

Epidemiology of viral hepatitis, bird flu, swine flu, dengue, chikungunya, SARS, Covid-19, emerging and reemerging diseases

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Viral hepatitis

- Hepatitis is an **inflammation of the liver** which can be self-limiting or can progress to **fibrosis (scarring), cirrhosis or liver cancer**.
- Hepatitis viruses are the most common cause** of hepatitis in the world but other infections, toxic substances (e.g. alcohol, certain drugs), and autoimmune diseases can also cause hepatitis.
- There are **5 main hepatitis viruses**, referred to as types **A, B, C, D and E**.
- These 5 types are of **greatest concern** because of the burden of illness and death they cause and the **potential for outbreaks and epidemic spread**.

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Viral hepatitis

- In particular, **types B and C lead to chronic disease** in hundreds of millions of people and, together, are the **most common cause of liver cirrhosis and cancer**.
- Hepatitis A and E** are typically caused by ingestion of **contaminated food or water**. Hepatitis **B, C and D usually occur** as a result of **parenteral contact with infected body fluids**.
- Common modes of transmission for these viruses include receipt of contaminated blood or blood products, invasive medical procedures using contaminated equipment and for hepatitis B transmission from mother to baby at birth, from family member to child, and also by sexual contact.

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Hepatitis A: Mode of transmission

- Faecal-oral route:** The hepatitis A virus is transmitted primarily by the faecal-oral route; that is when an uninfected person ingests food or water that has been contaminated with the faeces of an infected person. In families, this may happen though dirty hands when an infected person prepares food for family members.
- Parenteral route:** Rarely transmitted by blood and blood products or by skin penetration through contaminated needles.
- Sexual transmission:** The virus can also be transmitted through close physical contact (such as oral-anal sex) with an infectious person.

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Hepatitis A: Risk factors

- **Risk factors of hepatitis A infection** include:
 - poor sanitation;
 - lack of safe water;
 - living in a household with an infected person;
 - being a sexual partner of someone with acute hepatitis A infection;
 - use of recreational drugs;
 - sex between men; and
 - travelling to areas of high endemicity without being immunized.

Hepatitis A: Preventive and control measures

- Preventive and control measures of hepatitis A includes:
 1. **Control of reservoir**
 2. **Control of transmission**
 - Personal and community hygiene
 3. **Control of susceptible population**
 - Vaccination

Hepatitis A: Preventive and control measures

- **Improved sanitation, food safety, safer sex and immunization** are the most effective ways to combat hepatitis A.
- The spread of hepatitis A can be reduced by:
 - adequate supplies of safe drinking water;
 - proper disposal of sewage within communities; and
 - personal hygiene practices such as regular handwashing before meals and after going to the bathroom
 - use of safer sex practices – including condoms, dental dams and good hygiene practices.
 - hepatitis A vaccines are available internationally.

Hepatitis B

- Hepatitis B is an infection of the liver caused by the hepatitis B virus.
- Hepatitis B can cause a chronic infection and puts people at high risk of death from cirrhosis and liver cancer.
- It can spread through contact with infected body fluids like blood, saliva, vaginal fluids and semen. It can also be passed from a mother to her baby.
- Hepatitis B can be prevented with a safe and effective vaccine. The vaccine is usually given soon after birth with boosters a few weeks later. It offers nearly 100% protection against the virus.

Hepatitis B: Mode of transmission

- **Parenteral route:** Hepatitis B is spread by needlestick injury, tattooing, piercing and exposure to infected blood and body fluids, such as saliva and menstrual, vaginal and seminal fluids. Transmission of the virus may also occur through the sharing or reuse of contaminated needles and syringes or sharp objects.
- **Perinatal transmission:** Hepatitis B is most commonly spread from mother to child at birth.
- **Sexual transmission:** Is more prevalent in unvaccinated persons with multiple sexual partners.
- **Horizontal transmission:** Transmission from an infected child to an uninfected child during the first 5 years of life.

Hepatitis B: Sign symptoms

- Yellowing of the skin and eyes (jaundice)
- Dark urine
- Feeling very tired
- Nausea
- Vomiting
- Pain in the abdomen.
- Acute hepatitis can lead to liver failure, which can lead to death.
- Some people with chronic hepatitis b: cirrhosis and hepatocellular carcinoma (liver cancer).

