducing the technical content.

Session Objectives

By the end of this session, participants will be able to:

1. Define Injection Safety and Safe Injection.
2. Describe the WHO Three-Part Strategy for Injection Safety.
3. Explain the Ten Right Ways of giving a safe injection.
4. Identify common unsafe injection practices in healthcare settings.
5. Demonstrate safe injection techniques through practice.

1.0 Defining Injection Safety and Safe Injection

Injection Safety refers to administering injections in a manner that ensures safety for both the patient and the healthcare worker, while also minimizing harm to the environment.

A Safe Injection is one that:

- Does not harm the recipient.
- Does not expose the healthcare provider to avoidable risks.
- Does not produce waste that poses a danger to others or the community.

In primary healthcare settings, safe injection practices involve:

- Using new, sterile, single-use syringes and needles for every patient.
- Practicing hand hygiene before and after each procedure.
- Following aseptic technique during medication preparation and injection.
- Proper disposal of used equipment and sharps to prevent injuries or contamination.

Facilitator Discussion Point:

Ask: “What are the key steps that ensure an injection is safe in your facility?” Encourage participants to compare their facility practices with WHO standards.

2.0 WHO Three-Part Strategy for Injection Safety

The World Health Organization (WHO) promotes a three-part global strategy to ensure safe injection practices. These components are equally applicable in Pakistan and other developing healthcare systems.

Component	Focus Area	Examples of Practical Actions
1. Behavioral Change	Promoting safe practices among healthcare providers and patients	<ul style="list-style-type: none"> - Educate staff about infection risks. - Prescribe injections only when medically necessary. - Discourage unnecessary injection use by patients.
2. Ensuring Equipment and Supplies	Guaranteeing availability of safe and sterile equipment	<ul style="list-style-type: none"> - Ensure continuous supply of single-use syringes and needles. - Provide adequate safety boxes for sharps disposal. - Maintain sufficient stock of alcohol swabs, antiseptics and cotton.
3. Waste Management	Proper disposal of injection-related waste	<ul style="list-style-type: none"> - Use puncture-proof safety boxes. - Avoid reuse or improper handling of sharps. - Dispose of filled safety boxes promptly through incineration or safe burial.

Facilitator Note:

Explain that all three parts must function together.

3.0 The Ten Right Ways of Giving a Safe Injection

The “*Ten Right Ways*” framework ensures safety and accuracy during every injection procedure.

Right	Explanation
1. Right Patient	Confirm patient identity before administering injection.
2. Right Medicine	Check the prescribed medicine and verify the order.
3. Right Formulation	Use the appropriate drug form (solution, suspension, etc.).
4. Right Dosage	Measure and deliver the exact prescribed dose.
5. Right Equipment	Always use new, sterile, single-use syringes and needles.
6. Right Time	Administer the injection at the correct time.
7. Right Route	Choose the correct route (IM, IV, SC, or ID).
8. Right Site	Select an appropriate anatomical site for injection.
9. Right Storage	Ensure proper storage of medicines and injection equipment.
10. Right Waste Disposal	Dispose of used equipment immediately and safely in a safety box.

Facilitator Discussion Prompt:

“Which of these 10 ‘Rights’ are most likely to be missed under work pressure in your facility? Why?” Encourage short group reflection.

4.0 Common Unsafe Injection Practices

Unsafe injection practices are among the main causes of blood-borne infection transmission. Recognizing and addressing these unsafe behaviors is crucial for healthcare safety.

Provider-Related Unsafe Practices

- Over-prescribing injections when oral alternatives exist.
- Reusing or recapping needles, leading to needle-stick injuries.
- Passing or carrying used syringes between work areas.
- Not counseling patients, leading to sudden movements during injection.
- Using one syringe to prepare multiple vials or doses.

System and Supply Issues

- Shortages of sterile equipment or safety boxes.
- Improper storage of injectables or vaccines.
- Reuse of multi-dose vials without aseptic technique.
- Delayed or improper waste disposal and incineration.

Facilitator Tip:

Ask participants to describe an unsafe practice they’ve seen and suggest one change that could prevent it.

5.0 Ensuring Injection Safety

Injection safety can only be achieved when standard precautions are consistently applied.

A. Preventive Measures

- Avoid unnecessary injections — prescribe oral medications whenever suitable.
- Educate patients about the risks of unsafe injections.
- Allow only trained staff to administer injections.
- Maintain strict hand hygiene before and after the procedure.
- Clean the injection site with 70% alcohol and allow it to air-dry.

B. Procedural Safety

- Always use new sterile, single-use syringes and needles.
- Never reuse injection equipment for any purpose.
- Follow aseptic technique during preparation and administration.
- Do not mix leftover medications or use expired drugs.
- Apply the principle of “One needle – One syringe – One patient.”

