Standard Case Definitions
including recommended Prevention & Control Measures
and basic Management Principles of
Communicable Diseases

Integrated Disease Surveillance and Response System
(IDSRS)

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Introduction

Infectious diseases are caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi; the diseases can be spread, directly or indirectly, from one person to another. Zoonotic diseases are infectious diseases of animals that can cause disease when transmitted to humans.

An evaluation of their significance to public health and economies has convinced the health planners and other stake holders, including nongovernmental organizations, to invest in preventing and controlling the communicable diseases.

Past efforts to control communicable diseases, such as Small pox and dracunculiasis (guinea-worm disease) have yielded progressive health gains, including the imminent eradication of dracunculiasis.

There is a high risk of communicable disease outbreaks in emergency situations. Pakistan has recently experienced disasters like 2005 earthquake, Insurgency, IDP camps and devastating floods in 2010. Our experience in disaster management demonstrates that outbreaks must be recognized and controlled rapidly in order to minimise their impact. The effective containment of an outbreak depends on:

- Early detection and reporting of suspect cases
- Rapid epidemiological investigation
- Rapid laboratory confirmation of the diagnosis
- Implementation of effective control measures.

Rapid identification of the causative agent and the likely source or mode of transmission is essential. The initial investigation involves two important processes; collection of information on suspect cases and collection of clinical specimens for laboratory diagnosis. The National Institute of Health Islamabad has been providing a strong support through its reference Public Health Lab.

Achieving and sustaining intensified control of communicable diseases is critical for all the health partners in realizing its objective that all people attain the highest possible level of health.

Antimicrobial resistance – also known as drug resistance is currently emerging as a major health challenge due to various reasons and affecting public health management of various communicable diseases that were effectively being managed and controlled in the past. It occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render the medications used to cure the infections they cause ineffective. When the microorganisms become resistant to most antimicrobials they are often referred to as “superbugs”. This is a major concern because a resistant infection may kill, can spread to others, and imposes huge costs to individuals and society.

Antimicrobial resistance is facilitated by the inappropriate use of medicines, for example, when taking substandard doses or not finishing a prescribed course of treatment. Low-quality medicines, wrong prescriptions and poor infection prevention and control also encourage the development and spread of drug resistance.

Considering their potential harmful impact, the hand book “Standard Case Definitions including recommended Prevention & Control Measures and basic management principles of communicable diseases” having needed recommended interventions has been developed for the DEWS field officers to provide them a comprehensive guide and a quick reference book and to assist the healthcare professionals in timely recognition, reporting and proper management of epidemic prone diseases.

This handbook is an improved version of the Case Definitions Booklet that was earlier published by the Epidemic Investigation Cell, Public Health Laboratories Division, National Institute of Health as an integral component of the Disease Early Warning System (DEWS). Based on the operational needs of the public health field staff, significant additions have been made to the earlier editions subsequently published in 2001, 2002, 2005, 2006 and 2009. The current 6th addition also includes Rabies just added because of its public health significance and one new diseases i.e. Nipah virus Infection that has emerged in our neighbouring country.

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This hand book has been updated using following sites and Standard WHO documents on prevention control and management of communicable diseases:

- The WHO site http://www.who.int/health topics ,
- http://www.who.int/eme,
- *WHO-recommended standards for surveillance of selected vaccine-preventable disease,*
- *Guidelines for the Surveillance and Control of Anthrax in Humans and Animals WHO/EMC/ZDI./98.6,*
- *WHO. Weekly Epidemiological Record. 1994. 69:273-275. (HIV/AIDS)*
- *Guidelines for the treatment of malaria – 2nd edition World Health Organization, 2010 and*
- WHO Communicable Disease Profile for Iraq, a *Toolkit:*
- *Report of the WHO consultation on Surveillance for Pandemic Influenza, Global Influenza Program WHO 2009.*
- *Guidelines for Cholera Control, WHO 1993 and Fact Sheets on Environmental Sanitation for Cholera Control, WHO 1996*

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Acute Watery Diarrhoea / Cholera

Introduction:

Cholera is an acute intestinal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae.* It has a short incubation period, from less than one day (two hours) to five days, and produces an enterotoxin that causes copious, painless, watery diarrhoea that can quickly lead to severe dehydration and death if treatment is not promptly given. Cholera is transmitted through contaminated water or food. Primarily linked to insufficient access to safe water and proper sanitation, its impact can be even more dramatic in areas where basic environmental infrastructures are disrupted or have been destroyed accordingly the provision of safe water, proper sanitation, and food safety are critical for preventing occurrence of cholera.

About 75% of people infected with V. cholerae do not develop any symptoms, although the bacteria are present in their faeces for 7–14 days after infection and are shed back into the environment, potentially infecting other people.

Among people who develop symptoms, 80% have mild or moderate symptoms, while around 20% develop acute watery diarrhoea with severe dehydration. This can lead to death if untreated. People with low immunity – such as malnourished children or people living with HIV – are at a greater risk of death if infected.

Symptoms

Cholera is an extremely virulent disease. It affects both children and adults and can kill within hours. Besides acute diarrhoea, vomiting also occurs in most patients.

Up to 80% of cases can be successfully treated with oral rehydration salts. Effective control measures rely on prevention, preparedness and response. Provision of safe water and sanitation is critical in reducing the impact of cholera and other waterborne diseases.

Infectious agent:

Bacterium - *Vibrio cholerae*

Mode of transmission:

Faecal-oral route, contaminated water and food. Indirect contamination by hands

Incubation period:

Few hours to 5 days

Seasonality:

Throughout the year; higher incidence from April to November

Alert Threshold:

One case of suspected AWD/ Cholera is an alert must be investigated.

Outbreak threshold

One confirmed case of Cholera is an outbreak.

Risk factors:

- Lack of safe water
- Overcrowding
- Inadequate quantity and/or quality of water
- Poor personal hygiene
- Poor washing facilities
- Poor sanitation
- Insufficient soap
- Inadequate cooking facilities
- Population movement

Case definition:

Suspected case:

A case of cholera should be suspected when:

- In an area where the disease is not known to be present, a patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhoea;
- In an area where there is a cholera epidemic, a patient aged 5 years or more develops acute watery diarrhoea, with or without vomiting.

Confirmed case:

Any suspected case confirmed by laboratory through isolation of *Vibrio choleraeO01* or *O139* from diarrhoeal stool in any patient with diarrhoea.

Diagnosis

The presence of V. cholerae in stools is confirmed through laboratory procedures. However, a new rapid diagnostic test (RDT), now available, allows quick testing at the patient's bedside. WHO is currently in the process of validating this RDT, to be able to include it on the list of its pre-qualified products. In the meantime, WHO suggests that all samples tested positive with the RDT are re-tested using classic laboratory procedures for confirmation. Not all cases fitting the WHO clinical case definition need to be tested.

***Vibrio cholerae* strains**

Two sero-groups of V. cholerae – O1 and O139 – cause outbreaks. V. cholerae O1 causes the majority of outbreaks, while O139 – first identified in Bangladesh in 1992 – is confined to South-East Asia.

Non-O1 and non-O139 V. cholerae can cause mild diarrhoea but do not generate epidemics.

Recently, new variant strains have been detected in several parts of Asia and Africa. Observations suggest that these strains cause more severe cholera with higher case fatality rates. Careful epidemiological monitoring of circulating strains is recommended.

The main reservoirs of V. cholerae are people and aquatic sources such as brackish water and estuaries, often associated with algal blooms. Recent studies indicate that global warming creates a favourable environment for the bacteria.

Specimen Collection:

- Collect at least two rectal or fresh stools sample /swabs during active diarrhoea period (preferably as soon as possible after onset of illness before the initiation of antibiotic therapy.).
- Stool specimens should be transported at 4-8°C. Bacterial yields may fall significantly if specimens are not processed within 1-2 days of collection.
- Transport in Cary-Blair transport medium or alkaline peptone water.
- Each sample accompanying a complete lab request form with brief history of the patient may be sent by overnight mail.

Management:

- Cholera is an easily treatable disease. Efficient treatment resides in prompt rehydration through the administration of oral rehydration salts (ORS) pre-packaged mixture of sugar and salts to be mixed with water and drunk in large amounts.
- Intravenous fluids, depending of the severity of cases. Up to 80% of patients can be treated adequately through the administration of ORS. Very severely dehydrated patients are treated through the administration of intravenous fluids, preferably Ringer lactate (Hartmann's solution for injection). Appropriate antibiotics can be given to severe cases to diminish the duration of diarrhoea, reduce the volume of rehydration fluids needed and shorten the duration of V. cholera excretion.
- For children up to five years, supplementary administration of zinc as a proven effective in reducing duration of diarrhoea as well as reduction in successive diarrhoea episodes.
- Breast-feeding of infants and young children should be continued.
- Mass administration of antibiotics is not recommended, as it has no effect on the spread of cholera and contributes to increasing antimicrobial resistance. The sensitivity patterns in Pakistan show that *Vibrio cholera* O1 is sensitive to Doxycycline, Ciprofloxacin, Norfloxacin, Tobramycin and Tetracycline.
- In order to ensure timely access to treatment, cholera treatment centers (CTCs) should be set up among the affected populations. With proper treatment, the case fatality rate should remain below 1%.

Prevention and Control measures

A multidisciplinary approach based on prevention, preparedness and response, along with an efficient surveillance system, is key for mitigating cholera outbreaks, controlling cholera in endemic areas and reducing deaths.

a) Preventive measures:

The only sure means of protection against severe gastroenteritis including cholera epidemics is ensuring adequate safe drinking water supply and sanitation. To make water safe for drinking, when the water source has been contaminated, either boil the water or chlorinate it. Bringing water to a vigorous, rolling boil and keep it boiling for one minute will kill Vibrio choleras 01 and most other organisms that cause diarrhoea.

Making water safe by chlorination:

To make water safe by chlorination, first make a stock solution of 33 gm (3 tablespoons) of bleaching powder in one litre of water and store it in a brown bottle. Then put 3 drops (0.6 ml) of stock solution in one litre of water or 6 ml in 10 litres of water or 60 ml in 100 litres. Wait 30 minutes before drinking or using the water.

Sanitation:

Good sanitation to avoid the contamination of clean water sources can markedly reduce the risk of transmission of intestinal pathogens, including *cholera vibrios*. High priority should be given to observing the basic principles of sanitary human waste disposal at appropriate distance from water source and supply. When large groups of people congregate for fairs, funerals, religious festivals, etc, particular care must be taken to ensure the safe disposal of human waste and the provision of adequate facilities for hand washing.

Hygiene and Food Safety:

- Wash hands thoroughly with soap after defecating, or after contact with faecal matter, and before preparing or eating food, or feeding children.
- Handle and prepare food in a way that reduces the risk of contamination (e.g. cooked food and eating utensils should be kept separate from uncooked foods and potentially contaminated utensils and crockery).
- Avoid raw food, except those undamaged fruits and vegetables from which the peel can be removed in a hygienic manner.
- Cook food until it is hot throughout.
- Eat food while it is still hot, or reheat it thoroughly before eating.
- Wash and thoroughly dry all cooking and serving utensils after use.

Breast feeding:

- Continue breast-feeding in ill children as it may reduce the severity of gastroenteritis.

b) Control of patient, contacts and the immediate environment:

- Report of epidemic to the local health authority.
- Investigation of contacts and source of infection should be sought out in certain high-risk populations and antigen excretors in outbreak situation.

c) Epidemic measures:

- Search for vehicles of transmission and source on epidemiological basis.
- Once an outbreak is detected, the usual intervention strategy is to reduce deaths by ensuring prompt access to treatment, and to control the spread of the disease by providing safe water, proper sanitation and health education for improved hygiene and safe food handling practices by the community. The provision of safe water and sanitation is a formidable challenge but remains the critical factor in reducing the impact of cholera.

d) Oral cholera vaccines

Two oral vaccines are currently available:

- Killed cholera vaccine (WC/rBS, two doses); and
- Live attenuated vaccine (CVD103- HgR, single dose)

They are licensed in a few countries only, and are still very expensive. Both might be used in carefully evaluated emergency situations, such as refugee camps or slum residents.

WHO recommends that immunization with currently available cholera vaccines be used in conjunction with the usually recommended control measures in areas where cholera is endemic as well as in areas at risk of outbreaks as the vaccines provide a short term effect while longer term activities like improving water and sanitation are put in place.

The use of the parenteral cholera vaccine has never been recommended by WHO due to its low protective efficacy and the high occurrence of severe adverse reactions.

Anthrax

Introduction and Background:

Anthrax is a bacterial disease caused by Bacillus anthracis. It primarily affects herbivorous mammals, although other mammals and some birds have been known to contract it. Humans generally acquire the disease from infected animals or as a result of occupational exposure to contaminated animal products.

There are three types of anthrax in humans: cutaneous, gastrointestinal, and pulmonary. The vast majority of cases are cutaneous, caused by anthrax spores infecting a cut or abrasion. Anthrax is not transmitted from person to person, and can be treated with antibiotics.

Geographical Distribution:

Animal anthrax is present throughout the Middle East. It is endemic in Iraq, Iran and

Syria; sporadic in Jordan, Kuwait and Saudi Arabia; hyperendemic/epidemic in

Turkey.

Human anthrax has been reported from Iraq, Iran, Syria and Turkey.

Infectious agent:

Bacterium: spore-forming Bacillus anthracis. Free oxygen is required for sporulation (i.e. production of spores), but other conditions are also important: temperature, nutrient levels, and soil conditions. B. anthracis remains in vegetative non-spore form within the anaerobic environment of the infected host.

Incubation Period:

From 1 to 7 days, even if up to 60 days is possible

Mode of transmission:

It is largely through the uptake of spores that humans contract the infection, almost invariably from direct or indirect contact with animals: The routes of acquisition are:

- ***A skin lesion (cutaneous anthrax):***

Cutaneous infection is by contact with tissues of infected animals (cattle, sheep, goats, etc.) often during slaughter procedures or by contact with infected or contaminated animal products (e.g. hides). Person-to-person transmission has occurred, but only very rarely

- ***Ingestion of contaminated food (gastrointestinal anthrax):***

Intestinal and oropharyngeal anthrax arises from ingestion of contaminated

undercooked meat

- ***Inhalation of spore-laden dust (inhalational or pulmonary anthrax):***

Inhalational anthrax is usually an occupational disease of people working with

contaminated wool, hides, bones and other animal products.

NOTE: mechanical transmission by biting insects is a rare mechanism of transmission.

