



Epidemiology of

Common Nervous System infections



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Rabies

- Rabies is estimated to cause **59000 human deaths annually** in over 150 countries, with **95%** of cases occurring in **Africa and Asia**. **40%** of cases are children **under 15 years** of age.
- **New Zealand and Australia have never had rabies (rabies-free countries).**
- Rabid dogs are **commonly found** in Jordan. The number of dog bite cases in **2022 reached 5,138**.

• Reservoir:

Dogs: Mainly, cats, fox, raccoons
, wolf, Cows, horses,..

Rodents, bats..

Dogs are the main source of human rabies deaths, contributing up to 99% of all rabies transmissions to humans.

RABIES

Zero deaths by 2030

99%
human cases
result from
dog bites

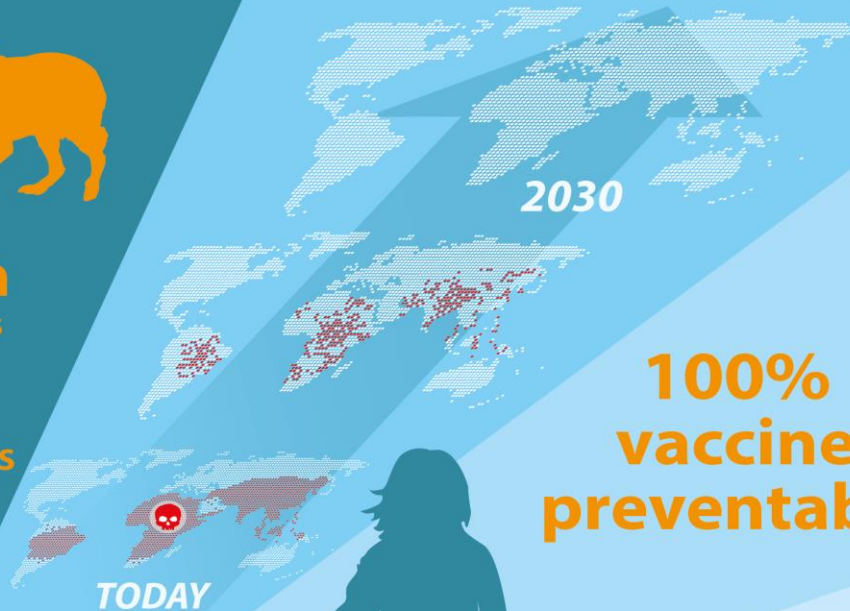


One death

every 9 minutes
worldwide



4 out of 10 deaths
are in children



2030

TODAY

100%
vaccine
preventable

**no bite
no rabies**



World Health
Organization

#rabies
28 September
World Rabies Day

www.who.int/rabies/en

- Exit: Saliva of rabid animal.

- Mode of transmission:

1- Bite of rabid animals (mainly).

2- Lick of animals (abrasions in skin).

Incubation period: from 10 days
to 12 months (typically between 20 and 90
days)

Rabies symptoms in humans

Initial symptoms

The first symptoms of rabies may be very similar to those of the flu, including general weakness or discomfort, fever, or headache. These symptoms may last for days.



Headache



Fever



Fatigue



Tingling at site of exposure

Rabies-specific symptoms

As the disease progresses, the person may experience delirium, abnormal behavior, hallucinations, hydrophobia (fear of water), and insomnia.



Hallucinations



Excessive salivation



Light sensitivity



Hydrophobia



Insomnia



Aggression



Prevention

I. For animals:

- **Control** of stray dogs and cats.
- Active **immunization** of dogs and cats using vaccine yearly and given license.
- **Quarantine** measures for imported dogs and cats.

Prevention

II. For human:

1- Pre-exposure immunization

-for: Veterinarians, zoo- workers, lab- workers, night-guards, and travelers to rabies-affected areas according to the level of risk in that area.

Human diploid cell vaccine (HDCV) 1ml, IM in the deltoid region, 3 doses



2-Post-exposure management & immunization

A.Wound care: Should be immediate, essential even if the person presents long after exposure

- Free flushing with **soap and water** at once for 15 minutes

-Delay suturing of wounds. If suturing is necessary, ensure that RIG has been applied locally

-Use **chemical disinfectant.**

B. Tetanus seroprophylaxis

or booster dose of toxoid.