Hepatitis B: Preventive and control measures

- To reduce the risk of getting or spreading hepatitis B:
 - **practice safe sex** by using condoms;
 - **avoid sharing needles** or any equipment used for injecting drugs, piercing, or tattooing;
 - **wash hands thoroughly** with soap and water after coming into contact with blood, body fluids, or contaminated surfaces; and
 - Hepatitis B is **preventable with a vaccine**. Get a hepatitis B vaccine if working in a health-care setting.

Hepatitis C: Modes of transmission

- The hepatitis C virus is a **bloodborne** virus. It is most commonly transmitted through:
 - the **reuse or inadequate sterilization** of medical equipment, especially syringes and needles in healthcare settings;
 - the transfusion of **unscreened blood and blood products**; and
 - **injecting drug use** through the sharing of injection equipment
 - HCV can be passed from an infected **mother to her baby** and via **sexual practices** that lead to exposure to blood; however, these modes of transmission are less common.

Hepatitis C: Preventive and control measures

- There is **no effective vaccine** against hepatitis C. The best way to prevent the disease is to avoid contact with infected blood.
- Ways to prevent hepatitis C include:
 - **safe and appropriate use of health-care injections and procedures;**
 - **safe handling and disposal of needles and medical waste;**
 - **harm-reduction services** for people who inject drugs;
 - **testing of donated blood** for the hepatitis C virus; and
 - **practicing safe sex** by using barrier methods such as condoms.

Hepatitis D

- **Hepatitis D** is an inflammation of the liver caused by the hepatitis D virus (HDV), which **requires hepatitis B virus (HBV)** for its replication.
- Hepatitis D infection **cannot occur in the absence of HBV**.
- **HDV-HBV co-infection** is considered the **most severe form of chronic viral hepatitis** due to more rapid progression towards hepatocellular carcinoma and liver-related death.
- **Vaccination against hepatitis B** can prevent HDV infection.
- HDV has recently been classified as carcinogenic to humans (class I) by the IARC monograph programme, just like hepatitis B and C.

Hepatitis D: Modes of transmission

- HDV is blood borne and transmitted in the **same way as HBV**.
- Transmission may occur through contact with **infected human blood or other bodily fluids**. It may also be transmitted through **sexual intercourse, or rarely from a mother to her child** before or around birth (vertical transmission).
- Chronic HBV carriers are at risk of infection with HDV.
- Those who are more likely to have HBV and HDV co-infection include indigenous people, people who inject drugs and people with hepatitis C virus or HIV infection, recipients of haemodialysis, men who have sex with men and commercial sex workers.

Hepatitis D: Preventive and control measures

- Prevention services of hepatitis D should focus on **reducing HBV transmission through-**
 - **hepatitis B immunization**, including timely birth dose, additional antiviral prophylaxis for eligible pregnant women,
 - **blood safety, safe injection practices** in health-care settings and harm reduction services with clean needles and syringes.
- Hepatitis B immunization **does not provide protection** against HDV for **those already infected with HBV**.

Hepatitis E

- Hepatitis E is inflammation of the liver caused by the hepatitis E virus (HEV).
- The virus is **shed in the stools of infected people** and enters the human body through the oral route.
- It is transmitted mainly through **contaminated drinking water**.
- The infection is usually **self-limiting and resolves within 2–6 weeks**.
- A serious disease known as **fulminant hepatitis (acute liver failure)** occasionally develops, which can be fatal.

Hepatitis E: Preventive and control measures

- At the **population level**, transmission of HEV can be reduced by:
 - **maintaining quality standards** for public water supplies
 - **establishing proper disposal systems** for human faeces
- On an **individual level**, infection risk can be reduced by:
 - **maintaining hygienic practices**
 - **avoiding consumption of water and ice** of unknown purity
- HEV prevention and disease control therefore primarily rely on water, sanitation, and hygiene (**WASH**) measures which are often inadequately implemented in settings which would benefit most.

