Unit 3: Communicable Diseases: Causes, Prevention, and Management

Subject: Health Education-I

Unit 3: Communicable Diseases—Causes, Prevention, and Management

(Overview • Prevention Framework • Immunity & Vaccination • Disease-wise: Viral Hepatitis, HIV/AIDS, Tuberculosis, Malaria, Rabies, Tetanus, Measles-Mumps-Rubella, Dengue & Swine Flu)

3.1 Introduction to Communicable Diseases

Communicable (infectious) diseases are illnesses caused by microorganisms—viruses, bacteria, parasites, or fungi—that spread **from an infected source to a susceptible person**. The classic **chain of infection** has six links:

1. Agent → 2) Reservoir → 3) Portal of exit → 4) Mode of transmission → 5) Portal of entry → 6) Susceptible host

Breaking **any** link (e.g., handwashing, safe water, vaccination, masks/ventilation, vector control) reduces transmission.

3.2 Causes & Prevention: A Practical Framework

3.2.1 Modes of transmission → matching prevention

Transmission route	Examples	How it spreads	High-yield prevention
Airborne / Droplet	Measles, TB, flu	Infectious particles in air	Ventilation, masks/respiratory etiquette, early diagnosis & treatment, vaccination (where available)
Fecal-oral	Hepatitis A, diarrhoeal diseases	Contaminated water/food, hands	Safe water, sanitation, food hygiene, handwashing
Blood / Body fluids	HIV, Hepatitis B & C	Sexual contact, needles, transfusion, birth	Safer sex (condoms), sterile injecting, screened blood, PEP/PrEP (HIV), vaccination (HBV)
Vector-borne	Malaria, Dengue	Bites from infected mosquitoes	Insecticide-treated nets (ITNs), indoor residual spraying (IRS), source reduction, repellents, window screens
Zoonotic (animal→human)	Rabies	Saliva via bites/scratches	Immediate wound washing; prompt PEP; dog vaccination
Environmental wound contamination	Tetanus	Spores in soil enter wounds	Vaccination (Td/Tdap) + proper wound care

3.3 Immunity, Vaccination, and Herd Protection

Immunity may be innate (in-born barriers) or adaptive (learned by exposure). Within adaptive immunity:

- Active immunity: body produces its own antibodies after infection or vaccination (slower onset, longer-lasting).
- Passive immunity: ready-made antibodies transferred (e.g., maternal antibodies, immunoglobulin; rapid, short-term).

Vaccines train the immune system **safely** to recognize pathogens, building memory B/T cells and reducing disease and transmission at population level (**herd protection**) when coverage is high.

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3.4 Disease-wise Notes: Causes, Symptoms, Prevention & Practical Management

The points below are student-level essentials for recognition and health-education counselling. Always follow national guidelines for diagnosis, treatment, and referral.

3.4.1 Viral Hepatitis (A, B, C, E)

Causes & transmission

• HAV/HEV: fecal-oral (unsafe water/food).

• HBV/HCV: blood & body fluids (sex, needles, transfusion), mother-to-child (HBV).

Key features: fatigue, nausea, dark urine, jaundice (yellow eyes/skin).

Prevention: safe water/food (A/E); HBV vaccination; screen blood; safe sex; sterile needles; HBV prophylaxis

in pregnancy to prevent transmission. (No vaccine for HCV; curative antivirals exist—specialist care.)

Student tip: Encourage early testing with any jaundice or after needle/sexual exposure.

3.4.2 HIV/AIDS

Cause & spread: Human Immunodeficiency Virus (HIV-1/2) via unprotected sex, shared needles, unscreened blood, and pregnancy/childbirth/breastfeeding without treatment.

Features: acute fever/rash early; later, weight loss, recurrent infections.

Prevention & management: consistent condom use; **PrEP** (pre-exposure prophylaxis) for those at risk; **PEP** within 72 h after exposure; regular testing; antiretroviral therapy (ART). **U=U:** people on ART with **undetectable viral load do not sexually transmit HIV**—a key message against stigma.