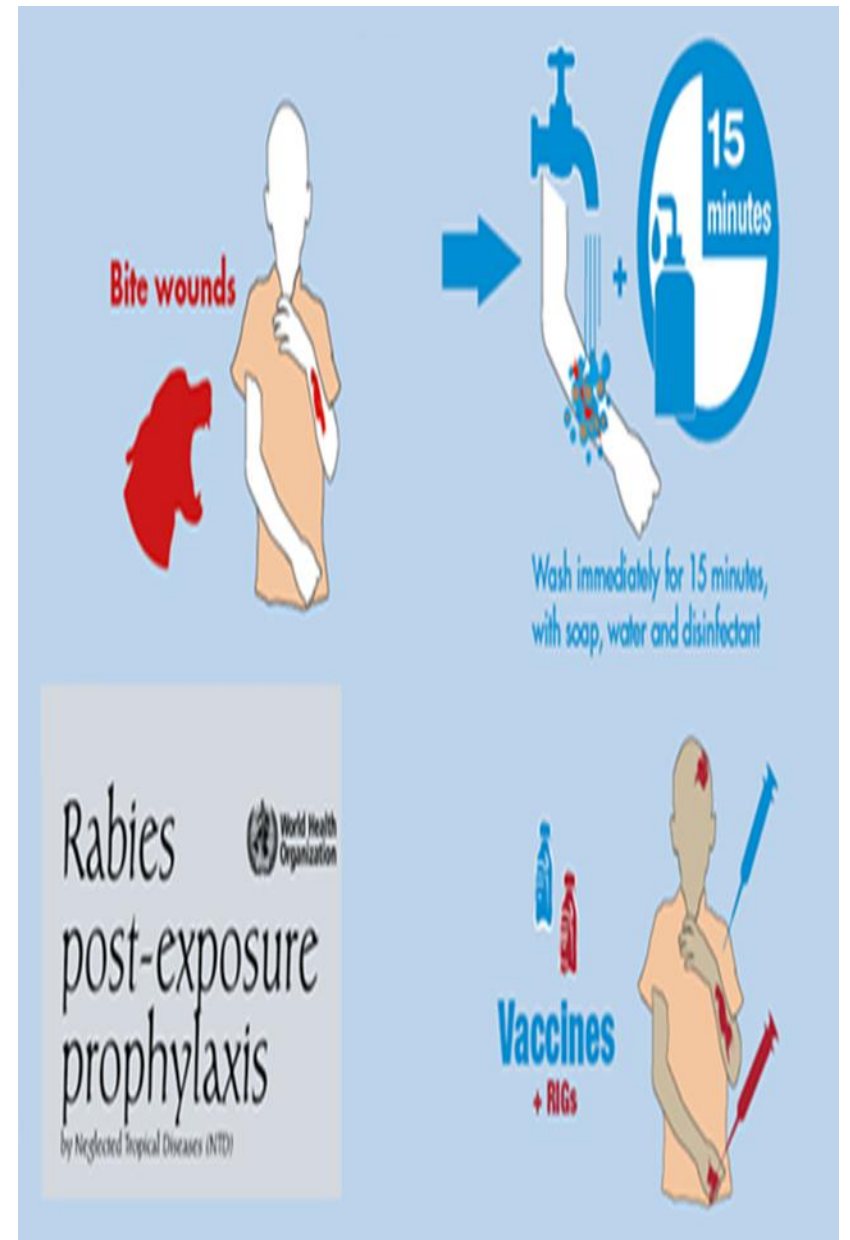
C. Chemoprophylaxis: by

penicillin.

D. Specific protection by

immunization (vaccination

& seroprophylaxis).



Categories of exposure

Category of exposure	Description	Post-exposure prophylaxis
Category I	Touching or feeding animals, licks on intact skin, contact of intact skin with secretions or excretions of rabid animal or person	Not regarded as exposures, therefore no PEP required
Category II	Nibbling of uncovered skin, minor scratches or abrasions without bleeding	Vaccine should be injected as soon as possible
Category III	Single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks and exposure to bats.	Vaccine and rabies immunoglobulin should be administered at distant sites as soon as possible.