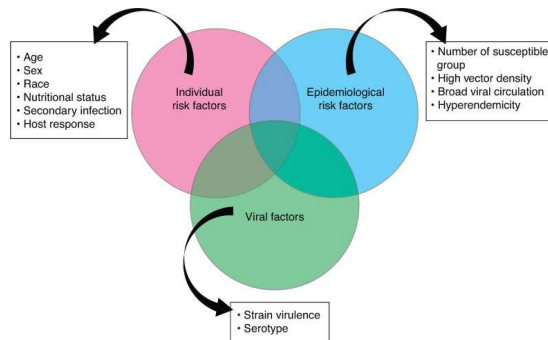
Dengue

- Dengue is a disease caused by **an arbovirus**, which has **four serotypes** and that is **transmitted by Aedes aegypti and Aedes albopictus mosquito**.
- It is regarded as the **most important arthropod transmitted** human viral disease, and constitutes an important global health problem.
- Dengue ranks as the most important, rapidly emerged disease in recent years and is endemic in all continents.
- Dengue virus infections may be asymptomatic or may lead to **undifferentiated fever, dengue fever, or dengue haemorrhagic fever (DHF)** with plasma leakage that may lead to **Dengue Shock Syndrome (DSS)**.

Dengue: Epidemiological triad

- The epidemiological triad, a model used to understand the factors contributing to disease spread, consists of three components:
 - Agent (e.g. dengue virus)**
 - Host (e.g. humans), and**
 - Environment** (external factors that facilitate disease transmission such as rainfall, temperature, humidity)

Risk factors of dengue



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Dengue situation in Bangladesh

- There are four dengue virus serotypes which are designated as DENV-1, DENV-2, DENV-3, and DENV-4.

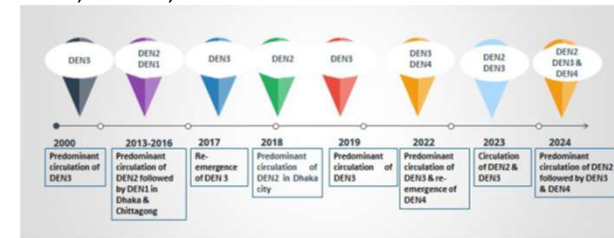


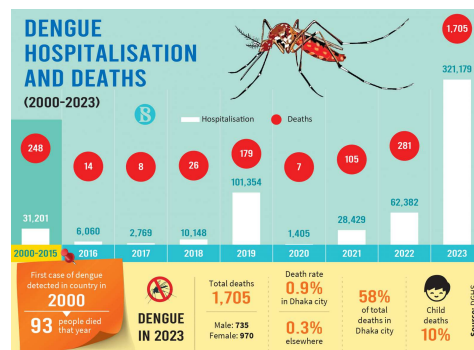
Figure: Dengue serotype by years. (DGHS, MIS and WHO Country office, Bangladesh)

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Dengue situation in Bangladesh

- In **2024**, total **101,214** dengue cases were reported among which **575** were died.
- In **2023**, total **1705** people were died due to dengue, the **deadliest year** on record!



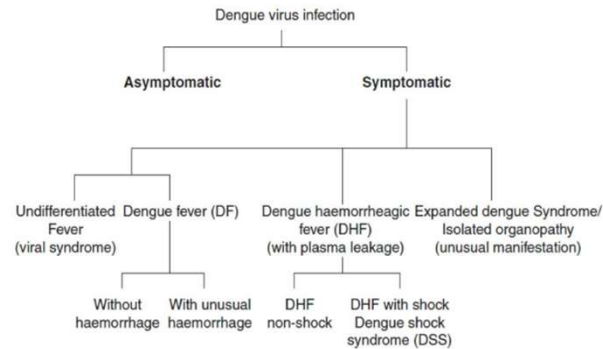
Dengue: Transmission cycle

- The **female mosquito** usually becomes **infected with the dengue virus when it takes a blood meal** from a person during the acute febrile (viraemia) phase of dengue illness.
- After an **extrinsic incubation period of 8 to 10 days**, the mosquito becomes infected.
- The virus is transmitted when the **infected female mosquito bites** and injects saliva into the person bitten.
- Dengue begins after an **intrinsic incubation period of 4 to 7 days** (range 3–14 days).
- There is evidence however, of the **possibility of maternal transmission** (from a pregnant mother to her baby).