C. Waste Management

- Dispose of syringes and needles immediately after use in puncture-proof safety boxes.
- Do not recap, bend, or manually remove needles.
- Replace safety boxes when $\frac{3}{4}$ full.
- Ensure safe destruction of sharps waste through incineration or encapsulation.

Facilitator Discussion:

Use this section to show photos or diagrams of proper sharps containers and discuss how participants' facilities manage waste disposal.

6.0 Administering a Safe Injection: Practical Demonstration

Facilitator Preparation:

- Arrange hand hygiene materials, dummy arm or model, sterile syringes, needles, vials (water-filled), safety boxes.
- Demonstrate and then allow participants to practice.

Steps for Demonstration

1. Perform hand hygiene before preparation.
2. Verify medicine name, dose and expiry date.
3. Maintain aseptic technique throughout.
4. Select the correct injection site and route.
5. Dispose of sharps immediately after use — no recapping.
6. Wash hands after the procedure.

Facilitator Debrief

After demonstration, ask: “Which steps were performed correctly? Which ones need improvement?” Encourage peer feedback.

7.0 Group Activities

Activity 1: Identifying Unsafe Practices

- Divide participants into small groups.
- Each group lists at least five unsafe injection practices they’ve observed.
- Discuss how these could be prevented.

Activity 2: Safe Injection Role Play

- Two participants perform a mock injection (using a dummy arm or mannequin).
- Observers identify errors and suggest corrections.

Activity 3: Waste Disposal Drill

- Show participants how to safely dispose of a used syringe.
- Discuss what happens when safety boxes overflow or are mishandled.

Facilitator Note:

Reinforce that safety boxes must never be more than three-quarters full and should be disposed of properly.

8.0 Key Messages

- A safe injection protects the patient, provider and community.
- Always adhere to the Ten Right Ways of safe injection.
- Never reuse syringes or needles — use sterile, single-use equipment.
- Follow aseptic technique and hand hygiene rigorously.
- Ensure proper waste segregation and disposal every time.
- Injection safety is a shared responsibility at all levels of healthcare.

9.0 Facilitator Notes and Discussion Tips

- Begin the session by asking: “*Why do patients often prefer injections?*”
- Use local statistics or examples (e.g., Hepatitis C prevalence) to emphasize importance.
- Encourage participants to reflect on their own daily practices.
- Reinforce positive examples of safe behavior.
- End with a short recap or quiz:

“Name three key things that make an injection safe.”

SESSION 3.8

POST EXPOSURE PROPHYLAXIS (PEP)

Introduction

This session provides facilitators with the knowledge and tools to guide participants through understanding Post Exposure Prophylaxis (PEP) — an essential component of infection prevention and control (IPC).

Facilitators should emphasize that PEP is an emergency medical response following exposure to potentially infectious materials such as blood or body fluids. The session also underlines the importance of timely reporting, assessment and initiation of prophylaxis to prevent HIV, Hepatitis B and Hepatitis C infections. Facilitators are encouraged to use interactive discussions, case studies and demonstrations to ensure participants understand both the *concept* and *practical aspects* of PEP management.

Session Objectives

By the end of this session, participants will be able to:

- Define key terms used in Post Exposure Prophylaxis (PEP).
- Describe the different types and classifications of exposures.
- Identify indications for PEP.
- Explain the management steps following exposure.
- Demonstrate how to correctly fill PEP documentation forms.

Facilitator Note:

At the start of the session, ask participants: “How many of you have seen or heard about a needle-stick injury at your workplace?”

Use this question to introduce the topic and highlight the importance of post-exposure management.

Key Concepts and Definitions

Post Exposure Prophylaxis (PEP) is a short-term treatment started immediately after potential exposure to infectious material to prevent infection. Commonly, PEP is used for HIV, Hepatitis B and Hepatitis C prevention.

Common Terminologies in PEP

Term	Definition
Exposure	Contact with blood, tissue, or other potentially infectious body fluids.
Occupational Exposure	Occurs during work-related activities (e.g., needle-stick injury).
Non-Occupational Exposure	Exposure outside the workplace (e.g., sexual assault).
Percutaneous Exposure	Piercing of skin by a contaminated sharp object.
Mucous Membrane Exposure	Contact of infectious fluids with eyes, nose, or mouth.
Standard Precautions	Basic infection control measures applied to all patients.

Facilitator Discussion Point:

Ask:

“Why do you think some health workers delay reporting an exposure?”
Encourage participants to discuss stigma, fear, or lack of awareness as barriers.