A-Without pre-exposure immunization (not immunized before):

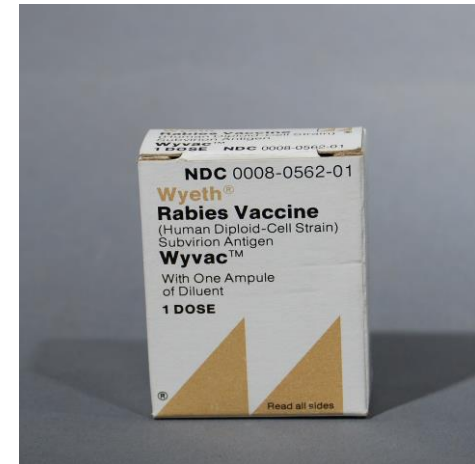
- Vaccination (and seroprophylaxis if needed)

Human diploid cell vaccine (HDCV):

- If the person is not vaccinated in the past, needs **4-5 doses** of rabies vaccine

(given on days **0, 3, 7, 14, and 28**), depending on **severity of the wound**.

*No neurological or allergic complications.



Seroprophylaxis

- Given **with vaccination, after severe exposure**.
- Without previous vaccination.
- **1/2 dose around the bite** by infiltration in wound and the other **1/2 IM**.
- If RIG is unavailable on first visit, its administration can be delayed by **a maximum of 7 days** from the date of first vaccine dose

B-With previous immunization (immunized before):

□ The exposed when re-exposed is given vaccination and No seroprophylaxis.

HDCV: 2 doses. (0-3)

- A recent **intradermal (ID) regimen** requires a reduced volume of vaccine to be utilized than any of the intramuscular regimens, therefore, **reducing vaccine cost by 60-80%**
- This method is appropriate where vaccine or/and money are in short supply, particularly in rural areas with high-flow clinics
- The volume per intradermal (ID) site is 0.1 mL
- Needs careful instructions.

Leprosy

Leprosy is a **chronic** infectious **skin** disease may lead to **disability** and **disfigurement** of the face. It is **endemic** in many regions of the world. India, Myanmar and Nepal contained 70% of cases.



It mainly affects the **skin**, the **peripheral nerves**, mucosal surfaces of the **upper respiratory tract** and the **eyes**.

Causative agent: **Mycobacterium leprae**, acid fast bacilli.

Between 2007 and 2021, Jordan leprosy cases remained stable at around 0.

• Reservoir:

Man: **open case** with ulcerated lesions of skin and mucous membrane.

• Mode of transmission:

- Prolonged **contact** with open case

I.P: **Several years.**

1- Lepromatous Leprosy:

- **Skin lesions.**
- **Sensory loss.**
- **Destruction of the nasal septum** with collapse of the nose leading to disfigurement **+ Leonine facies,**
- **Loss of eyebrows and lashes,** eye damage (dryness, reduced blinking)..



2- Tuberculoid Leprosy:

- **Peripheral nerve affection**
causes anesthesia
- **Muscle weakness & paralysis.**
- **Trophic changes of skin**
(hypo pigmented)



Control of cases:

1- Case- finding.

2- Notification

**3- Isolation: compulsory-
segregation.**

4- Disinfection.

**5- Treatment: by Multiple
Drug Therapy (MDT)**

**6- Release: after
becoming bacteriologically
free.**

Control of contacts:

1- Periodic examination for case-finding.

2- Health education.

3- Special prevention by chemoprophylaxis and BCG immunization

Tetanus (Lock-Jaw)

- Tetanus is a form of **wound infection** characterized by acute intoxication that involves the nervous system.

Causative agent: Clostridium tetani”



- Reservoir:

- Animals (herbivorous animals, horses). (The organism lives in the intestine is excreted with faeces and sporulates outside the body).
- Man (but No man to man spread).

Prevalence of tetanus

- In **2019**, the Global Burden of Disease study estimated over **73,000** total tetanus cases including over **27,000 neonatal tetanus** infections.
- According to the latest WHO data published in 2020, tetanus deaths in Jordan reached **11 or 0.04% of total deaths.**

Incubation period: 4-21 days

lock jaw or trismus. Risus sardonicus . Arched back.

• Mode of transmission:

Infection of wound, by spores occurs in different methods:

1. Injury in polluted place.
2. Neonatal infection: (**tetanus neonatorum**).
3. Surgical tetanus (post- operative)
4. Puerperal infection: Infection of uterus by non- sterile instruments.
5. **Otogenic infection:** Introduction of foreign body (F.B.) in the air into ear.

Prevention

I. General prevention:

1-Sanitation of the environment

2-Health education.

II. Specific prevention:

1. Active immunization

2. Seroprophylaxis

3. Chemoprophylaxis



Tetanus Toxoid

Pre-exposure application of Tetanus toxoid:

1. For infants in routine immunization program.
2. School children.
3. At risk groups like military forces, pregnant females, guards, Policemen.