Alert threshold

One human case must lead to an alert. Any animal outbreak must be followed up by the veterinary and public health authorities.

Seasonality:

Animal anthrax outbreaks due to soil-borne infections usually occur during warmer seasons.

Risk Factors:

Lack of veterinary services, especially effective animal vaccination

programmes, poor inspection control mechanism in the animal slaughter and consumption of anthrax-contaminated meat from infected animals due to food shortage.

Clinical description:

An illness with acute onset characterized by several clinical forms:

(a) Localized:

- *Cutaneous:* skin lesion evolving over 1 to 6 days from a papular through a vesicular stage, to a depressed black eschar invariably accompanied by oedema that may be mild to extensive. This form accounts for 95% or more of human cases globally. The case-fatality rate is 20% without, and <1% with, antibiotic treatment.

(b) Systemic:

- *Gastrointestinal*: abdominal distress characterized by nausea, vomiting, anorexia and followed by fever. The case-fatality rate is estimated to be 25-60%. The effect of early antibiotic treatment on the case-fatality rate is not established.
- *Inhalational (pulmonary)*: brief prodrome resembling acute viral respiratory illness, followed by rapid onset of hypoxia, dyspnoea and high temperature, with X-ray evidence of mediastinal widening. Case-fatality estimates are extremely high(>75%), even with all possible supportive care including appropriate antibiotics.

Diagnosis:

(Laboratory criteria):

Laboratory confirmation by **one or more** of the following:

- Isolation of *B. anthracis* from a clinical specimen (e.g. blood, lesions, discharges)
- Demonstration of *B. anthracis* in a clinical specimen by microscopic examination of stained smears (vesicular fluid, blood, cerebrospinal fluid, pleural fluid, stools)
- Positive serology (ELISA, Western blot, toxin detection, chromatographic assay, fluorescent antibody test)

NOTE: it may not be possible to demonstrate B. anthracis in specimens if the patient has been treated with antibiotics.

Case definition:

- **Suspected:** A case that is compatible with the clinical description and has an epidemiological link to confirmed or suspected animal cases or contaminated animal products.
- **Probable:** A suspected case with a positive reaction to allergic skin test (in nonvaccinated individuals)
- **Confirmed:** A suspected case that is laboratory confirmed

Case Management

a) Penicillin

Penicillin remains the drug of choice. It can be administered orally in milder cases; in more severely ill patients, systemic administration is required.

Mild uncomplicated cases *(cutaneous anthrax without systemic involvement)*

- Penicillin V, 500mg every 6 hours for 5-7 days orally, **or**
- Procaine penicillin, 1 million units intramuscularly every day for 3-7 days

Severe cases *(including all forms of systemic anthrax)**

Initially (until temperature returns to normal):

Penicillin G, 2 million units per day in:

- Slow (<300 mg/minute) intravenous injections of 0.5 million units every 6 hours, **or**
- Intravenous perfusion

Later (When temperature returns to normal):

- Procaine penicillin, 1 million units intramuscularly every day for 3-7 days

(*) Antibiotic therapy is less effective when the bacillus has produced high levels of toxin; gamma-globulin may be effective in such cases, where otherwise lethal levels of anthrax toxin have already accumulated.

Prompt antibiotic therapy with penicillin usually results in dramatic recovery of the individual infected with anthrax if given before onset or immediately after onset of illness. Tetracyclines, erythromycin, chloramphenicol, ciprofloxacin and doxycicline are also effective.

b) Ciprofloxacin

Strains resistant to penicillin will tend to be used for biological warfare: in this

situation the drug of choice is ciprofloxacin.

Cutaneous anthrax:

Ciprofloxacin 500mg twice daily (orally) for 7 days. This can be changed to oral amoxycillin if the organism is found to be sensitive. Treatment may need to be continued for up to 60 days if there is suspicion of deliberate release in order to provide cover for inhalational anthrax, which may have been acquired concurrently.

Inhalational (pulmonary) and gastrointestinal anthrax:

Adults:

- Ciprofloxacin 400mg every 12 hours (intravenously) for 60 days. Switch to oral therapy (see cutaneous anthrax) when clinically appropriate. **or (if strain is proven susceptible)**

- Benzylpenicillin 2.4g every 4 hours (intravenously) for 60 days. Switch to oral therapy (see cutaneous anthrax) when clinically appropriate.

Children:

- Ciprofloxacin 20-30 mg/kg per day (intravenously) divided into 2 daily doses, not to exceed 1g per day, for 60 days. Switch to oral therapy (see cutaneous anthrax) when clinically appropriate. **or (if strain is proven susceptible)**
- Age <12 years: Benzylpenicillin 30 mg/kg every 6 hours (intravenously) for 60 days
- Age ≥12 years: Penicillin G 2.4g every 4 hours (intravenously) for 60 days

Pregnancy:

Same as for non pregnant adult

NOTE: *Ciprofloxacin is not licensed for use in children or pregnant women*

Prevention and Control Measures;

a). Animal outbreaks:

Following the first detection of anthrax in a herd, the following control measures can be considered:

- Quarantine of animals on farms where cases have been confirmed and regular check for signs of illness
- Vaccination of all livestock on the farm and adjacent areas
- Treatment of animals with antibiotics
- Isolation and destruction of infected animals
- Incineration or burial of infected carcasses
- Disinfection of the premises (e.g. with formaldehyde)

In the case of animal outbreaks, the following precautions must be taken for exposed humans:

- Check vaccination status and administer booster if needed
- Use protective clothing (and face masks if there is a risk of aerosols)
- Disinfect and dress any cuts and abrasions before putting on protective clothing
- Avoid blood-spilling operations on infected/suspected animals/carcasses

b). **Human outbreaks:**

- Report to local health authority and livestock/agriculture authority. Consider reporting to law enforcement authorities for consideration of a bioterrorist source.
- Treat and manage patient taking Universal Precautions (see *Prevention of HIV/AIDS*) for the duration of illness. Isolation rooms are not required.
- Investigate contacts and source of infection. Search for history of exposure to infected animals or animal products and trace to place of origin. If possible, seal the suspected locations of exposure to prevent further contact. Consider a potential bioterrorist source for those cases with no obvious occupational source of infection.
- When the source of infection has been ascertained, remove the offending material in order to prevent further infections (especially in case of outbreaks linked to consumption of infected meat or occupational exposure).
- *For both humans and animals, report suspicious symptoms immediately*

Prevention in brief:

- Prevention of human anthrax depends upon prevention of animal anthrax and public awareness programmes regarding the dangers of contacting contaminated animals or their meat and products.
- Preventive measures in livestock in endemic areas are essential: these include regular vaccination programmes and the safe disposal of anthrax-infected carcasses. The most efficient method of disposal of infected carcasses is incineration in a manner that ensures heat sterilization of the surrounding soil

Immunization:

- Vaccines have been developed for human use, but they are not approved for widespread use.
- Vaccines are sometimes given to people who are likely to be exposed to anthrax through their occupation, for example, tannery workers, or to military personnel
- They are not recommended for mass immunization

Crimean Congo Haemorrhagic Fever

Introduction and Background:

CCHF is a viral haemorrhagic fever transmitted by ticks. It can be responsible for severe outbreaks in humans but it is not pathogenic for ruminants, their amplifying host.

The disease was first described in the Crimea in 1944 and given the name Crimean haemorrhagic fever. In 1969 it was recognized that the pathogen causing Crimean haemorrhagic fever was the same as that responsible for an illness identified in 1956 in the Congo, and linkage of the two place names resulted in the current name for the disease and the virus.

CCHF spreads to humans either by tick-bites, or through contact with viraemic animal tissues during and immediately post-slaughter. CCHF outbreaks constitute a threat to public health services because of its epidemic potential, its high case fatality ratio (10-40%), its potential for nosocomial outbreaks and the difficulties in treatment and prevention. CCHF is endemic in all of Africa, the Balkans, the Middle East and in Asia south of the 50° parallel north, the geographic limit of the genus Hyalomma, the principal tick vector.

Infectious Agent:

The Crimean-Congo Haemorrhagic Fever (CCHF) Virus, *Nairovirus* group of Bunyaviridae family

Mode of transmission:

Tick-borne (*Hyalomma genus*); also direct contact with blood / tissue of infected people, blood / tissue of infected domestic animals (butchering) or the grinding of infected ticks. Nosocomial spread is common.

Incubation period:

Incubation period is usually 1 to 3 days, with a maximum of 9 days. The incubation period following contact with infected blood or tissues is usually 5 to 6 days, with a documented maximum of 13 days.

Period of communicability:

Humans are infective during all the acute phase of illness. Nosocomial infections are common after exposure to blood and secretions.

Alert Threshold:

One probable case is an alert and requires an immediate investigation.

Outbreak threshold:

One confirmed case is an outbreak

Seasonality: Cases have been reported during fall, winter and spring seasons.

Risk factors for increased transmission:

- Living in tick-infested areas (Crimean-Congo haemorrhagic fever)
- Living in close contact with animals
- Attending a patient or working in a Laboratory where samples are being processed

Geographical distribution: Maximum cases reported from Zhob, Loralai, Quettta, Killa Saifulla, Ziarat, AJK, Karachi, Hazro, Attock, Peshawar, Abbotabad, and Mansehra

Case Definition:

Suspected Cases:

Patient with sudden onset of illness with high-grade fever over 38.5°C for more than 72 hrs and less than 10 days, especially in CCHF endemic area and among those in contact with sheep or other livestock (shepherds, butchers, and animal handlers). Note that fever is usually associated with malaise, weakness, irritability, headache, severe pain in limbs and loins (lower back), and marked anorexia and does not respond to antibiotic or anti-malarial treatment.

Probable case:

Suspected case with acute history of febrile illness 10 days or less, AND any two of the following: thrombocytopenia less than 50,000 /mm^3, petechial or purpuric rash, epistaxis, haematemesis, haemoptysis, blood in stools, ecchymosis, gum bleeding, other haemorrhagic symptom - AND no known predisposing host factors for haemorrhagic manifestations.

Confirmed case:

Probable case with positive diagnosis of CCHF in blood sample, performed in specially equipped high bio-safety level laboratories. Positive diagnosis includes any of the following:

- Confirmation of presence of IgG or IgM antibodies in serum by ELISA (enzyme-linked immunoassay) or any method.
- Detection of viral nucleic acid by PCR in specimen or isolation of virus.

Specimen Collection:

- Collect 5 ml of blood and separate serum for analysis of CCHF virus after centrifuge, observing strict safety precautions. If centrifuge is not available, store the blood specimens in a refrigerator until a clot is formed; then remove the serum and pipette it into an empty sterile tube (using a Pasteur pipette).
- Transport serum specimens to the lab in triple packing with ice packs or frozen with dry ice along with a prominent Bio Hazard label and complete lab request form with brief history of the patient.

Management:

- A suspected case of CCHF should be managed by diagnosing and treating for other likely causes of fever. If there is no response to anti-malarial and antibiotic treatment, the patient's platelet count should be checked and examined in view of the criteria mentioned above for "probable CCHF". All specimens of blood or tissues taken for diagnostic purposes should be collected and handled using universal safety precautions.
- If the case meets the criteria for probable CCHF, begin isolation precautions, alert health facility staff, report the case immediately, draw blood samples for CCHF diagnostic confirmation and start treatment protocol below without waiting for confirmation. Patients with probable or confirmed CCHF should be isolated and cared for using barrier-nursing techniques – masks, goggles, gloves, gowns and proper removal and disposal of contaminated articles.

Treatment Protocol

General supportive therapy is the mainstay of patient management in CCHF. Intensive monitoring to guide volume and blood component replacement is recommended. If the patient meets the case definition for probable CCHF, oral ribavirin treatment protocol needs to be initiated immediately with the consent of the patient/ relatives and strictly in consultation with the attending physician.

Oral Ribavirin: 2 gm loading dose

4 gm/day in 4 divided doses (8 hourly) for 6 days

2 gm/day in 4 divided doses for 6 days

Please note that pregnancy should be absolutely prevented (whether female or male partner is victim) within six months of completing a course of ribavirin.

Prophylaxis Protocol

- In case of known direct contact with the blood or secretions of a probable or confirmed case such as needle stick injury or contact with mucous membranes such as eye or mouth, <u>do baseline blood studies</u> and then start the person on the ribavirin protocol above in consultation with physician.
- Household or other contacts of the case who may have had the same exposure to infected ticks or animals, or who recall indirect contact with case body fluids should be monitored for 14 days from the date of last contact with the patient or other source of infection by taking the temperature twice daily. If the patient develops a temperature of 38.5° C or greater, headache and muscle pains, he/she would be considered a probable case and should be admitted to hospital and started on ribavirin treatment as mentioned above.
- Prophylactic administration of oral ribavirin to high risk contacts (having direct exposure to body fluids) of CCHF patients is NOT recommended.

Methods of control:

a) Preventive measures:

1. Educate public about the mode of transmission through tick bites, handling ticks and handling and butchering animals and the means for personal protection.
2. Tick control with acaricide (chemicals intended to kill ticks) is a realistic option for well-managed livestock production facilities. Animal dipping in an insecticide solution is recommended.
3. Avoid tick-infested areas when feasible. To minimize exposure, wear light colored clothing covering legs and arms.
4. Persons who work with animals in the endemic areas should take practical measures to protect themselves. They include the use of repellents on the skin (e.g. DEET) and clothing (e.g. permethrin) to prevent tick bites and wearing gloves or other protective clothing to prevent skin contact with infected tissues or blood.
5. In case of death of CCHF patient, family should be informed to follow safe burial practices. Please see EIC Publication: Guidelines for Management, Prevention and Control of CCHF.
6. Hospitals should maintain stock of Ribavirin.
7. Bio-safety is the key to avoid nosocomial infection. Patients with suspected or confirmed CCHF should be **<u>isolated</u>** and cared for using barrier-nursing techniques to prevent transmission of infection to health workers. Please see EIC Publication: Guidelines for Management, Prevention and Control of CCHF.
8. Persons living in endemic areas should use personal protective measures that include:

- Avoidance of areas where tick vectors are abundant, especially when they are active (spring to fall);

- Regular examination of clothing and skin for ticks, and their removal (without crushing them);
- Use of repellents: these can be used on the skin, e.g. DEET (N,N-diethyl-mtoluamide) and clothing, e.g. permethrin
- Other measures, such as wearing gloves or other protective clothing to prevent skin contact with infected tissue or blood may be taken by persons who work with livestock or other animals in endemic areas.