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Classification and clinical manifestations of Dengue



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Key features of dengue fever (classical)

- High, continued fever for 2- 7 days
- Headache
- Myalgia
- Arthralgia/ bone pain (break-bone fever)
- Rash
- GIT manifestation: Nausea, vomiting, diarrhea
- Hemorrhagic manifestations (mild, unusual haemorrhage)
- Leukopenia (WBC <5,000 cells/mm³)
- Platelet count ≤150,000 cells/mm³
- Rising Hct 5-10%

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Key features of dengue hemorrhagic fever

- High, continuous fever 2-7 days.
- **Hemorrhagic manifestations:** tourniquet test positive, petechiae, ecchymosis, purpura, epistaxis, hematemesis etc.
- **Liver enlargement ±**
- **Shock±**
- **Platelet counts ≤100,000 cells/mm³**

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Key features of dengue shock syndrome

- **Evidence of plasma leakage+ evidence of circulatory failure**
- Platelet counts ≤100,000 cells/mm³.
- **Evidence of plasma leakage:** Pleural effusion; Ascites; Rising Hct ≥ 20%; hypoalbuminemia; Peri-cholecystic fluid collection evidenced by USG
- **Evidence of circulatory failure:** Cold/cold clammy skin; CRFT>2 Sec; tachycardia; weak pulse; narrow pulse pressure <20; hypotension

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Warning signs of dengue fever (CDC 2024)

- Intense continuous **abdominal pain** or pain when palpating abdomen
- **Persistent vomiting** (≥ 3 episodes in 1 hour or ≥ 4 in 6 hours)
- **Fluid accumulation** (pleural effusion, ascites, or pericardial effusion)
- **Mucosal bleeding** (gums, nose, vagina [metrorrhagia or hypermenorrhea], kidney [macroscopic hematuria])
- **Altered mental status** (irritability, drowsiness, GCS score < 15)
- **Hepatomegaly** (≥ 2 cm below costal margin)
- Progressive **increase of the haematocrit** (in at least 2 consecutive measurements taken 6 hours apart)

Laboratory Tests for diagnosis and monitoring

- **CBC, NS-1 Antigen, Anti-Dengue IgM and IgG** should be done in all suspected dengue patients at their first visit depending on the day of presentation.
- CBC count shows leucopenia, thrombocytopenia and raised haematocrit
- The Dengue **NS1 antigen** usually positive on **first day** of illness and may become negative from 4-5 days of illness.
- **Anti-dengue IgM** can be detected **after 5 days** of the onset of fever and reaches highest level after 7 days of fever.
- **IgG** usually appears on the **9th or 10th day** of illness and persist at low levels for life long, indicating past dengue infection.

Dengue case definition

- **Suspected case:** Acute febrile illness meeting clinical dengue criteria without confirmatory tests.
- **Probable case:** Acute febrile illness with serological diagnosis.
- **Confirmed case:** Laboratory confirmation through any one of the followings-
 - Positive RT-PCR or NS1 antigen test
 - Positive immunohistochemistry from necropsy tissues
 - Seroconversion (negative to positive IgM/IgG in paired sera)
 - Fourfold rise in IgG in paired sera samples

Preventive and control measures

- Reduce larval habitats in and around houses by-
 - **covering all water storage containers**
 - **emptying or drying water containers** at least once every week
- **Carry out spray** with commercially available safe aerosols (Pyrethroid-based)
- **Larvivorous fishes** (e.g., Gambusia/Guppy) may be introduced in ornamental water tanks/garden

Preventive and control measures

- Take **personal protection measures**, i.e.,
 - **protective clothing** (full sleeved shirts and full pants during day time), and
 - using **commercially available repellents**
- Use **insecticide-treated mosquito nets** while sleeping during day time
- Ensure **doors and windows have screens/wire mesh**
- **Create awareness** among local residents

Chikungunya

- Chikungunya is a **mosquito-borne viral disease** caused by the chikungunya virus (CHIKV), an RNA virus in the *alphavirus* genus of the family *Togaviridae*.
- The name chikungunya derives from a word in the **Kimakonde** language of southern Tanzania, meaning “that which bends up” and describes the contorted posture of infected people with severe joint pain.
- CHIKV was **first identified** in the **United Republic of Tanzania in 1952** and subsequently in other countries Africa and Asia.