Key Message:

PEP is not limited to HIV prevention—it also applies to Hepatitis B, Hepatitis C and other infections where prophylaxis can prevent disease.

Types and Classifications of Exposures

Types of Exposures

1. Occupational Exposures:

Occur among healthcare workers during professional duties — e.g., needle-stick injuries, splashes of body fluids, cuts from contaminated instruments.

2. Non-Occupational Exposures:

Occur outside the workplace — e.g., sexual assault, unprotected intercourse, or contact with contaminated instruments in the community.

Classification of Exposures

- **High-Risk Exposure:**

Deep puncture with contaminated sharps, visible blood on device, or exposure of mucous membranes/non-intact skin to blood.

- **Low-Risk Exposure:**

Superficial contact with minimal body fluids on intact skin.

Facilitator Activity:

Ask participants to share examples of exposures they have seen or heard about. Classify each example as *high-risk* or *low-risk* on a flip chart.

Indications for PEP

PEP is indicated when an individual has had high-risk exposure to potentially infectious body fluids.

Common indications include:

- Needle-stick injuries or cuts with sharp objects.
- Splashes of blood or body fluids on mucous membranes.
- Sexual assault or unprotected intercourse with a high-risk individual.
- Contact of infectious material with open wounds or broken skin.

Facilitator Note:

Reinforce the urgency of PEP — the treatment must start within 72 hours of exposure for it to be effective.

Management of Exposure

When an exposure occurs, it should be treated as a medical emergency. Facilitators should walk participants through the **six key steps** using a combination of explanation and group role play.

1. Immediate First Aid

- Wash the affected area thoroughly with soap and water.
- For mucous membrane exposure, rinse with clean water or saline.
- Do **not** squeeze or rub the injury site.

2. Report the Incident

- Inform the supervisor or in-charge immediately.
- Record details in the incident register.

3. Assessment

- Evaluate the type and severity of exposure.

- Determine HIV/Hepatitis status of both source and exposed person.

4. Initiate PEP

- Start PEP within 72 hours if indicated.
- Continue for the prescribed 28-day course.

5. Documentation

- Fill out PEP documentation form and update the register.
- Record follow-up schedule for HIV testing.

6. Follow-Up and Support

- Provide post-test counseling and emotional support.
- Conduct follow-up HIV testing at 4 weeks, 3 months and 6 months.

Facilitator Role Play Suggestion:

Divide participants into pairs — one acts as a healthcare worker who experiences a needle-stick injury and the other plays the supervisor. Practice the reporting and assessment process.

Decision-Making for PEP Initiation

Exposed Individual	Source of Exposure	Action
HIV-Negative	HIV-Positive	Start PEP; follow-up HIV testing at 4 weeks, 3 months and 6 months.
HIV-Positive	HIV-Positive	No PEP; follow HIV care guidelines.
HIV-Positive	HIV-Negative	No PEP; counsel both individuals.
HIV-Negative	HIV-Negative	No PEP; follow-up testing as per protocol.
HIV-Negative	HIV Status Unknown	Start PEP; follow-up testing as per protocol.

Facilitator Discussion Question:

“If the HIV status of the source is unknown and cannot be tested immediately, should you wait for the result before starting PEP?”

Expected Answer: No. PEP must be initiated immediately—do not wait for results.

Recommended Antiretroviral Regimens for HIV PEP

Category	Recommended Prophylaxis
Adults	Tenofovir (TDF 300 mg) + Lamivudine (3TC 150 mg) + Atazanavir/Ritonavir (ATV/r 300/100 mg)
Children	Abacavir (ABC) + Lamivudine (3TC) + Lopinavir/Ritonavir (LPV/r), dosed per pediatric chart

Facilitator Tip:

Show participants the actual medication packs . Emphasize adherence to the full 28-day course.

Documentation and Record Keeping

Explain the importance of completing:

- *PEP Documentation Form*
- *PEP Register*

Both are vital for monitoring, follow-up and accountability.

Activity:

Display a sample PEP form on a projector or distribute printed copies. Ask participants to fill it out based on a case scenario.

Key Messages

- PEP is most effective when started as soon as possible, ideally within 2 hours and no later than 72 hours after exposure.
- All exposures must be reported, assessed and documented.
- Never delay PEP initiation while waiting for test results.
- Counseling and follow-up are essential for both psychological and medical recovery.
- PEP protects lives — both of healthcare workers and the community.

Facilitator Wrap-Up

Conclude by revisiting the objectives. Ask:

“What is the most important step after a needle-stick injury?”

Encourage participants to summarize key takeaways.

Finally, highlight that PEP is part of a larger safety culture — one that begins with consistent use of infection prevention and control practices.