Adults dose schedule: **2 doses, 8 weeks interval + 3rd dose after 1y**
(three doses)

and then booster is needed every 10 years .

After injury:

Immunization status	Clean minor wound (< 6 hours)	Other wounds
Not immunized before or less than 3 doses or unknown status	Give 3 doses of vaccine	* 1 dose of the vaccine then completes as in clean wound *TIG., IM (TT + TIG)
3 doses	Nothing	* booster dose can be given if the risk of infection is high (TT only)

Control of tetanus

1- Case:

- **Surgical care of wound** (cleaning, disinfectant & removal of FB)
- **Specific therapy**
 1. **Serotherapy** with ATS or TIG (better)
 2. **Chemotherapy** (rarely used) Penicillin or tetracycline
 3. Muscle **relaxant**

2- Contacts:

Nothing because no man to man transmission.

Guillain–Barré syndrome

- Guillain-Barré syndrome (GBS) is a rare autoimmune condition (temporary inflammation and **demyelination** of peripheral nerve myelin sheaths).
- People of all ages can be affected, but it is more common in adults and in males.
- Most people recover fully from even the most severe cases of Guillain-Barré syndrome, however, it can be life-threatening in the acute phase.

- **Severe** cases of Guillain-Barré syndrome are rare but can result in **near-total paralysis** and **problems breathing**. People with Guillain-Barré syndrome should be treated and monitored as quickly as possible; some may need intensive care.
- The cause of it is **not fully understood**, but most cases (70%) **follow an infection** with a virus or bacteria. Infection with the bacteria **Campylobacter jejuni**, which causes gastroenteritis, is one of the **most common risk factors** for GBS. People can also develop GBS after having the **flu** or other viral infections including **cytomegalovirus, Epstein-Barr virus, corona virus**, and the **Zika virus**.

- The global incidence of Guillain-Barré syndrome is **1-2 cases per 100000** person-years.
- Ascending paralysis, weakness beginning in the feet and hands and migrating towards the trunk, is the most typical symptom, and some subtypes cause change in sensation or pain as well as dysfunction of the autonomic nervous system.
- Patients usually recover spontaneously over a few weeks or months as affected nerves are re-myelinated.
- In most cases, Guillain-Barré syndrome isn't preventable. But one way you can try to lower your risk of GBS is to stay as healthy as possible.

Herpes Zoster (shingles)

- People get shingles when the varicella-zoster virus, which causes **chickenpox**, reactivates in their bodies after they have already had chickenpox.
- It is a painful but self-limited dermatomal rash. Most people who develop shingles only have it one time during their life. However, you can have shingles more than once.
- You cannot get shingles from someone who has shingles, however, you can get chickenpox from someone who has shingles if you never had chickenpox or never got chickenpox vaccine. You could then develop shingles later in life.

- People who never had chickenpox or didn't get chickenpox vaccine can get infected with VZV from someone who has shingles. These people can get the virus through:

1. **Direct contact** with the fluid from shingles rash blisters.

2. **Breathing** in virus particles that come from the blisters.

- **At risk group:**

1. With a **weakened immune system** (such as people with cancer, HIV, organ transplant recipients or those receiving chemotherapy).

2. **Over the age of 50.**

3. Who have been **ill.**

4. Who are under **stress.**



- **Without vaccination**, individuals who live to **85 years** old have an approximately **50% lifetime risk** of developing HZ. Hence, HZ prevention is an important global health priority.
- **Scarring** can occur if deeper epidermal and dermal layers have been compromised by **excoriation or secondary infection**.
- Almost all adults experience **pain**, typically **severe**.
- **Treatment** includes **antiviral medications** such as acyclovir, famciclovir, and valacyclovir given within 72 hours of symptom onset, with other **conservative** measures (NSAIDs, lotions)

- **Prevention:**

The routine use of the **varicella vaccine** has led to a remarkable reduction in the incidence of primary varicella infection.

- CDC recommends two doses of recombinant zoster vaccine (**Shingrix**) to prevent shingles and related complications in adults **50 years and older**, (and adults 19 years and older who have weakened immune systems because of disease or therapy).

- **Varivax** (live- attenuated varicella vaccine)for **children**.

Shingrix is given even if in the past you:

- Had shingles
- Received Zostavax
- Received varicella (chickenpox)

vaccine