Chikungunya: Transmission cycle

- Chikungunya virus is transmitted by **infected female mosquitoes**, most commonly *Aedes aegypti* and *Aedes albopictus*, which can also transmit dengue and Zika viruses.
- These **mosquitoes bite primarily during daylight** hours and *Aedes aegypti* feeds both indoors and outdoors.
- When an uninfected mosquito feeds on a person who has CHIKV circulating in their blood, the mosquito can ingest the virus.
- The virus then replicates in the mosquito over several days, enters its salivary glands, and can be transmitted into a new human host when the mosquito bites them.

Clinical features of Chikungunya fever

Common	Infrequent	Rare in adults but seen in children
Fever Arthritis/ Arthralgia Backache Headache Rash	Stomatitis Oral ulcers Exfoliative dermatitis Photosensitive hyperpigmentation	Photophobia Retro-orbital pain Vomiting Diarrhoea Mental confusion Signs of meningeal irritation

Clinical classification of Chikungunya fever

Mild	Moderate	Severe
a. Low grade fever b. Mild arthralgia c. Mild focal myalgia d. General weakness e. Skin rash/itching	a. Low to high grade persistent fever b. Moderate arthralgia /arthritis c. Generalized myalgia d. Hypotension e. Mild bleeding f. Retro-orbital pain g. Oliguria	a. Persistent high-grade fever b. Severe arthralgia/Arthritis c. Persistent vomiting/ Diarrhoea d. Altered sensorium e. Bleeding (GI bleeding due to use of drugs e.g. analgesics) f. Shock due to persistent vomiting and diarrhoea

Chikungunya: Preventive and control measures

- The main method to reduce transmission of CHIKV is through **control of the mosquito vectors and reduction of mosquito breeding sites**.
- During outbreaks, **insecticides may be sprayed** to kill flying adult mosquitoes, to kill the immature mosquito larvae.
- People are advised to **wear clothing** that minimizes skin exposure to the day-biting mosquitoes.
- **Window and door screens** should be used to prevent mosquitoes from entering homes. Repellents can be applied to exposed skin or to clothing in strict accordance with product label instructions.
- **Insecticide-treated mosquito nets** should be used against day-biting mosquitoes by persons who sleep during the daytime.

Yellow fever

- Yellow fever is a **zoonotic disease** caused by an arbovirus.
- It affects principally monkeys and other vertebrates in tropical America and Africa and is **transmitted to man by certain culicine mosquitoes (Aedes)**.
- It shares **clinical features with other viral hemorrhagic fevers** such as dengue HF, Lassa fever etc. but is characterized by more severe hepatic and renal involvement.
- Severe cases develop jaundice with **haemorrhagic manifestations (black vomit, epistaxis, melena) and albuminuria or anuria, shock, agitation, stupor and coma**.

Yellow fever

- **Agent:** The causative agent, Flavivirus fibricus formerly classified as a group B arbovirus, is a member of togavirus family.
- **Reservoir of infection:** In forest areas, the reservoir of infection is mainly monkeys and forest mosquitoes. In urban areas, the reservoir is man (subclinical and clinical cases) besides Aedes aegypti mosquitoes.
- **Modes of transmission:** Infected Aedes mosquitoes transmit the virus from person-to-person.
- **Incubation period:** 3 to 6 days (6 days recognized under IHR-2005)

Control of yellow fever

- **Vaccination:** Rapid immunization of the population at risk is the most effective control strategy for yellow fever.
- **Vector control:** The other principal method of preventing yellow fever is through intensive and integrated vector control.
- **Surveillance:** A programme of surveillance should be instituted in countries where the disease is epidemic.

International certificate of vaccination against yellow fever

- Vaccination against yellow fever may be **required of any traveller** leaving an area where the Organization has determined that a **risk of yellow fever transmission** is present.
- Yellow fever vaccines approved by WHO provide protection against infection **starting 10 days following the administration of the vaccine**.
- This **protection continues for the life** of the person vaccinated.
- The validity of a certificate of vaccination against yellow fever shall **extend for the life of the person vaccinated, beginning 10 days after the date of vaccination**.