Dengue Fever Classical and Haemorrhagic

Introduction:

Dengue is a viral disease transmitted by the bite of Aedes aegypti or Aedes albupictus mosquitoes having with any one of the four dengue viruses causing high-grade fever, body aches and a rash on first infection, but seldom causes death.

Dengue hemorrhagic fever (DHF) is a potentially deadly complication in about 1-3% of cases that begin with a sudden rise in temperature which usually continues for two to seven days and can be as high as 40-41°C. In moderate

DHF cases, all signs and symptoms abate after the fever subsides.

It occurs in tropical and sub-tropical areas of the world. Symptoms appear 3—14 days (average 5–7 days) after the infective bite. Dengue fever is a febrile illness that affects infants, young children and adults. Once unknown is now endemic in Pakistan since 2006.

In severe cases, the patient's condition may suddenly deteriorate after a few days of fever when the temperature drops, followed by signs of circulatory failure. With modern intensive supportive therapy, the fatality rates can be reduced to less than 1%. History of infection with one serotype increases susceptibility for hemorrhagic complications when exposed to another serotype.

Infectious Agent:

Flavivirus group

Mode of transmission:

Bite of infective mosquitoes, principally Aedes aegypti (day biting species)

Incubation period:

Incubation period is 5-7 days after the mosquito bite.

Alert Threshold:

One probable case is an alert and requires an immediate investigation.

Outbreak threshold

One confirmed case is an outbreak

Case Definition:

Suspected case:

Any person with acute febrile illness of two to seven days duration AND two or more of the following symptoms: Headache, retro-orbital pain, myalgia, arthralgia, rash, haemorrhagic manifestations and leucopoenia.

Probable Case:

Any suspected case, which occurs in an area where an outbreak of Dengue exists, with laboratory-confirmed cases and presence of the vector.

Confirmed Case:

Any suspected case confirmed by laboratory isolation of the virus or by the IgM-ELISA test OR by detection of viral nucleic acid by PCR.

Probable Dengue Haemorrhagic Fever:

A probable or confirmed case of dengue AND any two of the following: thrombocytopenia less than 100,000 /mm^3, petechial or purpuric rash, epistaxis, haematemesis, haemoptysis, blood in stools, ecchymosis, gum bleeding, other haemorrhagic symptom - AND no known predisposing host factors for haemorrhagic manifestations.

Specimen Collection:

- Collect 5 ml of blood 5 days after onset of fever and separate serum for analysis after centrifuge.
- Transport serum specimens along with complete lab request form with brief history of the patient.

Management:

1. Supportive treatment- there is no specific therapeutic agent.
2. Patient should rest and take only paracetamol for fever or pain. No aspirin or other NSAIDS.
3. Patient should take large amounts of fluids (water, soups, milk and juices) along with the patient's normal diet
4. Patient should immediately consult physician if any of the following manifestations appear:
5. * Red spots or points on the skin; bleeding from the nose or gums; frequent vomiting; vomiting with blood; black stools; sleepiness; constant crying; abdominal pain; excessive thirst (dry mouth); pale, cold or clammy skin; or difficulty in breathing.

6. In the hospital, supportive therapy with intensive monitoring to guide volume and blood component replacement is recommended with use of platelets only in case of active bleeding.
7. Investigate contacts - determine place of residence of patient for 2 weeks before onset of illness.

Prevention:

At present, the only method of controlling or preventing dengue virus transmission is to combat the vector mosquitoes, *Aedes aegypti* breeds primarily in man-made containers like earthenware jars, metal drums and concrete cisterns used for domestic water storage, as well as discarded plastic food containers, used automobile tyres and other items that collect rainwater. Details are as under:

1. Proper solid waste disposal and improved water storage practices, including covering containers to prevent access by egg-laying female mosquitoes are among methods that are encouraged through community-based programs.
2. Protect against day biting mosquitoes including use of screening, protective clothing and repellents.
3. Conduct community survey to determine density of vector mosquitoes and identify and destroy mosquito larval habitats and breeding sites such as old tyres, old water containers, etc.
4. Indoor residual spray in urban and peri-urban high-risk areas at least one month before transmission period, and thermal fogging in case of outbreaks.
5. Community- based environmental management and health education campaign for improved water storage practices to remove mosquito breeding sites and to protect families from mosquito bites.

Diphtheria

Introduction

Diphtheria is caused by the bacterium Corynebacterium diphtheriae. This germ produces a toxin that can harm or destroy human body tissues and organs.

It is an infectious disease spreading from person to person by respiratory droplets from the throat through coughing and sneezing. The disease normally breaks out 2 to 5 days after infection. Diphtheria usually affects the tonsils, pharynx, larynx and occasionally the skin.

Diphtheria affects the throat and sometimes the tonsils. Diphtheria affects people of all ages, but most often it strikes unimmunized children. In temperate climates, diphtheria tends to occur during the colder months.

Symptoms range from a moderately sore throat to toxic life-threatening diphtheria of the larynx or of the lower and upper respiratory tracts. Diphtheria is often complicated by diphtheric myocarditis (toxic damage to heart muscles) and neuritis (toxic damage to peripheral nerves). The disease can be fatal - between 5% and 10% of diphtheria patients die, even if properly treated. Untreated, the disease claims even more lives. Untreated patients are infectious for 2 to 3 weeks.

Infectious agent:

Bacterium: *Corynebacterium diphtheriae*

Mode of transmission:

Contact (usually direct, rarely indirect) with the respiratory droplets of a case or carrier; or In rare cases, the disease may be transmitted though foodstuffs (raw milk has served as a vehicle).

Incubation period:

Usually 2-5 days, occasionally longer.

Period of communicability:

Until virulent bacilli have disappeared from discharges and lesions: usually 2 weeks or less and seldom more than 4 weeks. The disease is usually not contagious 48 hours after antibiotics are instituted.

Seasonality:

Throughout the year; higher incidence in cold months

Risk Factors:

Crowded conditions facilitate transmission and large-scale movements of non-immunized populations.

Alert Threshold:

One suspected, probable or confirmed case is an alert and requires an immediate investigation.

Outbreak threshold

One confirmed case is an outbreak

Case Definition:

Probable case:

Probable Case is an illness characterized by an adherent membrane on the tonsils, pharynx and/or nose and any one of the following: laryngitis, pharyngitis or tonsillitis.

Confirmed case:

A confirmed case is a probable case who has been laboratory confirmed or linked epidemiologically to a laboratory confirmed case

At least one of the following criteria is used for diagnosing a confirmed case:

- The isolation of Corynebacterium diphtheria from a clinical specimen; OR
- A fourfold or greater rise in serum antibody (but only if both serum samples were obtained before the administration of diphtheria toxoid or antitioxin)

Note: Asymptomatic persons with positive C diphtheria cultures (i.e. asymptomatic carriers) should not be reported as probable or confirmed diphtheria cases.

Carrier: presence of *C. diphtheriae* in nasopharynx, no symptoms.

Specimen Collection:

- Collect nasopharyngeal samples by using alginate swabs and throat culture by using cotton swabs.
- Collect 5ml of clotted blood or serum (acute and convalescent phase) for serological diagnosis.
- Transport in routine bacteriological transport media (Amies transport medium).

Case Management:

Diphtheria antitoxin and antibiotic therapy are the cornerstone of therapy for

Diphtheria:

- The antibodies only neutralize toxin before its entry into cells, and is therefore critical that diphtheria antitoxin be administered as soon as a presumptive diagnosis has been made.
- Antibiotic therapy, by killing the organism, has three benefits:
  - ➢ The termination of toxin production
  - ➢ Amelioration of the local infection
  - ➢ Prevention of spread of the organism to uninfected persons

Patients:

- Do not wait for laboratory results before starting treatment/ control activities.
- Diphtheria antitoxin I/M (20 000 to 100 000 units) in a single dose, immediately after throat swabs have been taken; **plus** Procaine penicillin G I/M (25 000 to 50 000 units/kg/day for children; 1 200 000 units/kg/day for adults in 2 divided doses) or parenteral erythromycin (40-50 mg/kg/d with a maximum of 2 g/d) until the patient can swallow; **then**;
- Oral penicillin V (125-250 mg) in 4 doses a day, or erythromycin (40-50 mg/kg/day) in divided doses. Antibiotic treatment should be continued for total of 14 days.
- Note: Clinical diphtheria does not necessarily confer natural immunity, and patients should thus be vaccinated before discharge from a health facility with either primary or booster doses.
- Treatment consists of immediate administration of diphtheria antitoxin and antibiotics.
- Antibiotic treatment usually renders patients non-infectious within 24 hours.
- Unless immunized, children and adults may repeatedly be infected with the disease.

Contacts:

- All close contacts, regardless of vaccination status, should have nose and throat cultures, receive a single dose of benzathine penicillin I/M (600,000 units for children <6; 1.2 million units for 6 or older) or a 7-10 days course of erythromycin (PO) and remain under surveillance for 7 days.
- Those who handle milk or work with school children should remain at home until culture results are available.
- If cultures are positive, give antibiotics as above.

Carriers

- All must receive a single dose of benzathine penicillin G i.m. (600,000 units for children < 6; 1.2 million units for 6 or older).

Prevention and control Measures:

Routine immunization consists of 3 doses of 0.5 ml DPT-HepB-Hib administered IM to children under one year of age with the schedule of: 1st dose at the age of 6 weeks; 2nd at 10 weeks; 3rd at 14 weeks.

Epidemic Control:

- If children in outbreak area are unimmunized, immunize the age groups that are most affected and at highest risk.
- DPT can be given up to age 7 years. For older children, Td vaccine can be used.
- Repeat immunization campaign one month later to provide at least two doses to recipients.
- Ensure safety of injection during immunization with auto destroyable syringes and safety boxes. Safe disposal of used sharps should be ensured

Acute Viral Hepatitis

Introduction:

Hepatitis A and E are major causes of outbreaks and sporadic cases of viral-infections, caused by ingestion of contaminated food or water. Hepatitis A occurs sporadically and in epidemics worldwide, with a tendency for cyclic recurrences. The course of hepatitis E in pregnancy may be fulminating. Hepatitis B, C and D usually occur as a result of parenteral contact with infected body fluids (e.g. from blood transfusions or invasive medical procedures using contaminated equipment). Hepatitis B is also transmitted by sexual contact.

The symptoms of hepatitis include jaundice (yellowing of the skin and eyes), dark urine, extreme fatigue, nausea, vomiting and abdominal pain.

Infectious agent:

Hepatitis is an inflammation of the liver, most commonly caused by a viral infection. There are five main hepatitis viruses, referred to as types A, B, C, D and E.

Hepatitis A is caused by infection with the hepatitis A virus (HAV), a nonenveloped, positive stranded RNA virus, first identified by electron microscopy in 1973, classified within the genus hepatovirus of the picornavirus family. Hepatitis B is caused by HBV an enveloped virus containing a partially double strand, circular DNA genome, and classified within the family hepadnavirus. Hepatitis C is caused by infection with the hepatitis C *virus* (HCV), an enveloped, single stranded, positive sense RNA virus.

Hepatitis D or Delta Hepatitis is caused by the Hepatitis Delta Virus (HDV), a defective RNA virus. Hepatitis E is caused by infection with the hepatitis E virus (HEV), a nonenveloped, positive-sense, singlestranded

RNA virus.

Mode of transmission:

Hepatitis A

Hepatitis A is a viral liver disease that can cause mild to severe illness. It is spread by faecal-oral (or stool to mouth) transmission when a person ingests food or drink contaminated by an infected person's stool.

The disease is closely associated with poor sanitation and a lack of personal hygiene habits such as hand-washing, usually occurring in overcrowded settings. An estimated 1.4 million cases of hepatitis A occur annually.

Improved sanitation and the Hepatitis A vaccine are the most effective ways to combat the disease.

Hepatitis E (HEV)

HEV is a waterborne disease caused by infection with the hepatitis E virus, a non-enveloped, positive-sense, single-stranded RNA virus.The virus is transmitted by faecal-oral route similar to hepatitis A with faecally contaminated drinking water or food supplies being the usual vehicle.

Hepatitis E is generally a self-limiting viral infection followed by recovery; it causes acute sporadic and epidemic viral hepatitis.

Symptomatic HEV infection is most common in young adults aged 15-40 years. Although HEV infection is frequent in children, it is mostly asymptomatic or causes a very mild illness without jaundice (anicteric) that goes undiagnosed. Fulminate hepatitis occurs more frequently in pregnancy and regularly induces a mortality rate of 20% among pregnant women in the 3rd trimester.It may also cause abortion, premature delivery, or death of a live-born baby soon after birth.

The risk factors for HEV infection are related to poor sanitation in large areas especially where faecal contamination of drinking water is common due to HEV shedding in faeces. Person-to-person transmission is uncommon. There is no evidence for sexual transmission or for transmission by transfusion. Prolonged viraemia or faecal shedding is unusual and chronic infection does not occur.

There is a possibility of zoonotic spread of the virus, since several non-human primates, pigs, cows, sheep, goats and rodents are susceptible to infection.

Hepatitis B virus (HBV)

- HBV is transmitted by through contact with the blood or other body fluids of an infected person - not through casual contact, transmitted in the same way as human immunodeficiency virus (HIV). Modes of transmission for Hepatitis B virus are vertical (from mother to baby at the time of delivery); unsafe injections (use and re-use of un-sterilized needles/syringes/drips etc.); blood transfusions, and sexual or household contact with an infected person. The hepatitis B virus is 50 to 100 times more infectious than HIV. Unlike HIV HBV can survive outside the body for at least 7 days. Chronic infection develops in about 90% of infants infected during the first year of life and 40% of children infected between 1 to 4 years of age. In Pakistan HBV is endemic and is one of the major causes of chronic hepatitis, liver cirrhosis and liver cancer.
- Hepatitis D virus (HDV) mechanisms of transmission are similar to those of hepatitis B virus. HDV affects only those who have hepatitis B virus either as co-infection or super-infection of HBV and increases risk of severe acute disease and progression to chronic hepatitis.

- Hepatitis C virus (HCV) is transmitted primarily by direct contact with human blood through un-screened transfusions, re-use of inadequately sterilized needles, syringes or other medical equipment, or through needle-sharing among drug-users. Sexual and perinatal transmission may also occur, although less frequently as compared to HBV. In Pakistan HCV is also endemic in some areas and contributes to chronic hepatitis, liver cirrhosis and primary liver cancer.

All of the hepatitis viruses can cause an acute disease with symptoms lasting several weeks including yellowness of the skin and eyes (jaundice); darker colour of urine; extreme fatigue; nausea; vomiting and abdominal pain. It can take several months to a year for a patient to feel fit again.