3.4.3 Tuberculosis (TB)

Cause & spread: Mycobacterium tuberculosis via airborne droplet nuclei from persons with pulmonary TB.

Features: cough ≥2 weeks, fever/night sweats, weight loss, blood-streaked sputum.

Prevention: prompt **testing & treatment**, cough etiquette, **ventilation**, appropriate **respiratory protection** in healthcare; **BCG** prevents severe childhood TB forms; programmatic care (e.g., DOTS).

3.4.4 Malaria

Cause & spread: Plasmodium parasites via female Anopheles mosquitoes.

Features: fever with chills/rigors, headache, malaise (cyclical in some).

Prevention: ITNs and **IRS** (core WHO tools), eliminate breeding sites (stagnant water), repellents/covered clothing;

chemoprophylaxis for travellers per guidelines.

3.4.5 Rabies

Cause & spread: Rabies virus from bites/scratches/licks on broken skin—usually dogs; nearly 100% fatal after symptoms begin.

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Immediate action after bite: wash wound with soap and running water for 15 minutes, seek care urgently. PEP = wound care + rabies vaccine ± rabies immunoglobulin (per risk and history). Community prevention: mass dog vaccination & avoiding animal bites.

3.4.6 Tetanus

Cause & spread: Clostridium tetani spores entering contaminated wounds (not person-to-person).

Features: jaw stiffness (trismus), muscle spasms, autonomic instability.

Prevention: vaccination across lifespan (Td/Tdap boosters) and proper **wound management**; consider **TIG** for certain dirty wounds and incomplete vaccination.

3.4.7 Measles, Mumps, Rubella (MMR)

Causes & spread: respiratory droplets/airborne; highly contagious (measles). **Features:**

- Measles: high fever, cough/coryza/conjunctivitis, Koplik spots, rash.
- Mumps: parotid swelling, fever; complications include orchitis, meningitis.
- Rubella: mild fever/rash; dangerous in pregnancy → Congenital Rubella Syndrome (CRS) (hearing, heart, eye defects).

Prevention: Two-dose MMR-containing vaccination in childhood; ensure adult catch-up if missed; vaccinate to protect against CRS.

3.4.8 Dengue

Cause & spread: Dengue virus via Aedes aegypti (a day-biting mosquito; peak early morning and before dusk).

Features: sudden high fever, severe headache, retro-orbital pain, myalgia/arthralgia, rash. Danger signs (seek care): belly pain, persistent vomiting, bleeding, lethargy—often after the fever subsides.

Prevention: source reduction (empty containers), **cover water storage**, personal protection (long sleeves, repellents), screens; community vector control. (Vaccines exist in some settings—follow local/WHO guidance.)

3.4.9 "Swine Flu" (Influenza A H1N1pdm09)

Cause & spread: now part of seasonal influenza A viruses; spreads via droplets/airborne and contaminated hands/surfaces.

Features: sudden fever, cough, sore throat, myalgia, fatigue; higher risk of complications in pregnancy, the elderly, and those with chronic conditions.

Prevention & management: annual influenza vaccination, respiratory hygiene, stay home when sick; early antivirals for high-risk/confirmed cases per protocol.

3.5 Quick Reference Tables

3.5.1 Disease-Prevention snapshot

Disease Primary prevention Post-exposure / additional steps
Hepatitis A Safe water/food; vaccine (context-dependent)

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Disease	Primary prevention	Post-exposure / additional steps
Hepatitis B	HBV vaccine; safe sex; sterile needles	HBV vaccine ± HBIG after exposure; antenatal prophylaxis
HIV	Condoms; PrEP ; screened blood; harm-reduction	PEP ≤72 h ; ART → U=U reduces transmission to zero when undetectable
ТВ	Ventilation, cough etiquette, early treatment; BCG (childhood severe forms)	Household screening & preventive therapy per policy
Malaria	ITNs/IRS, source control, repellents	Chemoprophylaxis for travellers
Rabies	Avoid bites; vaccinate dogs; pre-exposure vaccine for risk groups	Wound wash + PEP (vaccine ± RIG) ASAP
Tetanus	Routine Td/Tdap boosters; clean wounds	TIG + vaccine depending on wound/status
MMR	Two-dose MMR for all eligible	Catch-up; protect pregnancy from rubella
Dengue	Vector control, personal protection (daytime)	Monitor warning signs ; supportive care in health facility for severe cases
H1N1 (flu)	Annual flu vaccine; hygiene	Early antivirals for high-risk/confirmed cases (protocol)