The Elimination of Yellow Fever Epidemic (EYE) strategy

- The **EYE strategy was developed by WHO, UNICEF and GAVI**, in response to increased threat of yellow fever urban outbreaks with international spread.
- It is guided by **three strategic objectives**:
 - a. **Protect at-risk populations**
 - b. **Prevent international spread of yellow fever and**
 - c. **Contain outbreaks rapidly**

Rabies: Epidemiological determinants

- **Causative agent:** Rabies virus (RNA enveloped) under rhabdovirus family.
- **Reservoir/Source of Infection:** Rabid canine animals include mostly Dog; in very few cases other animals are Cat, Fox, Jackal, Mongoose, Monkey and other Wild-animals.
- **Transmission:** Commonly by contaminated saliva of rabid animal and gains entry into the human body by the animal bite or scratch or through an open wound. In rare cases: contamination of mucus membranes with saliva or brain tissue, aerosol transmission, and corneal/organ transplantation.

Rabies: Epidemiological determinants

- **Incubation Period:** The incubation period varies from 5 days to several years (usually 2–3 months; rarely more than 1 year).
- **The incubation period depends on factors inclusive of:**
 - a. Location and severity of bite wound
 - b. The amount of virus inoculated within the wound
 - c. Degree of innervations at the site of the bite wound

Rabies: Clinical symptoms

- **Prodromal syndrome:** Pain, Itching, Tingling sensation and numbness at the site of wound in association with fever, malaise, headache, nausea, vomiting and myalgia
- **Classic rabies (furious form) manifestations:** Furious rabies accounts for approximately 80% of the total number of human cases; manifesting as signs of-
 - **Delirium** with alternating periods of calm i.e., Altered Behavior, Hallucinations, Incoordination
 - **Aerophobia**

Rabies: Clinical symptoms

- **Hydrophobia** during attempts at drinking due to extremely painful laryngeal spasms
- **Photophobia**
- **Excessive salivation, Aggression, Hyperactivity** periods of agitation alternating with lucidity
- After a few days, the infection invariably leads to **coma and death** by cardio-respiratory arrest.

Rabies: Clinical symptoms

- **Paralytic or dumb form (less common):**
 - An acute, **ascending paralysis resembling Guillain-Barre syndrome** predominates with initially relative sparing higher cortical functions.
 - Paralytic (or dumb) rabies accounts for **approximately 20%** of the total number of human cases.
 - **Fatality** after the onset of manifestation is **100%**.

Rabies: Pre-exposure prophylaxis

- **Pre-Exposure Prophylaxis (PrEP)** is a course of rabies vaccination administered to protect a person from getting rabies before exposure to a rabid (or suspected rabid) animal/any other mode of exposure to the rabies virus.
- **Indication:** **Service providers** in Rabies case management, **laboratory professionals and caregivers** for infected dogs and humans.

Rabies: Pre-exposure prophylaxis

Dose	Route	Duration	No. of injection sites per clinic visit (0, 3, 7, 14, 21-28)	Sites
0.1 ml each site	Intradermal ID-RV	1 week Day 0 Day 7	2-0-2-0-0	Deltoid region (above 2 yrs.)
1 vial (1 ml)	Intramuscular IM-RV	1 week Day 0 Day 7	1-0-1-0-0	Antero-lateral thigh (if ≤ 2 yrs.)

Management of animal bite wound

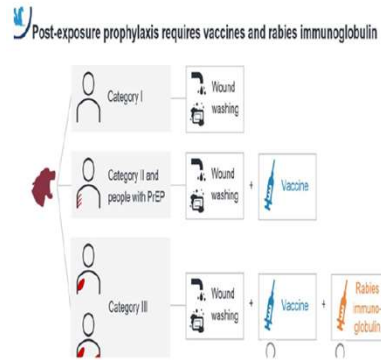
- **Wound care:**
 - **Wash thoroughly** (immediate washing and flushing) with soap and running water for 15 minutes, followed by an iodine solution (aqueous solution).
 - **Keep wound open**
 - Bleeding at any wound site indicates potentially severe exposure and must be infiltrated with either human or equine rabies immunoglobulin.
 - **Avoid using a bandage or stitch** to the wound.

Management of animal bite wound

- **Active immunization with CCV**
 - Intradermal (ID) vaccine regimen:
 - Intramuscular vaccine regimen:
- **Passive immunization: Rabies Immunoglobulin (RIG) when indicated-**
 - All WHO-Category III exposures
 - Bites by all wild animals viz. by mongoose, jackal, fox etc.
 - Category II exposures in immunocompromised/ immunosuppressed individuals, including AIDS patients.