Incubation period:

Hepatitis A (15 to 50 days, average 30 days), Hepatitis B (45 to 180 days, average 75 days, as short as 2 weeks to the appearance of HbsAg), Hepatitis C (2 weeks to 6 months, most commonly within 2 months), Hepatitis D (approximately 2-10 weeks) and the incubation period of HEV ranges from 3 to 8 weeks, with a mean of 40 days.

Alert Threshold:

A cluster of 3-5 cases in one location is an alert and requires investigation.

Outbreak threshold

A cluster of 8-10 cases in one location is an outbreak

Case Fatality Rate (CFR)

CFR of HEV ranges between 0.5% - 4.0%.

Case Definition

(Clinical description)

Suspected case viral hepatitis syndrome:

An acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness. Biological signs include increased urine urobilonogen and >2.5 times the upper limit of serum alanine aminotransferase

Note: Most infections occur during early childhood. A variable proportion of adult infections are asymptomatic.

Case classification

Suspected: A case that is compatible with the clinical description

Confirmed: (For Hepatitis A only) A suspected case that is laboratory-confirmed **or**, for hepatitis A only, a case compatible with the clinical description in a person who has an epidemiological link (i.e. household or sexual contact with an infected person during the 15-50 days before the onset of symptoms) with a laboratory-confirmed case of hepatitis A.

Confirmed case:

A suspected case that meets the clinical case definition AND is laboratory confirmed for:

Laboratory criteria for diagnosis

- **Hepatitis A:** positive for IgM anti-HAV
- **Hepatitis B:** positive for IgM anti-HBc or (less desirably) hepatitis B surface antigen (HBsAg)
- **Non-A, non-B:** negative for IgM anti-HAV and IgM anti-HBc or (less desirably) HBsAg

  Note: The anti-HBc IgM test, specific for acute infection, is not available in most countries. HBsAg is often available but is less desirable since it cannot distinguish acute new infections from exacerbation of chronic hepatitis B. Nevertheless, continued HBsAg seropositivity (> six months) is an indicator of chronic infection. For patients with non-A, non-B, the following testing is used for a diagnosis of acute hepatitis C, D or E
- **Hepatitis C:** positive for anti-HCV
- **Hepatitis D:** positive for IgM anti-HBc or (less desirably) HBsAg plus anti-HDV positive (N.B. only occurs as co-infection or superinfection of hepatitis B)
- **Hepatitis E:** positive for IgM anti-HEV. Hepatitis E diagnosis is made by blood tests which detect elevated antibody levels of specific antibodies to hepatitis E in the body or by reverse transcriptase polymerase chain reaction (RT-PCR). Unfortunately, such tests are not widely available. Hepatitis E should be suspected in outbreaks of waterborne hepatitis occurring in underdeveloped areas with poor sanitation, especially if the disease is more severe in pregnant women, or if hepatitis A has been excluded.

Surveillance and control

Surveillance and control procedures should include

- provision of safe drinking water and proper disposal of sanitary waste
- monitoring disease incidence

- determination of source of infection and mode of transmission by epidemiologic investigation
- detection of outbreaks
- spread containment

Vaccines

At present, no commercially available vaccines exist for the prevention of hepatitis E. However, several studies for the development of an effective vaccine against hepatitis E are in progress.

Specimen Collection:

- Collect 5 ml blood during acute phase of illness observing all safety precautions.
- Separate serum by centrifugation technique or keep the blood sample refrigerated until the clot is formed and retracted completely. Separate serum in a tube.
- Transport serum specimens either refrigerated (for serology) or frozen (for antigen detection by PCR) with complete lab request form. Specimens can be refrigerated by placing them in an insulated box with ice or frozen refrigerant packs. Frozen specimens can be kept frozen by shipping them on dry ice.
- Batch the specimens and send by overnight mail.

Management:

There is no specific management for acute uncomplicated hepatitis but general supportive measures can be helpful in the earlier recovery of the disease like bed rest, fluid replacement, nutritional support etc. It is also important to avoid all the hepatotoxic drugs during the illness. Alpha interferon and Lamivudine are available therapeutic options for patients with chronic hepatitis B and C. However, it is important to note that the management of chronic hepatitis requires specialist consultation.

Prevention:

Hepatitis A and E:

Surveillance and control procedures should include the following:

- provision of safe drinking water and proper disposal of sanitary waste
- monitoring disease incidence
- determination of source of infection and mode of transmission by epidemiologic investigation
- detection of outbreaks
- spread containment

- While no vaccine is available yet against Hepatitis E, an effective inactivated hepatitis A vaccine is available both for adults and children aged 2 years or older. The vaccine is administered I/M with a recommended vaccination schedule of 0, 1, and 6-12 months.
- As almost all HAV and HEV infections are spread by the faecal-oral route, good personal hygiene including frequent and proper hand washing after bowel practices and before food preparation, avoiding drinking water and/or ice of unknown purity and avoiding eating uncooked fruits or vegetables that are not peeled, high quality standards for public water supplies and proper disposal of sanitary waste are important measures to reduce the risk of disease transmission. For HAV post-exposure prophylaxis of non-vaccinated people, the passive administration of IG can modify the symptoms of infection, provided it is given within 2 weeks of exposure.

Treatment for Hepatitis E

As no specific therapy is capable of altering the course of acute hepatitis E infection, prevention is the most effective approach against the disease. Hospitalization is required for fulminant hepatitis and should be considered for infected pregnant women.

Prevention of Hepatitis B, C and D:

- Hepatitis B virus has become a vaccine-preventable disease, vaccine against hepatitis B has been available since 1982. Hepatitis B vaccine is 95% effective in preventing HBV infection and its chronic consequences, and is the first vaccine against a major human cancer. Both serum-derived and recombinant hepatitis B vaccines are safe and immunogenic. This vaccine is available in Pakistan as an integral part of the EPI schedule, with a standard of administration as follows: three doses administered I/M to the infant concurrently with DPT vaccination at weeks 6, 10 and 14. This schedule is consistent with the insignificant risk of perinatal transmission in the country.
- No vaccines exist against HCV or HDV; however, vaccination against HBV of patients who are not chronic HBV carriers also provide protection against HDV infection. All measures aimed at preventing the transmission of HBV will prevent the transmission of hepatitis D and HBV-HDV co-infection or super infection.
- For the prevention of HBV and HCV, implement and maintain infection control practices in health care settings, including appropriate sterilization of medical and dental equipment, screening and testing of blood and organ donors, and virus inactivation of plasma derived products; promote behaviour change among the general public

and health care workers to reduce overuse of injections, use safe injection practices and build public awareness for safe and protected sex. HBV, HDV and HCV are not spread by contaminated food or water, and cannot be spread casually in the workplace.

- For post-exposure prophylaxis or suspected perinatal transmission, Hepatitis B Immune Globulin (HBIG) 0.5 ml I/M is effective, followed by vaccine 1 and 6 months later.

Comment

Persons who have chronic hepatitis should not be reported as having acute viral hepatitis unless they have evidence of an acute illness compatible with viral hepatitis (with the exception of perinatal hepatitis B infection). Up to 20% of acute hepatitis C cases will be anti-HCV negative when reported and will be classified as non-A, non-B hepatitis because some have not yet sero-converted and others remain negative even with prolonged follow-up. Available serologic tests for anti-HCV do not distinguish between acute and chronic or past infection. Thus, other causes of acute hepatitis should be excluded for anti-HCV positive patients who have an acute illness compatible with viral hepatitis.

Human Immunodeficiency Virus (HIV)

Infectious Agent:

Human Immunodeficiency Virus (HIV). Two types have been identified: HIV-1 and HIV-2, with similar epidemiological characteristics. HIV-2 is less pathogenic than HIV-1.

Mode of transmission:

Sexual intercourse (vaginal or anal) with an infected partner, especially in presence of a concurrent ulcerative or non-ulcerative Sexually Transmitted Infection (STI); or

- Contaminated needles, injecting drug users, syringes, other injecting equipment and injecting solutions (contamination often occurs when drug solutions are mixed or when multiple users draw up solutions from a single container); or
- Transfusion of infected blood or blood products; or
- Infected mother to her child during pregnancy, labour and delivery or through breastfeeding

Incubation period:

Variable. On average, time from HIV infection to clinical AIDS is 8 to 10 years, though AIDS may be manifested in less than 2 years or be delayed in onset beyond 10 years.

Incubation times are shortened in resource poor settings and in older patients. They can be prolonged by provision of primary prophylaxis for opportunistic infections or antiretroviral treatment.

Alert Threshold

One suspected case must be investigated

Risk Factors

- Overcrowding
- War and population movement that can erode traditional values, social ties and coping strategies. This can result in higher risk sexual behaviour which increases risk of HIV spread.
- Influence illicit drug trafficking and drug use, increasing risk of HIV transmission through injecting drug use.
- Poverty, food shortage
- Sexual Violence
- Sex Work
- Injecting drug use
- Un-safe blood transfusions
- Long route truck drivers

Case Definition:

Acquired Immunodeficiency Syndrome (AIDS) is the late clinical stage of HIV infection, defined as an illness characterised by one or more indicator diseases.

Suspected case:

Not applicable.

WHO Staging System for HIV Infection and Disease in Adults and Adolescents

Stage 1

1. Asymptomatic

2. Persistent generalized lymphadenopathy (PGL)

Performance Scale 1: *asymptomatic, normal activity*

Stage 2

3. Weight loss, <10% of body weight

4. Minor mucocutaneous manifestations (seborrheic dermatitis, prurigo, fungal nail infections, recurrent oral ulcerations, angular cheilitis)

5. Herpes zoster within the last 5 years

6. Recurrent upper respiratory tract infections (e.g. bacterial sinusitis)

And/or Performance Scale 2: *symptomatic, normal activity*

Stage 3

7. Weight loss, >10% of body weight

8. Unexplained chronic diarrhoea, >1 month

9. Unexplained prolonged fever (intermittent or constant), >1 month

10. Oral candidiasis (thrush)

11. Oral hairy leukoplakia

12. Pulmonary tuberculosis within the past year

13. Severe bacterial infections (i.e. pneumonia, pyomyositis)

And/or Performance Scale 3: *bedridden, <50% of the day during the last month*

Stage 4

14. HIV wasting syndrome, as defined by the Centers for Disease Control and

Prevention (CDC)[a]

15. *Pneumocystis carinii* pneumonia

16. Toxoplasmosis of the brain

17. Cryptosporidiosis with diarrhoea >1 month

18. Cryptococcosis, extrapulmonary

19. Cytomegalovirus (CMV) disease of an organ other than liver, spleen or lymph nodes

20. Herpes simplex virus (HSV) infection, mucocutaneous >1 month, or visceral any duration

21. Progressive multifocal leucoencephalopathy (PML)

22. Any disseminated endemic mycosis (e.g. histoplasmosis, coccidiomycosis)

23. Candidiasis of the oesophagus, trachea, bronchi or lungs

24. Atypical mycobacteriosis, disseminated

25. Non-typhoid Salmonella septicaemia

26. Extrapulmonary tuberculosis

27. Lymphoma

28. Kaposi's sarcoma

29. HIV encephalopathy, as defined by the Centers for Disease Control and

Prevention (CDC)[b]

And/or Performance Scale 4: *bedridden, >50% of the day during the last month.*

Note: both definitive and presumptive diagnoses are acceptable

(a) **HIV wasting syndrome:** weight loss of >10% of body weight, **plus either** unexplained chronic diarrhoea (>1 month), **or** chronic weakness and unexplained prolonged fever (>1 month).

(b) HIV encephalopathy: clinical finding of disabling cognitive and/or motor dysfunction interfering with activities of daily living, progressing over weeks to month, in the absence of a concurrent illness or condition other than HIV infection that could explain the findings.

Expanded WHO case definition for AIDS surveillance*

An adult or adolescent (>12 years of age) is considered to have AIDS if a test for HIV antibody gives a positive result, and one or more of the following conditions are present:

- >10% body weight loss or cachexia, with diarrhoea or fever, or both, intermittent or constant, for at least 1 month, not known to be due to a condition unrelated to HIV
- Cryptococcal meningitis
- Pulmonary or extrapulmonary tuberculosis
- Kaposi's sarcoma
- Neurological impairment that is sufficient to prevent independent daily activities, not known to be due to a condition unrelated to HIV infection (e.g.

trauma or cerebrovascular accident)

- Candidiasis of the oesophagus (which may be presumptively diagnosed based on the presence of oral candidiasis accompanied by dysphagia)
- Clinically diagnosed life threatening or recurrent episodes of pneumonia, with or without aetiological confirmation
- Invasive cervical cancer

** WHO. Weekly Epidemiological Record. 1994. 69:273-275.*

Note: Sentinel sites should focus on testing high risk groups which include patients seeking treatment for sexually transmitted diseases, users of intravenous drugs, commercial sex workers seeking health treatment, etc. Cases suspected at first level care facility should be referred to second level care facility for confirmation.

Confirmed case:

As mentioned the case is confirmed by the lab diagnosis.

Laboratory evidence of HIV

- This is most commonly done by detecting HIV antibody in serum samples using enzyme-linked immunoassay (ELISA or EIA). When this test is positive, it must be confirmed with another test of higher specificity such as the Western blot, the indirect fluorescent antibody (IFA) test or a second ELISA test that is methodologically and/or antigenically independent
- The rapid tests, which are recommended by WHO, have been evaluated at WHO collaborating centres and have levels of sensitivity and specificity comparable to WHO recommended ELISA tests. The use of rapid HIV tests may afford several advantages in emergency and disaster settings including :
  - ➢ Rapid tests that do not require refrigeration will be more suitable for remote and rural areas and sites without a guaranteed electricity supply. Long shelf life is also important especially for remote areas and sites performing smaller numbers of tests
  - ➢ Many rapid tests require no laboratory equipment and can be performed in settings where electrical and water supplies need not be guaranteed
  - ➢ Rapid tests can detect HIV antibodies in whole blood (finger prick samples) as well as serum/plasma and testing therefore may be performed by non-laboratory personnel with adequate training and supervision.

Specimen Collection:

- Collect 5ml blood/serum sample observing all safety precautions.
- For sero-diagnosis the specimen can be refrigerated at 4^{o}C and transported to lab.
- For antigen detection by PCR samples should immediately be freezed if delay is anticipated.
- Transport specimens with complete lab request form and Biohazard label and send by overnight mail.