Unit Summary

Communicable diseases spread along a **chain of infection**; health action breaks the chain through **hygiene**, **safe water/food**, **ventilation & masks**, **vector control**, **safer sex/needle practices**, **and vaccination**. Understanding **immunity** (active/passive) clarifies **why vaccines work** and how herd protection builds. For priority conditions:

- Hepatitis A/E (water/food) vs B/C (blood/sex); HBV vaccine and perinatal prophylaxis matter.
- HIV prevention includes condoms, PrEP/PEP, testing, and ART—U=U.
- TB is airborne; ventilation, early treatment, and BCG (for severe childhood TB) reduce impact.
- Malaria & Dengue need mosquito control plus personal protection.
- Rabies demands immediate wound washing and PEP; tetanus demands vaccination + wound care.
- MMR two-dose vaccination protects individuals and communities; H1N1pdm09 is now seasonal—annual flu shots and hygiene remain key.

Key Terms

- Chain of infection Reservoir/portal of exit/entry Airborne vs droplet vs contact transmission
- Active vs passive immunity Vaccination Herd protection
- **PEP/PrEP ITN/IRS Vector control U=U** (Undetectable = Untransmittable)

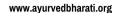
Self-Assessment

A. MCQs

- 1. Breaking which **link** most directly stops mosquito-borne diseases?
 - a) Portal of entry b) Mode of transmission (vector control) c) Susceptible host d) Reservoir
- 2. **U=U** means:
 - a) Any ART reduces transmission to zero
 - b) Undetectable viral load on ART → zero sexual transmission risk
 - c) Only condoms prevent HIV transmission
 - d) PrEP equals ART
- 3. **TB** primarily spreads by:
 - a) Handshake b) Food c) Water d) **Airborne droplet nuclei**
- 4. The **most effective** community prevention for measles is:

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- a) Herbal tonics b) Isolation alone c) Two-dose MMR vaccination d) Vitamin C
- 5. **Rabies** first aid after a bite includes:
 - a) Bandage only b) **15-minute soap-and-water wash + urgent PEP** c) Wait for symptoms d) Antibiotics only
- 6. **Tetanus** prevention hinges on:
 - a) Mosquito nets b) Lifelong vaccination + wound care c) Masks d) Isolation
- 7. **Dengue danger signs** that need urgent care commonly appear:
 - a) Only during fever b) After fever subsides c) Only in children d) Only with rash
- 8. The core WHO tools for malaria vector control are:
 - a) Repellents and coils b) Fogging only c) ITNs and IRS d) Vaccines only

Answer key: 1-b, 2-b, 3-d, 4-c, 5-b, 6-b, 7-b, 8-c

B. Short Answer

- 1. Draw/describe the **chain of infection** and give **one method** to break each link.
- 2. Differentiate active vs passive immunity with one real-life example of each.
- 3. List four HIV prevention strategies, including one biomedical and one behavioural.
- 4. Write a **3-point community plan** to reduce **dengue** risk in monsoon season.
- 5. Explain why **BCG** does **not** fully prevent adult pulmonary TB yet remains important.

C. Reflective/Application

- A hostel student has jaundice. Draft a 2-3 line health-education message on testing, hygiene, and contacts.
- 2. Your college plans a "Bite-to-Care" poster. Write the five steps you will print for dog-bite first aid.
- 3. Plan a one-page infographic for parents about MMR: timing, benefits, myths to avoid.

End of Unit 3: Communicable Diseases—Causes, Prevention, and Management

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