Rabies: Post-exposure prophylaxis

Post-exposure prophylaxis (PEP) consists of a dose of human rabies immunoglobulin (HRIG) and rabies vaccine given on the day of the rabid (or suspected rabid) animal exposure or as soon as possible, and then a course of vaccination given again as per schedule.



Rabies: Post-exposure prophylaxis

Category	Type of contact	Recommended treatment
I	Touching or feeding of animals; Licks on intact skin	Wash the site with soap and water only
II	Minor scratches or abrasions without bleeding	Wound management Anti-Rabies vaccine (ARV)
III	Single or multiple bites or scratches with active bleeding; Licks or broken skin	Wound management Anti- Rabies vaccine Administer rabies immunoglobulin (RIG) Prophylactic antibiotics and Anti-tetanus vaccine if required

Rabies: Post-exposure prophylaxis

Dose	Route	Duration	No of injection sites per clinic visit (0, 3, 7, 14, 21-28)	Sites
0.1 ml each site	Intradermal (ID)	1 week Day 0 Day 3 Day 7	2-2-2-0-0	Deltoid region (above 2 yrs.) Or, Antero-lateral thigh (if ≤ 2 yrs.)

Rabies: Post-exposure prophylaxis

Dose	Route	Duration	No of injection sites per clinic visit (0, 3, 7, 14, 21-28)	Sites
Entire vial (1 ml)	Intramuscular (IM)	14-28 days (Essen Regimen)	1-1-1-1-0 (4 Doses)	Deltoid region (above 2 yrs.) Or, Antero-lateral thigh (if ≤ 2 yrs.)
		21 days (Zagreb Regimen)	2-0-1-0-1	

Rabies: Re-exposure prophylaxis

- Re-exposure vaccination for rabies prophylaxis consists of repeating anti- Rabies vaccination as per national guidelines after re-exposing to a rabid (or suspected rabid) animal when one was already vaccinated before, as per schedule.
- According to WHO Guideline, If a rabid dog bites a previously immunized person **within 3 months** of completing an entire course of PEP or PrEP, **no new course of PEP** is required.
- For exposures occurring **more than 3 months** after a PEP or PrEP course, treated as **Re-Exposure Prophylaxis** for previously immunized individuals.

Rabies: Re-exposure prophylaxis

Dose	Route	Duration	No. of injection sites per clinic visit (0, 3, 7, 14, 21-28)	Sites
0.1 ml each site	Intradermal	1 week Day 0 Day 3	1-1-0-0-0	Deltoid region (above 2 yrs.) Or,
1 vial (1 ml)	Intramuscular	1 week Day 0 Day 3	1-1-0-0-0	Antero-lateral thigh (if ≤ 2 yrs.)

Rabies control program in Bangladesh

- **Bangladesh is ranked third** in the world list for rabies infection.
- Since **2010**, the Government of Bangladesh has priorities the '**Rabies Control**' as an important program.
- A joint initiative of the MOHFW, MOFL and MOLGRD started 'Rabies Control' activities from 2011 and prepared a 'National Strategy Paper' on rabies control and developed a roadmap for its implementation by 2023 with the commitment to '**Rabies free Bangladesh**'.
- The Communicable Disease Control (CDC) under the Directorate General of Health Services (DGHS) is working diligently to implement this roadmap and moving forward to **eliminate rabies from Bangladesh by 2030**.

Rabies control program in Bangladesh

- In pursuance of this, with the achievement of the UN-approved Sustainable Development Goals (SDGs) 3.3, the DGHS has been continuing its efforts under the '**National Rabies Elimination Program**' in 2010 of the Zoonotic Disease Control Program.
- Strategies adopted for successful implementation of rabies elimination program includes:
 - **Advocacy, Communication and Social Mobilization (ACSM)**
 - **Animal Bite Management (ABM)**
 - **Mass Dog Vaccination (MDV)**
 - **Dog Population Management (DPM)**
 - **Surveillance and Research**

Severe acute respiratory syndrome (SARS)

- **SARS** is a communicable viral disease caused by a **new strain of coronavirus**, which differs considerably in genetic structure from previously recognized coronavirus.
- The most common symptoms in patient progressing to SARS including **fever, malaise, chills, headache, myalgia, dizziness, cough, sore throat and running nose**.
- In some cases, there is rapid deterioration with low oxygen saturation and acute respiratory distress requiring ventilatory support.
- It is capable of causing **death in as many as 10% cases**.