Management:

- In case of a confirmed case with HIV infection or AIDS provide high quality care and support to all people living with HIV/AIDS (PLHA) that includes counseling, psychosocial support, treatment for opportunistic infections (e.g. TB), palliative care and access to antiretroviral therapy where feasible
- Support PLHA to live normal and productive lives that are free of stigmatization and discrimination

Prevention:

Reduce sexual and mother-to-child transmission

- *Awareness and life skills education*, especially youth modifying the risk behaviours of persons in the community through “behaviour change communication” (BCC)., ensuring that all people are well informed of what does, and does not, constitute a mode of transmission; of how and where to acquire free condoms and medical attention if necessary; and information on basic hygiene.
- *Condom promotion* which would ensure that good-quality condoms are available to those who need them, using culturally sensitive instructions and distribution.
- *STI control*, including for sex workers, using the syndromic STI management approach, with partner notification and promotion of safer sex
- Reduce mother-to-child transmission of HIV by **:**
  - ○ The primary prevention of HIV among women, especially young women
  - ○ Avoiding unintended pregnancies among HIV infected women and promoting family planning methods, particularly in women who are infected with HIV
  - ○ Preventing the transmission of HIV from infected pregnant women to their infants by:
    - ➢ Using an antiretroviral prophylaxis regimen;
    - ➢ Avoiding unnecessary obstetrical invasive procedures, such as artificial rupture of membranes or episiotomy; and
    - ➢ Modifying infant feeding practices (replacement feeding given with a cup when acceptable, feasible, affordable, sustainable and safe. Otherwise exclusive breastfeeding for the first months of life is recommended)

Blood safety

- HIV testing of all transfused blood

- Avoid non-essential blood transfusion
- Recruitment of safe blood donor pool

Prevention among injecting drug users

- Ready access to sterile needles, syringes and other injecting equipment (and disposal of used equipment)
- HIV risk reduction education and counselling for injecting drug users (including peer outreach when possible)
- Drug dependence treatment services, including substitution treatment (e.g. methadone) where possible
- Access to STI and HIV/AIDS treatment for injecting drug users

Universal precautions

- Washing hands thoroughly with soap and water, especially after contact with body fluids or wounds
- Using protective gloves and clothing when there is risk of contact with blood or other potentially infected body fluids
- Safe handling and disposing of waste material, needles, and other sharp instruments. Properly cleaning and disinfecting medical instruments between patients

Physical protection

- The protection of the most vulnerable, especially women and children, from violence and abuse is not only an important principle of human rights but is also essential for reducing the risk of HIV infection

Protecting Health Care Workers

- In order to reduce nosocomial transmission, health workers should strictly adhere to Universal Precautions with all patients and laboratory samples - whether or not known to be infected with HIV.
- Health care workers should have access to voluntary counselling, testing and care. Often health workers deployed in complex emergencies experience significant occupational stress and those tested, as part of the management of occupational exposures, will require additional support.

Counselling and voluntary testing programs

The establishment of voluntary testing and counselling services to help

individuals make informed decisions on HIV testing should be considered when relative stability is restored. Often refugees are coerced into testing, or are required to make decision with regard to testing when they are suffering acute or post traumatic stress disorders

- As refugees are often tested prior to resettlement in other countries, it is critical that they receive counselling on the legal and social implications of the test. Often migration or temporary residency status is contingent on the applicant having HIV antibody seronegative status
- Post-test counselling is essential for both seronegative and seropositive results. Refugees and conflict survivors who are already traumatized will require additional psychosocial support if they test seropositive. Typically the support networks of displaced persons are disrupted and suicide risk assessment forms an important part of post-test counselling in a refugee or conflict context.
- Testing of orphaned minors should be done with the consent of their official guardians only where there is an immediate health concern or benefit to the child. There should be no mandatory screening prior to admittance to substitute care

Immunization

- Asymptomatic HIV-infected children should be immunized with the EPI vaccines.
- Symptomatic HIV-infected children should NOT receive BCG .

Influenza (Seasonal)

Introduction

Influenza is an acute viral infection and is a serious public health problem that causes severe illnesses and deaths for higher risk populations. Influenza circulates worldwide and can affect anybody in any age group. Influenza is a viral infection that affects mainly the nose, throat, bronchi and, occasionally, lungs. Infection usually lasts for about a week, and is characterized by sudden onset of high fever, aching muscles, headache and severe malaise, non-productive cough, sore throat and rhinitis.

The virus is transmitted easily from person to person via droplets and small particles produced when infected people cough or sneeze. Influenza tends to spread rapidly in seasonal epidemics.

Most infected people recover within one to two weeks without requiring medical treatment. However, in the very young, the elderly, and those with other serious medical conditions, infection can lead to severe complications of the underlying condition, pneumonia and death. An epidemic can take an economic toll through lost workforce productivity, and strain health services.

Types

Seasonal influenza is an acute viral infection caused by an influenza virus.

There are three types of seasonal influenza – A, B and C. Type A influenza viruses are further typed into subtypes according to different kinds and combinations of virus surface proteins. Among many subtypes of influenza A viruses, currently influenza A(H1N1) and A(H3N2) subtypes are circulating among humans. Influenza viruses circulate in every part of the world. Type C influenza cases occur much less frequently than A and B. That is why only influenza A and B viruses are included in seasonal influenza vaccines.

Infectious Agent:

Myxovirus group (Influenza virus) type A, B and C.

Mode of transmission:

Inhaling infected droplets from the air; spreads from person to person.

Incubation period:

24-28 hours.

Transmission

Seasonal influenza spreads easily and can sweep through schools, nursing homes or businesses and towns. When an infected person coughs, infected droplets get into the air and another person can breathe them in and be exposed. The virus can also be spread by hands infected with the virus. To prevent transmission, people should cover their mouth and nose with a tissue when coughing, and wash their hands regularly.

Alert Threshold:

One suspected case is an alert and requires an immediate investigation.

Outbreak threshold

One confirmed case is an outbreak.

Seasonality

Influenza causes annual epidemics that peak during winter in temperate regions. Influenza epidemics occur yearly during autumn and winter in temperate regions. Illnesses result in hospitalizations and deaths mainly among high-risk groups (the very young, elderly or chronically ill). Most deaths associated with influenza occur among people age 65 or older. In some tropical countries, influenza viruses circulate throughout the year with one or two peaks during rainy seasons.

Case Definition:

Suspected Case:

Any person with sudden onset of fever greater than 39ºCentigrade, AND sore throat or cough in the absence of another known cause. Headache, myalgias, and prostration are often present.

Confirmed Case:

Any suspected case with laboratory confirmation by isolation of virus in culture, by IFAT or by serologic test demonstrating a rise in specific antibody titer.

Clinical Presentation

Seasonal influenza is characterized by a sudden onset of high fever, cough (usually dry), headache, muscle and joint pain, severe malaise (feeling unwell), sore throat and runny nose. Most people recover from fever and other symptoms within a week without requiring medical attention.

Specimen Collection:

- Collect throat and nasal swabs and nasopharyngeal aspirates from patient and tracheal aspirate or broncho-alveolar lavage fluid from intubated patients place immediately in Viral Transport Medium (VTM).
- Collect 5ml blood or serum for serology (acute and convalescent if possible).
- Transport specimens' bottles and tubes in upright position and secured in a screw cap container or in a rack in a transport box having enough absorbent paper around them to soak up all the liquid in case of spillage.
- Sample for virus isolation collected in VTM can be taken to lab within 4 days, kept at +4oC and frozen at -70oC on arrival in lab if stored.
- In the absence of freezers or VTM, ethanol preserved swabs are a possible alternative. Storage of such specimens at 4^{o}C (in a standard refrigerator) is better than at room temperature.
- Blood/serum samples should be frozen at -70^{o}C for PCR and at -20^{o}C or lower for antibody determination but can also be stored at +4^{o}C for about one week.
- Specimens for influenza virus isolation should not be stored or transported in dry ice unless they are sealed, taped and double plastic-bagged as CO2 (dry ice) can rapidly inactivate the virus if it gains access to the specimens.

Management:

- The goal of treatment is to alleviate the symptoms. Antibiotics are not effective against viruses. Bed rest is advisable until the fever is subsided.
- A mild analgesic such as paracetamol 0.5 - 1 g every 4-6 hours usually relieves the headache and generalized pains and warm fluids help to relieve the discomfort of the symptoms.
- Pholcodine 5-10 mg 3-4 times daily may be used to suppress unproductive cough.
- Specific treatment of complications such as bronchitis and pneumonia may be necessary.

Prevention:

a) Vaccination

It is the most effective way to prevent infection. The most effective way to prevent the disease or severe outcomes from the illness is vaccination. Safe and effective vaccines have been available and used for more than 60 years. Among healthy adults, influenza vaccine can prevent 70% to 90% of influenza-specific illness. Among the elderly, the vaccine reduces severe illnesses and complications by up to 60%, and deaths by 80%.

Vaccination is especially important for people at higher risk of serious influenza complications, and for people who live with or care for high risk individuals.

Following high risk groups need annual vaccination for (in order of priority):

- nursing-home residents (the elderly or disabled)
- elderly individuals
- people with chronic medical conditions
- other groups such as pregnant women, health care workers, those with essential functions in society, as well as children from ages six months to two years.

Influenza vaccination is most effective when circulating viruses are well-matched with vaccine viruses, therefore WHO annually recommends a new vaccine composition that targets the three most representative strains that are in circulation.

b) Other measures

- Good ventilation of public buildings;
- Avoidance of crowded places during an epidemic;
- Encourage sufferer to cover their faces with a mask or handkerchief when coughing and sneezing;
- Annual winter vaccination (Anti influenza vaccine) is usually recommended for patients suffering from chronic pulmonary, cardiac or renal disease.
- For older individuals who have been exposed to the virus, the drug amantadine may be given to prevent them from actually getting the flu. This may also be used for treatment.

Pandemic Influenza (H1N1)

Introduction

H1N1 Influenza surfaced in 2009 and was confirmed in virtually every country and territory in the world. The majority of infected cases caused by the pandemic (H1N1) 2009 virus infection had been self-limiting, mild-to-moderate and it was an uncomplicated disease, however severe complications including fatal outcomes have been reported.

This virus from the Influenza A group causes acute respiratory illness and the disease can spread through droplets generated by coughing or sneezing of infected person or touching objects contaminated with patient's secretions. Rapid human-to-human transmission has been reported in 2009 and late 2010.

Background

The epidemiology of pandemic (H1N1) 2009 virus infection to date indicates that children and young adults have had the highest attack rates. A wide clinical spectrum of disease ranging from non-febrile, mild upper respiratory tract illness, febrile influenza like illness (ILI) to severe or even fatal complications, including rapidly progressive pneumonia has been described. The most commonly reported symptoms have included cough, fever, sore throat, muscle aches, malaise, and headache. Some patients have experienced gastrointestinal symptoms (nausea, vomiting, and/or diarrhoea).

Approximately 10-30% of hospitalized patients in some countries have required admission to intensive care units (ICU). Critically ill patients include those who experienced rapidly progressive lower respiratory tract disease, respiratory failure, and acute respiratory distress syndrome (ARDS) with refractory hypoxemia. Other severe complications have included secondary invasive bacterial infection, septic shock, renal failure, multiple organ dysfunction, myocarditis, encephalitis, and worsening of underlying chronic disease conditions such as asthma, chronic obstructive pulmonary disease (COPD), or congestive cardiac failure.

Risk factors

Risk factors for severe disease from pandemic (H1N1) 2009 virus infection reported to date are considered similar to those risk factors identified for complications from seasonal influenza. These include the following groups:

- Infants and young children, in particular <2 years
- Pregnant women
- Persons of any age with chronic pulmonary disease (e.g. asthma, COPD)
- Persons of any age with chronic cardiac disease (e.g. congestive cardiac failure)
- Persons with metabolic disorders (e.g. diabetes)
- Persons with chronic renal disease, chronic hepatic disease, certain neurological conditions (including neuromuscular, neurocognitive, and seizure disorders), hemoglobinopathies, or immunosuppression, whether due to primary immunosuppressive conditions, such as HIV infection, or secondary conditions, such as immunosuppressive medication or malignancy
- Children receiving chronic aspirin therapy
- Persons aged 65 years and older

Post-pandemic Phase

The illness in the affected patients during the Pandemic had mostly been mild with mortality rate (0.45 %). As per WHO declaration, world is now in the post-pandemic period, the virus is expected to continue to circulate as a seasonal virus for some years to come. The WHO has reminded national health authorities that cases and local outbreaks of H1N1 (2009) infection will continue to occur, and in some locations, such outbreaks could have a substantial impact on communities.

The key actions recommended during the post-pandemic period include

i) Strengthening surveillance

ii) Vaccination and proper clinical management.

In Pakistan, laboratory based surveillance to detect novel H1N1 is being carried out by NIH since 2009. A high level of suspicion is required by all clinicians to detect any possible cases. Disease is notifiable under IHR 2005 and any suspected patient along with sample must be immediately reported to NIH, Islamabad.

Incubation period

The disease has an incubation period of 1-7 days. The infected person can spread the virus to its close contacts from one day prior to the appearance of symptoms to 7 days after their disappearance.

Case Definitions:

i) **Confirmed case :** A confirmed case of new influenza A (H1N1) virus infection is defined as an individual with laboratory confirmed new influenza A(H1N1) virus infection by one or more of the following tests:-

- Real-time RT-PCR

- Viral culture
- Four-fold rise in new influenza A (H1N1) virus specific neutralizing antibodies.

ii) Probable Case: A Probable case of new influenza A (H1N1) virus infection is defined as an individual with an influenza test that is positive for influenza A, but is un-subtypable by reagents used to detect seasonal influenza virus infection.

OR

An individual with a clinically compatible illness or who died of an unexplained acute respiratory illness who is considered to be epidemiologically linked to a probable or confirmed case.

Surveillance and Monitoring

Surveillance during the post-pandemic period include:

- Monitoring for unusual events, such as clusters of severe respiratory illness or death;
- Investigating severe or unusual cases (atypical pneumonia), clusters or outbreaks to facilitate rapid identification of important changes in the epidemiology or severity of influenza;
- Maintaining routine surveillance, including for influenza-like illness and cases of severe acute respiratory infections;
- Data collection and maintaining regular reporting to the National Institute of Health Islamabad.
- H1N1 2009 infection is a notify-able disease under International Health Regulations (IHR 2005) if any of the following changes are detected:
    - Sustained transmission of antiviral-resistant H1N1 2009 influenza
    - Human cases of infection with any influenza virus not currently circulating in human populations
    - Any notable changes in the severity or other epidemiological or clinical characteristics of the H1N1 2009 virus, including changes in the age distribution, the clinical appearance, proportion of cases requiring intensive management, or unexpected increases in numbers of cases.
- Monitoring the H1N1 2009 virus for important genetic, antigenic or functional changes, such as antiviral drug sensitivity.
- Stockpiling of required medicine and logistics.
- Activation of district and provincial Influenza Committees / Task Forces.

Sample Collection & Transportation:

- Collect throat and nasal swabs and nasopharyngeal aspirates from patient and tracheal aspirate or broncho-alveolar lavage fluid from intubated patients place immediately in Viral Transport Medium (VTM).
- Collect 5 ml blood or serum for serology (acute and convalescent if possible).
- Transport specimens' bottles and tubes in upright position, secured in a screw cap container or in a rack in a transport box having enough absorbent paper around them to soak up all the liquid in case of spillage.
- Sample for virus isolation collected in VTM can be taken to lab within 4 days, kept at +4^{o}C and frozen at -70^{o}C if stored.
- In the absence of freezers or VTM, ethanol preserved swabs are a possible alternative. Storage of such specimens at 4^{o}C (in a standard refrigerator) is better than at room temperature.
- Blood/serum samples should be frozen at -70^{o}C for PCR and at -20^{o}C or lower for antibody determination but can also be stored at +4^{o}C for about one week.
- Specimens for influenza virus isolation should not be stored or transported in dry ice unless they are sealed, taped and double plastic-bagged as CO2 (dry ice) can rapidly inactivate the virus if it gains access to the specimens.

Prevention & Control Measures:

Most of the cases of Influenza A H1N1 infection would be mild to moderate not requiring hospitalization, however it may be advisable to promote respiratory etiquette, confining to homes, bed rest, and avoiding attending office/ work places, schools and social gatherings during the illness. Appropriate infection control measures (Standard plus Droplet Precautions) should be followed at all times.

The required measures are as follows:

i) For Health Care providers and healthy persons

- Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash covered in a bag after you use it.
- Wash your hands often with soap and water. If soap and water are not available, use an alcohol-based hand rub.

- Avoid touching your eyes, nose and mouth. Germs spread this way.
- Try to avoid close contact with sick people and crowded settings
- Practice good health habits including good sleep, nutritious food with plenty of fluids and be physically active

ii) For sick persons

- If you are sick with flu–like illness, it is recommends that you stay home for at least 24 hours after your fever is gone except to get medical care or for other necessities. (Your fever should be gone without the use of a fever-reducing medicine.)
- While sick, limit contact with others as much as possible to keep from infecting them.
- Encourage sufferer to cover their faces with a mask or handkerchief when coughing and sneezing.
- Infected patients should not travel
- Improve ventilation in living places
- Hospitalized patients should be put in isolation

Infection Control

i) Infection Control at Health-care facility managerial activities

Procedures should be developed to ensure proper implementation of administrative controls, environmental controls, and use of personal protective equipment (PPE). Administrative policies that address adequate staffing and supplies, training of staff, education of patients and visitors, and a strategy for risk communication are particularly needed.

ii) Basic infection control recommendations for all health-care facilities

Standard and Droplet Precautions should be used when caring for a patient with an acute, febrile, respiratory illness.

iii) Respiratory hygiene/cough etiquette

All persons (HCWs, patients and family members, visitors) should cover their mouth and nose with a disposable tissue when coughing or sneezing, then discard the tissue in a receptacle and perform hand hygiene. Additionally, whenever available, patients who are showing signs of an ILI should wear a medical mask in waiting areas and when they are being transported within the facility.

Vaccination:

Vaccination remains important as a means of reducing the morbidity and mortality caused by influenza viruses. The health authorities should create awareness for promoting voluntary immunization of the high risk groups i.e., the health workers, pregnant women, children under 5 years, and those with chronic cardiopulmonary diseases. Following are the important points in immunizing the high risk population:

- An yearly flu vaccine commonly known as “flu-shot” is recommended as the first and most important step in protecting against flu viruses.
- The 2010-2011 flu vaccine will protect against an influenza A H3N2 virus, an influenza B virus and the 2009 H1N1 virus that caused so much illness last season.
- Everyone 6 months of age and older should get vaccinated against the flu as soon as the 2010-2011 seasonal vaccine is available.
- People at high risk of serious flu complications include young children, pregnant women, people with chronic health conditions like asthma, diabetes or heart and lung disease and people 65 years and older.
- Vaccination of high risk persons is especially important to decrease their risk of severe flu illness.
- Vaccination also is important for health care workers, and other people who live with or care for high risk people to keep from spreading flu to high risk people.
- Children younger than 6 months are at high risk of serious flu illness, but are too young to be vaccinated. People who care for them should be vaccinated instead.

Management:

Mild to moderate illness

- The goal of treatment is to alleviate the symptoms. Antibiotics are not effective against viruses. Bed rest is advisable until the fever is subsided.
- A mild analgesic such as paracetamol 0.5 -1 g every 4-6 hours usually relieves the headache and generalized pains and warm fluids help to relieve the discomfort of the symptoms.
- Pholcodine 5-10 mg 3-4 times daily may be used to suppress unproductive cough. Specific treatment of complications such as bronchitis and pneumonia may be necessary.

- Virus has been found sensitive to oselatmivir (Tami flu) and zanamivir but resistant to amantadine and remantadine. Antiviral drugs can make illness milder and shorten the time you are sick. They may also prevent serious flu complications.
- It's very important that antiviral drugs be (within the first 2 days of symptoms) given only to treat people who are very sick (such as those who are hospitalized) or people who are sick with flu symptoms and who are at increased risk of severe flu illness, such as pregnant women, young children, people 65 and older and people with certain chronic health conditions. Patients not considered being at higher risk of developing severe or complicated illness need not be treated with anti-virals.

Hospitalized patients

- Patients with atypical pneumonia not responding to antibiotics should be suspected of infection with H1N! 2009 infection
- Persons suspected of illness from influenza should receive appropriate clinical care.
- Cases of severe illness in higher-risk individuals, as well as in otherwise healthy individuals, are likely to occur.
- Early recognition and appropriate treatment of such cases remains important.
- Guidelines for use of antiviral medicines, which refer to both seasonal and pandemic influenza, should be followed.
- High risk groups included young children, pregnant women, and people with underlying respiratory or other chronic conditions, including asthma and diabetes.
- Patients who have severe or deteriorating influenza should be treated at the earliest with oseltamivir (Tamiflu).
- Patients who have severe or complicated influenza should be treated with oseltamivir or zanamivir as soon as possible
- The antivirals should be treated as quickly as possible and not lator than 48 hours of onset of the symptoms to achieve positive clinical outcome (however it may be used at any stage of active disease if an ongoing viral replication is anticipated)
- Seasonal influenza and past influenza pandemics have been associated with an increased risk of secondary Staphylococcus aureus infections, which may be severe, rapidly progressive, therefore results of microbiological studies, wherever possible, should be used to guide antibiotic usage for suspected bacterial co-infection in patients with influenza A (H1N1) virus infection.

The following antiviral regimen should be followed for hospitalized patients

<table>
<tr><th>Medicine</th><th>Duration</th><th colspan="5">Age Group (Years)</th></tr>
<tr><td rowspan="2">Oseltamivir (Tami Flu)</td><td rowspan="2">5 days</td><th>1-4</th><th>5-9</th><th>10-12</th><th>13-64</th><th>>65</th></tr>
<tr><td colspan="3">Weight Adjusted dose
• 30 mg twice daily for < 15kg body weight
• 45 mg twice daily for > 15-23 kg body weight
• 60 mg twice daily for > 23-40 kg body weight
• 75 mg twice daily for > 40 kg body weight</td><td colspan="2">75 mg twice daily</td></tr>
</table>

Note: Patients not considered being at higher risk of developing severe or complicated illness and who have uncomplicated illness due to confirmed or strongly suspected influenza virus infection need not be treated with antivirals.

Avian/Human Influenza, A (H5N1)

Avian influenza ("bird flu") is an infectious disease of birds caused by type A strains of the influenza virus. The infection can cause a wide spectrum of symptoms in birds, ranging from mild illness, which may pass unnoticed, to a rapidly fatal disease that can cause severe epidemics.

Avian influenza viruses do not normally infect humans. However, there have been instances of certain highly pathogenic strains causing severe respiratory disease in humans. In most cases, the people infected had been in close contact with infected poultry or with objects contaminated by their faeces. Nevertheless, there is concern that the virus could mutate to become more easily transmissible between humans, raising the possibility of an influenza pandemic.

Avian (bird) flu is caused by influenza A avian viruses that occur naturally among birds. In at-least five countries (Cambodia, China, Egypt, Indonesia and Vietnam), the avian influenza A H5N1 virus continues to circulate in poultry with sporadic cases in humans with the risk of mutation and triggering yet another influenza pandemic in the world. In Pakistan three human cases including one death was lab confirmed in October 2007.

Case Fatality Rate:

Since 2004, 509 confirmed cases of human infection from subtype avian influenza A-H5N1 infection have been confirmed globally, including 303 deaths (59.5%).

Diagnosis:

According to the WHO criteria for accepting positive PCR test results of H5 infection in humans from national reference laboratories, WHO accepts positive PCR test results of H5 infection in humans from the following laboratories:

Case definition:

Possible case is any person presenting at a health care facility with severe pneumonia, characterized by fever (temp>38oC) and one or more of the following:

· cough, sore throat, shortness of breath AND who can answer "Yes" to any of the following questions:

In the 7 days before first symptoms started.

1. Have you been in contact with a person who was suspected or confirmed case of Avian Influenza A (H5N1) during the infectious period?
2. Have you been in contact with live or dead birds, pigeons, including chickens, ducks, fancy/backyard birds or crows?
3. Have you lived in or have you visited a place where poultry deaths have occurred in the last 2 weeks?
4. Have you worked in a laboratory where there is processing of samples from persons or animals that are suspected of having highly pathogenic avian influenza (HPAI) infection?

Probable case is any possible case AND limited laboratory evidence for influenza A (H5N1) such as IFA + using HF5 monoclonal antibodies OR no other disease.

Confirmed case of Influenza A/H5N1 infection is any probable case with detection of viral nucleic acid by PCR.

Prevention and Control Measures;

Humans become infected with avian influenza through close contact with live, sick or dead infected birds, e.g. breathing in particles from their droppings, plucking or handling poultry, playing in an area where carcasses were buried.

- If you must go to a bazaar where live poultry is sold, protect your eyes, nose and mouth from dust.
- Wash hands after contact with poultry or other birds.
- Report sick or dying poultry to local authorities.
- Cook poultry and eggs thoroughly before eating

Treatment:

Cases with severe disease should be hospitalized and treated in intensive care with universal precautions. Early treatment with anti-virals oseltamavir and zanamavir can be life-saving.

Vaccination:

Since 2003, highly pathogenic avian influenza A(H5N1) viruses have become enzootic in some countries and continue to cause outbreaks in poultry as well as sporadic human infections. The A(H5N1) viruses have diversified both genetically and antigenically leading to the need for multiple candidate vaccine viruses for pandemic preparedness purposes.

Despite the emergence of the pandemic 2009 influenza A(H1N1) viruses, the zoonotic and pandemic threats posed by A(H5N1) viruses remain. Efforts are under way for the the development of candidate A(H5N1) vaccine viruses from the A(H5N1) viruses isolated from birds and humans.

Leishmaniasis

Introduction

Leishmaniasis is caused by parasitic protozoa of the genus *Leishmania*. Humans are infected via the bite of phlebotomine sandflies, which breed in forest areas, caves, or the burrows of small rodents.

Background

Leishmaniasis is still one of the world's most neglected diseases, affecting largely the poorest of the poor, mainly in developing countries; 350 million people are considered at risk of contracting leishmaniasis, and some 2 million new cases occur yearly.

Infectious agent:

Leishmaniasis is caused by protozoan parasites belonging to the genus *Leishmania*. Protozoal parasites family Trypanasomatidae, genus Leishmanania: L. donovani and L. infantum may cause visceral leishmaniasis while L. tropica and L. major may cause cutaneous leishmaniasis.

The Vector

The parasites are transmitted by the bite of a tiny – only 2–3 mm long – insect vector, the *phlebotomine sandfly*.

Mode of transmission:

Spread by the bite of the sand fly. The sand fly bites on the skin and the protozoan is transmitted to the blood stream. Only the female sandfly transmits the parasites. Female sandflies need blood for their eggs to develop, and become infected with the Leishmania parasites when they suck blood from an infected person or animal. Over a period of between 4 and 25 days, the parasites develop in the sandfly. When the infectious female sandfly then feeds on a fresh source of blood, it inoculates the person or animal with the parasite, and the transmission cycle is completed.If animals are the primary host reservoir, it is called zoonotic leishmaniasis; if humans are the primary host reservoir, it is called anthroponotic leishmaniasis.

Incubation period:

Considered to be at least a week but may extend up to several months. For zoonotic type it is considered to be about 4 months and for the anthroponotic type it ranges from 6-12 months

Alert Threshold:

One suspected case is an alert and requires an immediate investigation.

Outbreak threshold

One confirmed case is an outbreak

Case Definition:

Two types of leishmaniasis occur in Pakistan: - cutaneous and visceral.

Visceral leishmaniasis (VL)

Person with clinical signs of prolonged (>2 weeks) irregular fever, splenomegaly and weight loss, with serological (at peripheral geographical level) and/or (when feasible at central level) parasitological confirmation of the diagnosis.

Note: In endemic malarious areas, visceral leishmaniasis must be suspected when fever not responding to anti-malarial drugs persists for more than 2 weeks (assuming drug-resistant malaria has also been considered).

To confirm case:

Positive parasitology

- stained smears from bone marrow, spleen, liver, lymph node, blood

or

- culture of the organism from a biopsy or aspirated material

Positive serology (immunofluorescent assay, ELISA, Direct Agglutination Test)

Positive immunochromatography (dipstick)

Cutaneous leishmaniasis (CL)

Person with clinical signs and parasitological confirmation of the diagnosis.

Clinical signs: Appearance of one or more skin lesions, typically on uncovered parts of the body. The face, neck, arms and legs are most common sites. A nodule may appear at the site of inoculation and may enlarge to become an indolent ulcer. The sore may remain in this stage for

a variable time before healing - it typically leaves a depressed scar.