Clinical case definition of SARS

- A history of fever, or documented fever
and
- One or more symptoms of lower respiratory tract illness (cough, difficulty in breathing, shortness of breath)
and
- Radiographic evidence of lung infiltrates consistent with pneumonia or acute respiratory distress syndrome
and
- No alternative diagnosis fully explaining the illness

Prevention of SARS

- **Prompt identification** of persons with SARS, their movements and contacts
- **Effective isolation** of SARS patients in hospitals
- **Appropriate protection** of medical staff treating these patients
- **Comprehensive identification and isolation** of suspected SARS cases
- **Simple hygienic measures** such as hand-washing after touching patients, use of appropriate and well-fitted masks and introduction of infection control measures
- **Exit screening of international travellers**
- **Timely and accurate reporting and sharing** of information

Covid-19

- COVID-19 is the disease caused by the **SARS-CoV-2 coronavirus**.
- It usually **spreads between people in close contact**.
- Anyone can get sick with COVID-19 and become seriously ill or die, but most people will recover without treatment.
- People over age 60 and those with existing medical conditions have a higher risk of getting seriously ill. These conditions include high blood pressure, diabetes, obesity, immunosuppression including HIV, cancer and pregnancy.
- **Unvaccinated people** also have a **higher risk** of severe symptoms.

Signs and symptoms of Covid-19

- ❑ **Most common symptoms are:**
 - fever
 - chills
 - sore throat.
- ❑ **Less common symptoms are:**
 - muscle aches and heavy arms or legs
 - severe fatigue or tiredness
 - runny or blocked nose, or sneezing
 - headache
 - sore eyes
 - dizziness
 - new and persistent cough
 - tight chest or chest pain
 - shortness of breath
 - hoarse voice
 - numbness or tingling
 - appetite loss, nausea, vomiting, abdominal pain or diarrhoea
 - loss or change of sense of taste or smell
 - difficulty sleeping

Prevention of Covid-19

- **Avoid crowds and keep a safe distance** from others, even if they don't appear to be sick;
- Wear a properly **fitted mask**
- **Clean hands frequently** with alcohol-based hand rub or soap and water;
- **Cover mouth and nose** with a bent elbow or tissue when cough or sneeze;
- **Dispose of used tissues** right away and clean hands; and
- If develop symptoms or test positive for COVID-19, **self-isolate until recover**
- **Vaccination against covid-19**

Avian influenza (Bird flu)

- Avian influenza refers to a large group of different **influenza viruses that primarily affects birds**.
- It is caused by **H₅N₁ strain of influenza virus**.
- Human infections are primarily acquired through direct contact with infected live or dead poultry birds or contaminated environments.
- Public health management includes **personal protective measures** like regular handwashing and proper drying; **good respiratory hygiene** (covering mouth and nose when coughing and sneezing); **early self-isolation; avoid close contact with sick people; and avoid touching eyes, mouth and nose**.

Emerging disease

- **Emerging infectious diseases** are those whose **incidence in humans has increased** during the last two decades or which **threaten to increase** in the near future.
- The term also refers to **newly-appearing infectious diseases**, or diseases that are spreading to new geographical areas- such as cholera in South America and yellow fever in Kenya.
- Such as- **Covid-19, monkey pox, tomato fever, AIDS, Ebola virus disease, bird flu, swine flu** etc.

Re-emerging disease

- The term **re-emerging diseases** refers to the diseases which were **previously easily controlled** by chemotherapy and antibiotics, but **now they have developed antimicrobial resistance** and are often appearing in epidemic form.
- Such as- **dengue, tuberculosis** etc.

Factors responsible for emergence and re-emergence of diseases

- Unplanned and under-planned urbanization
- Overcrowding and rapid population growth
- Poor sanitation
- Inadequate public health infrastructure
- Resistance to antibiotic
- Increased exposure to disease vectors and reservoirs in nature
- Rapid and intense international travel
- Microbial genetic mutation

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