Diagnosis:

Positive parasitology (stained smear or culture from the lesion)

Parasitological diagnosis remains the reference standard in diagnosis of cutaneous leishmaniasis because of its high specificity. Material for parasitological diagnosis can be obtained by scraping, fine- needle aspiration or biopsy of lesions. Secondly impression smears from the biopsy can be stained and examined.

The material obtained by any of these methods can be used for microscopic examination, culture and molecular diagnostic techniques.

Suspected case

- In cutaneous leishmaniasis there are lesions on the face, neck, arms, and legs, which begin as nodules and turn into skin ulcers, eventually healing but leaving a depressed scar.
- In visceral leishmaniasis, the parasite invades the spleen, liver, bone marrow, and lymph nodes. Symptoms include mainly irregular fever, splenomegaly and weight loss; also fatigue, enlargement of the lymph nodes and the liver, secondary infections such as pneumonia, and it can be fatal if left untreated.

Confirmed case

Suspected cases with positive parasitological evidence from a stained smear by microscopy or culture from the lesion.

Specimen Collection:

Cutaneous Leishmaniasis:

- Skin biopsy is the standard dermatologic technique for obtaining specimen.
- Slit-skin preparation or aspiration from the edge of the lesion by a well-trained staff is the alternate.
- No preservatives are required for examining LD bodies in patient's sample or for leishmania culture.

Visceral leishmaniasis:

- Collect 5ml clotted blood or serum for serologic studies.
- Splenic or bone marrow aspirate collected in a tube with anticoagulant is required for demonstration of amastigotes.
- Specimen can be transported at room temperature without delay.

Management:

Intra-lesional Treatment:

Patient's wt. in kg	Calculated dose (mg Antimony)	Recommended dose (mls) / day	
		Glucantime	Pentostam
70	922	10	8.5
60	832	9	8
50	737	8	7
40	635	7	6
30	524	6	5
20	400	5	4
10	252	3	2.5
05	159	2.5	2

Intra-lesional treatment means carefully infiltrating the area around the lesion and the base, with a fine gauge (25g) needle and injecting the Glucantime / pentostam pentavalent antimony under pressure as the needle advances. Treatments are every week up to five times.

Systemic (intra-muscular) treatment:

Injections should be given daily (with a break of one day for a week-end) for 14 days into the upper, outer quadrant of the buttock, alternating sides. If the response is poor by the 14th day, the treatment can be continued for 7 more days. Here is a table showing the correct doses for Glucantime and Pentostam on a scale based on a simplified formula relating body weight to surface area whereby a 20 Kg child receives 20 mg/kg of antimony.

Prevention:

- Prevention of ACL is very similar to malaria, as sand flies bite at night and indoors, permethrin treated bed nets, etc. Sand flies are generally more sensitive than mosquitoes to insecticide, i.e. residual spraying of indoor rooms (vector control).
- Use of insecticide is unlikely to work in prevention of Zoonotic Cutaneous, as the sand fly vector tends to bite outdoors, so the most effective strategy is to poison or dig up the burrows of reservoir rodents.

Malaria

Introduction:

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected mosquitoes. It is caused by a parasite called Plasmodium, which is transmitted via the bites of infected mosquitoes. In the human body, the parasites multiply in the liver, and then infect red blood cells. Malaria is preventable and curable. In 2008, malaria was present in 108 countries and territories.

Symptoms of malaria include fever, headache, and vomiting, and usually appear between 10 and 15 days after the mosquito bite. If not treated, malaria can quickly become life-threatening by disrupting the blood supply to vital organs. In many parts of the world, the parasites have developed resistance to a number of malaria medicines.

Infectious agent*:*

Malaria is caused by Plasmodium parasites. The parasites are spread to people through the bites of infected Anopheles mosquitoes, called "malaria vectors", which bite mainly between dusk and dawn.

There are four types of human malaria:

- Plasmodium falciparum
- Plasmodium vivax
- Plasmodium malariae
- Plasmodium ovale.

Protozoan parasite Plasmodium falciparum which is the most life threatening form of the disease and Plasmodium vivax which causes the less severe form of the disease.

Mode of transmission:

Bite of infected female Anopheles mosquito. May also be rarely transmitted by injection of infected blood (transfusion malaria). The intensity of transmission depends on factors related to the parasite, the vector, the human host, and the environment.

Incubation period:

Average incubation period for P. falciparum is 12 days and for P. vivax is 13-17 days

Alert Threshold:

1.5 times the mean of cases in the previous three weeks, by reporting sit, is an alert and requires investigation.

Risk Factors:

- Movement of people from endemic into malaria-free zones or from areas of low endemicity to a hyperendemic areas.
- Increased population density promoting mosquito bites.
- Interruption of vector control measures
- Inadequate health care services
- Stagnant water
- Flooding, Changes in weather patterns

Outbreak threshold:

Clustering of cases in a particular locality on alert investigation.

Seasonality:

Transmission also depends on climatic conditions that may affect the abundance and survival of mosquitoes, such as rainfall patterns, temperature and humidity. In many places, transmission is seasonal, with the peak during and just after the rainy season.

Case Definition:

Person with fever or history of fever within the last 48 hours (with or without other symptoms such as nausea, vomiting and diarrhoea, headache, back pain, chills, myalgia) with positive laboratory test for malaria parasites [blood film (thick or thin smear) or rapid diagnostic test].

Suspected case of uncomplicated malaria:

- History of recent fever (may be continuous or irregular in beginning), chills, headache, body aches, weakness, anaemia, hepato-splenomegaly. (In falciparum infection the fever may be continuous with bouts of high peaks.)

Suspected case of severe or complicated malaria:

- Only Falciparum malaria can develop into severe malaria if not treated promptly, especially in children and pregnant women.

- History of fever with prostration (inability to sit), altered consciousness (lethargy, coma), generalized seizures (followed by coma), difficulty in breathing, low urinary output or dark urine, severe anaemia, abnormal bleeding, and hypoglycaemia. (The parasites may not be visible in peripheral smears, as they are sequestrated in the capillaries).

Probable case:

A suspected case with history of same type of manifestation in other members of the household; or in the same patient in the past.

Confirmed case:

Clinical case, which is confirmed by:

- Laboratory diagnosis of malarial parasites in peripheral blood film.
- Parasite antigens by immunodiagnostic test kit.

Diagnosis

WHO recommends that malaria be confirmed by parasite-based diagnosis before giving treatment. Results of parasitological confirmation can be available in a few minutes. Treatment solely on the basis of symptoms should only be considered when a parasitological diagnosis is not possible.

The two methods in routine use for parasitological diagnosis are:

- Light microscopy
- Rapid diagnostic tests (RDTs)

The latter detect parasite-specific antigens or enzymes and some have a certain ability to differentiate species. Deployment of microscopy and RDTs must be accompanied by quality assurance.

Antimalarial treatment should be limited to test positive cases and negative cases should be reassessed for other common causes of fever. The benefit of parasitological diagnosis depends entirely on health-care providers adhering to the results in managing the patient, except where the severity of the disease justifies the use of antimalarials in test negative cases, considering the possible small risk of false negative tests. The risk of false negative microscopy is higher if the patient has received a recent dose of an artemisinin derivative.

The results of parasitological diagnosis should be available within a short time (less than two hours) of the patient presenting. In the absence or delay of parasitological diagnosis, patients with suspected severe malaria, and other high risk groups, should be treated immediately on clinical grounds.

Specimen Collection:

- Collect 3-5ml blood in a tube with anticoagulant (EDTA) for demonstration of malarial parasites in peripheral blood film.
- Sample may also be used to demonstrate parasite antigen by immunodiagnostic test kit.
- Transport the specimen at room temperature preventing sample spillage or damage to the tubes.

Management:

Early diagnosis and treatment of malaria especially in children and pregnant women reduces disease and prevents deaths. It also contributes to reducing malaria transmission.

In the past resistance has occurred n treatment with chloroquine and sulfacoxine-pyrimethamine (SP).

The best available treatment, particularly for *P. falciparum* malaria, is artemisinin-based combination therapy (ACT). Growing resistance to antimalarial medicines has spread very rapidly, undermining malaria control efforts.

If resistance to the artemisinins develops and spreads to other large geographical areas, the public health consequences could be dire, as no alternative antimalarial medicines will be available in the near future.

When treated with an artemisinin-based monotherapy, patients may discontinue treatment early following the rapid clearance of malaria symptoms. This results in partial treatment and patients still have persistent parasites in their blood. Without a second drug given as part of a combination (as is done with an ACT), these resistant parasites survive and can be passed on to a mosquito and then another person. Monotherapies are therefore the primary force behind the spread of artemisinin resistance.

The Treatment requires the following steps:

To counter the threat of resistance of *P. falciparum* to monotherapies, and to improve treatment outcome, WHO recommends that artemisinin-based combination therapies be used for the treatment of uncomplicated *P. falciparum* malaria (symptomatic malaria without signs of severity or evidence (clinical or laboratory) of vital organ dysfunction).

Although the evidence base confirming the benefits of artemisinin-based combinations has grown substantially in recent years, there is still substantial geographic variability in the efficacy of available ACT (Anti-malarial Combination Therapy) options, underlining the importance of countries regularly monitoring the efficacy of the ACTs in use to ensure that the appropriate ACT option(s) is being deployed. Therefore Artemisinin-based combination therapies

should be used in preference to amodiaquine plus sulfadoxine-pyrimethamine for the treatment of uncomplicated *P. falciparum* malaria. ACTs should include at least 3 days of treatment with an artemisinin derivative.

The ACT options now recommended for treatment of uncomplicated falciparum malaria in alphabetical order are:

- artemether plus lumefantrine,
- artesunate plus amodiaquine,
- artesunate plus mefloquine,
- artesunate plus sulfadoxine-pyrimethamine,
- dihydroartemisinin plus piperaquine.

Artemether plus lumefantrine

This is currently available as a fixed-dose formulation with dispersible or standard tablets containing 20 mg of artemether and 120 mg of lumefantrine.

Therapeutic dose. The recommended treatment is a 6-dose regimen over a 3-day period. The dosing is based on the number of tablets per dose according to pre-defined weight bands (5–14 kg: 1 tablet; 15–24 kg: 2 tablets; 25–34 kg: 3 tablets; and > 34 kg: 4 tablets), given twice a day for 3 days. This extrapolates to 1.7/12 mg/kg body weight of artemether and lumefantrine, respectively, per dose, given twice a day for 3 days, with a therapeutic dose range of 1.4–4 mg/kg of artemether and 10–16 mg/kg of lumefantrine.

Second-line antimalarial treatment:

- alternative ACT known to be effective in the region;
- artesunate plus tetracycline or doxycycline or clindamycin, any of these combinations should be given for 7 days;
- quinine plus tetracycline or doxycycline or clindamycin, any of these combinations should be given for 7 days.

Complicated or Severe Malaria Faciparun

The main objective is to prevent the patient from dying.

In a patient with *P. falciparum* asexual parasitaemia and no other obvious cause of symptoms, the presence of one or more of the following clinical or laboratory features classifies the patient as suffering from severe malaria

Clinical features:

– impaired consciousness or unrousable coma

– prostration, i.e. generalized weakness so that the patient is unable walk or sit up without assistance

– failure to feed

– multiple convulsions – more than two episodes in 24 h

– deep breathing, respiratory distress (acidotic breathing)

– circulatory collapse or shock, systolic blood pressure < 70 mm Hg in adults and < 50 mm Hg in children

– clinical jaundice plus evidence of other vital organ dysfunction

– haemoglobinuria

– abnormal spontaneous bleeding

– pulmonary oedema (radiological)

Laboratory findings:

– hypoglycaemia (blood glucose < 2.2 mmol/l or < 40 mg/dl)

– metabolic acidosis (plasma bicarbonate < 15 mmol/l)

– severe normocytic anaemia (Hb < 5 g/dl, packed cell volume < 15%)

– haemoglobinuria

– hyperparasitaemia (> 2%/100 000/µl in low intensity transmission areas or > 5% or 250 000/µl in areas of high stable malaria transmission intensity)

– hyperlactataemia (lactate > 5 mmol/l)

– renal impairment (serum creatinine > 265 µmol/l)

Severe malaria is a medical emergency. After rapid clinical assessment and confirmation of the diagnosis, full doses of parenteral antimalarial treatment should be started without delay with any effective antimalarial first available.

Adults

For adults, artesunate 2.4 mg/kg body weight IV or IM given on admission (time = 0), then at 12 h and 24 h, then once a day is the recommended treatment. Quinine is an acceptable alternative

if parenteral artesunate is not available: quinine 20 mg salt/kg body weight on admission (IV infusion or divided IM injection), then 10 mg/kg body weight every 8 h; infusion rate should not

exceed 5 mg salt/kg body weight per hour.

Children

For children the following antimalarial medicines are recommended, as there is insufficient evidence to recommend any of these antimalarial medicines over another:

– artesunate 2.4 mg/kg body weight IV or IM given on admission (time = 0), then at 12 h and 24 h, then once a day;

– quinine 20 mg salt/kg body weight on admission (IV infusion or divided IM injection), then 10 mg/kg body weight every 8 h; infusion rate should not exceed 5 mg salt/kg body weight per hour;

– artemether 3.2 mg/kg body weight IM given on admission then 1.6 mg/kg body weight per day should only be used if none of the alternatives are available as its absorption may be erratic.

Warnings:

- Do not give primaquine to pregnant women and children below 2 years of age, and it is advisable to do a Glucose 6-Phosphate dehydrogenase test before giving this drug. Give primaquine preferably after the patient has recovered from the acute illness.
- Do not give undiluted chloroquine or quinine by I/M or I/V route, as it can cause sudden cardiac arrest, especially in children.
- Do not give Sulfadoxine/ pyrimethamine to children below 2 months of age or during first trimester of pregnancy.
- Halofantrine (Halfan) is potentially a cardio-toxic drug and should be used under strict government control, according to WHO recommendations.

Prevention:

a) Personal protection

- Promote personal protection measures like wearing long sleeves and trousers outside the houses in the evening. Use of repellent creams and sprays. Avoidance of night time outside activities.
- Screen windows and use of mosquito nets.
- Wearing protective clothing
- Use mosquito's coils or vaporizing mat containing a pyrethrin.
- Destroy breeding places of mosquitoes by filling in ditches where water stands or stagnates.
- Prompt diagnosis and treatment of cases to prevent spread of the disease.

b) Vector control

Vector control is the primary public health intervention for reducing malaria transmission at the community level. It is the only intervention that can reduce malaria transmission from very high levels to close to zero. In high transmission areas, it can reduce child mortality rates and the prevalence of severe anaemia. For individuals personal protection against mosquito bites represents the first line of defence for malaria prevention.

Two forms of vector control are effective in a wide range of circumstances. These are:

- Insecticide-treated mosquito nets (ITNs): Long lasting insecticide impregnated nets (LLINs) are the preferred form of insecticide treated nets for public health distribution programmes. WHO recommends universal vector control coverage, and in most places, the most cost effective way to achieve this is through provision of LLINs, so that everyone in high transmission areas sleeps under a LLIN every night;
- Indoor spraying with residual insecticides: Indoor residual spraying (IRS) with insecticides is the most powerful way to rapidly reduce malaria transmission. Its full potential is realized when at least 80% of houses in targeted areas are sprayed. Indoor spraying is effective for 3–6 months, depending on the insecticide used and the type of surface on which it is sprayed. DDT can be effective for 9–12 months in some cases. Longer-lasting forms of IRS insecticides are under development.

Mosquito control is being strengthened in many areas, but there are significant challenges, including:

- An increasing mosquito resistance to insecticides, including DDT and pyrethroids, particularly in Africa; and

- A lack of alternative, cost-effective and safe insecticides.

c) Chemoprophylaxis

Drugs can also be used to prevent malaria. For travellers, malaria can be prevented through chemoprophylaxis, which suppresses the blood stage of malaria infections, thereby preventing malaria disease.

Measles

Introduction:
Measles is a highly contagious viral disease, which affects mostly children. It is one of the leading causes of death among young children even though a safe and cost-effective vaccine is available. In 2008, there were 164 000 measles deaths globally – nearly 450 deaths every day or 18 deaths every hour. More than 95% of measles deaths occur in low-income countries with weak health infrastructures. It is transmitted via droplets from the nose, mouth or throat of infected persons. Initial symptoms, which usually appear 8–12 days after infection, include high fever, runny nose, bloodshot eyes, and tiny white spots on the inside of the mouth. Several days later, a rash develops, starting on the face and upper neck and gradually spreading downwards. People who recover from measles are immune for the rest of their lives.
Measles is a highly contagious, serious disease caused by a virus. There is no specific treatment for measles and most people recover within 2–3 weeks. However, particularly in malnourished children and people with reduced immunity, measles can cause serious complications, including blindness, encephalitis, severe diarrhoea, ear infection and pneumonia. Measles can be prevented by immunization.

Infectious agent:
Measles virus, a member of the genus Morbillivirus in the family Paramyxoviridae.

Mode of transmission:
The highly contagious virus is spread via airborne droplets by coughing and sneezing, or direct contact with nasal or throat secretions of an infected patients or direct contact with items infected with nasal or throat secretions.

The virus remains active and contagious in the air or on infected surfaces for up to two hours. It can be transmitted by an infected person from four days prior to the onset of the rash to four days after the rash erupts.

Incubation period:
It is considered to be on an average of 10-12 days after exposure to infection with a maximum range of 7-18 days.

Alert Threshold:
One case of measles is an alert and requires an investigation.

Outbreak threshold:
An outbreak will be defined as more than 05 suspected measles cases satisfying case definition including at least one laboratory confirmed measles case in one location

Trigger for investigation of measles outbreaks:
DSCs with assistance of SO-WHO will review weekly compilation reports and identify clustering of cases for possible outbreaks. An outbreak investigation will be triggered by: · More than 05 suspected measles cases from one first level health care facility (RHC and below) in one week OR More than 05 suspected measles cases in a higher level facility coming from a single geographical area in one week OR Report of more than 05 suspected measles cases in one area in a week by any trained health worker (vaccinator, LHS, LHW etc.)

During their routine domiciliary visits, if a health worker observes more than 05 cases satisfying measles case definition in one area; s/he should immediately notify local health facility in-charge, who will then notify the EDO (Health) and DSC/SO-WHO to confirm the outbreak and initiate outbreak investigation.
The trigger initiates preliminary phase of case identification. During this phase, DSCs will try to confirm the existence of an outbreak.

Risk Factors

- Measles immunization coverage rates below 80% in country of origin
- Unvaccinated young children are at highest risk of measles and its complications, including death. Any non-immune person (who has not been vaccinated) can become infected.
- Population movement
- Overcrowding
- Measles outbreaks can be particularly deadly in countries experiencing or recovering from a natural disaster or conflict. Damage to health infrastructure and health services interrupts routine immunization, and overcrowding in make shift residential camps greatly increases the risk of infection.

Case Definition:
A suspected measles case is defined as:

- Any person with generalized maculo-papular rash (i.e. non-vesicular) and fever plus one of the following: cough or coryza (runny nose) or conjunctivitis (red eyes) or

- Any person in whom a clinician suspects measles

Patients with history of measles (satisfying case definition) within past one month should also be reported as suspected measles case. Hence, it is important for physicians to routinely ask patients (or parents) who presents with

common complications of measles e.g. pneumonia, diarrhea, otitis media, corneal scarring and malnutrition about history of rash illness.

To confirm case:
Presence of measles-specific IgM antibodies

Suspected Case: A patient presenting with complaints of fever with rash should be investigated as a suspected case of measles.

Probable Case: A probable case is characterized by the following symptoms:
- Fever > 38.3ºC (101ºF)
- Cough, coryza (i.e. runny nose), or conjunctivitis (i.e. red eyes)
- Generalized maculopapular rash (non-vesicular type) for at least 3 days, usually lasting 5-6 days. The rash begins at the hairline, and then involves the face and upper neck. During the next three days, gradually proceeds downward and outward, reaching extremities last and being less pronounced on hands and feet. Rash fades in the same order that it appears, from head to feet.
- Koplik's spots may occur 1-2 days before and after rash. They appear as pinpoint, depressed blue white spots on bright red background on the buccal mucosa.

Confirmed Case
Measles case is confirmed by the laboratory, in the absence of recent (1-14 days) immunization with measles-containing vaccine, with one of the following:
- Isolation of measles virus from an appropriate clinical specimen OR
- Significant rise (about 4 fold) in measles specific antibody titer between acute and convalescent sera OR
- Positive serologic test for measles IgM antibody using a recommended assay

Clinical measles in a person who is epidemiologically linked to a laboratory-confirmed case is also considered to be a confirmed case

Specimen Collection:
- Collect throat swab for virus isolation and genotyping, preserved in VTM. It is to be taken very early in the rash phase of the measles case. Five samples should be taken from fresh cases, less than five days from rash onset, in documented outbreaks
- Collect Blood, 5ml blood, centrifuged for serum separation at 3000 rpm for 5 minutes. If only two or three fresh cases are available that is sufficient.
- Store serum at 4-8ºC for not more than 48 hours. Do not freeze the whole blood.
- If centrifugation is not possible, blood should be kept in refrigerator until there is complete retraction of the clot from the serum.
- Carefully remove the serum and transfer aseptically to a sterile labelled vial.
- Transport the specimens in zip lock plastic bags with complete request form along with the cold chain

Management:

For uncomplicated cases:
Give Vitamin A and advise to treat the child at home if no complications develop (control fever, treat mouth ulcers, provide nutritional feeding)

For complicated cases:
Severe complications from measles can be avoided though supportive care that ensures good nutrition, adequate fluid intake and treatment of dehydration with WHO-recommended oral rehydration solution. This solution replaces fluids and other essential elements that are lost through diarrhoea or vomiting. Antibiotics should be prescribed to treat eye and ear infections, and pneumonia.
All children in developing countries diagnosed with measles should receive two doses of vitamin A supplements, given 24 hours apart. This can help prevent eye damage and blindness. Vitamin A supplements have been shown to reduce the number of deaths from measles by 50%.
Prevention:
Routine measles vaccination for children, combined with mass immunization campaigns in countries with high case and death rates, are key public health strategies to reduce global measles deaths. The measles vaccine has been in use for over 40 years. It is safe, effective and inexpensive. It costs less than one US dollar to immunize a child against measles.
The measles vaccine is often incorporated with rubella and/or mumps vaccines in countries where these illnesses are problems. It is equally effective in the single or combined form. Details as under:
1. Immunize population at risk as soon as possible. Children who are vaccinated against measles before 9 months of age must receive a 2nd measles vaccination. This should be given at 9 months with at least one month between first and 2nd vaccination. Any child who received measles vaccine should also receive OPV.

2. Priority is to immunize children 6 months to 5 years old, regardless of vaccination status or history of disease. Expansion to older children is of less priority & should be based on evidence of high susceptibility among this age group.
3. All children 6 months - 5 years of age should also receive prophylactic Vitamin A supplementation. If evidence of clinical vitamin A deficiency in older age groups, treatment with Vitamin A should be initiated as per WHO guidelines.
4. Ensure safety of injection during immunization, auto destructible syringes and safety boxes are recommended and safe disposal of used sharps be ensured.

Global Measles Initiative

This strategy includes:

- Strong routine immunization for children by their first birthday.
- A 'second opportunity' for measles immunization through mass vaccination campaigns, to ensure that all children receive at least one dose.
- Effective surveillance to quickly recognize and respond to measles outbreaks.
- Better treatment of measles cases, to include vitamin A supplements, antibiotics if needed, and supportive care that prevents complications.

Meningococcal Meningitis

Introduction:
Meningitis is inflammation of the meninges (thin lining), the covering of the brain and spinal cord. It is most often caused by infection (bacterial, viral, or fungal), but can also be produced by chemical irritation, subarachnoid haemorrhage, cancer and other conditions. It is the main cause of epidemic meningitis. Majority of cases are in children under age five and case fatality is between 5-15%.

Infectious agent:
Bacterium: *Neisseria meningitidis* serogroups A,B,C,Y,W135.

Mode of transmission:
The bacteria are transmitted from person to person through droplets of respiratory or throat secretions. Close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters (such as a dormitory, sharing eating or drinking utensils) with an infected person – facilitates the spread of the disease. The average incubation period is four days, but can range between two and 10 days.

Incubation period:
Incubation period varies between 2 to 10 days, most commonly 4 days

Period of communicability:
From the beginning of the symptoms till 24 hours after the institution of the
therapy, but the most important source of infection are asymptomatic carriers.

Alert Threshold:
One case is an alert and requires investigation.

Outbreak threshold
Two confirmed cases from the same location is an outbreak.

Seasonality:
Throughout the year with higher incidence during cold months

Risk Factors
Lower risk of epidemics in the general population while following are known risk factors:

- Travel, migration and displacement of people facilitate the circulation of virulent strains inside a country
- Living in Meningitis belt/ area
- Dry season
- Dust storms
- Overcrowding
- High rates of acute respiratory infections

Diagnosis:
Initial diagnosis of meningococcal meningitis can be made by clinical examination followed by a lumbar puncture showing a purulent spinal fluid. The bacteria can sometimes be seen in microscopic examinations of the spinal fluid. The diagnosis is supported or confirmed by growing the bacteria from specimens of spinal fluid or blood, by agglutination tests or by polymerase chain reaction (PCR). The identification of the groups and susceptibility testing to antibiotics are important to define control measures.

Case Definition:
Clinical case definition:
An illness with sudden onset of fever (>38.5 °C rectal >38.0 °C axillary)
and one or more of the following:
_ neck stiffness
_ altered consciousness
_ other meningeal sign **or** petechial or purpural rash
In patients under one year of age, suspect meningitis when fever is accompanied by bulging fontanelle.

Laboratory criteria:
_ Positive CSF antigen detection, **or**
_ Positive culture

Case classification:
Suspected: a case that meets the clinical case definition (mentioned above).

Probable: a suspected case as defined above **and:**
- Turbid CSF (with or without positive Gram-stain), **or**

- Ongoing epidemic and epidemiological link to a confirmed case.

Confirmed: Positive cerebrospinal fluid antigen detection **or** positive cerebrospinal fluid culture **or** positive blood culture a suspected or probable case with laboratory confirmation.

Specimen Collection:
- Collect 2-3 ml of CSF under aseptic measures through lumber puncture in a sterile screw-capped container for chemical analysis, latex particle agglutination test and culture for Neisseria meningitides.
- Blood samples should directly be inoculated in blood culture bottles.
- Transport the specimen immediately (within a maximum of one hour) to the lab. If delay is anticipated, sample should be inoculated in Trans Isolate Medium (TIM).

Case Management:
Meningococcal disease (either meningitis or septicaemia) is potentially fatal and should always be viewed as a medical emergency.

a) Non-Epidemic Conditions:
- Any suspected case should be referred to a hospital immediately as the admission to a hospital or health centre is necessary for diagnosis (lumbar puncture and CSF examination). Lumbar puncture must be done as soon as meningitis is suspected, prior to starting antibacterials.

- As infectivity of patients is moderate and disappears quickly following antimicrobial treatment, isolation of the patient is **not** necessary.

- Antimicrobial therapy must be instituted as soon as possible after lumbar puncture (without waiting for laboratory results), and should be combined with supportive treatment.

Besides general supportive measures that are important, Initial antimicrobial therapy should be effective against the three major causes of
bacterial meningitis until bacteriological results are available:

AGE GROUP	**P R O B A B L E PATHOGENS**	**ANTIBIOTIC THERAPY**	
		First Choice	Second Choice
Adults and children >5	*S. pneumoniae*	Penicillin G	Ampicillin or Amoxicillin Chloramphenicol Ceftriaxone or Cefotaxime
Children 1 month-5 years of age	*H. influenzae* *S. pneumoniae* *N. meningitidis*	Ampicillin or Amoxicillin (1)	Chloramphenicol Ceftriaxone or Cefotaxime
Neonates	Gram-negative bacteria and Group B streptococci Listeria	Ampicllin Gentamycin	Ceftriaxone or C e f o t a x i m e (2) Chloramphenicol (at reduced doses)
(1) If *H. influenzae* is highly resistant to Ampicillin, Chloramphenicol should be given with Ampicillin. (2) No effect on Listeria			

Once diagnosis of meningococcal disease has been established, many antimicrobials can be used: either *penicillin* or *ampicillin* is the drug of choice. *Chloramphenicol* is a good and inexpensive alternative. The third-generation cephalosporins, *Ceftriaxone* and *Cefotaxime*, are excellent alternatives but are considerably more expensive.
A seven-day course is still the general rule for the treatment of meningococcal disease (beyond the neonatal period). The long-acting (oily) form of chloramphenicol has also been shown to be effective.

b) ***Epidemic conditions:***
During epidemics of confirmed meningococcal disease, case management needs to be simplified to permit the health system to respond to rapidly expanding numbers of cases.

- Diagnosis: as the flood of patients could make the routine use of lumbar

puncture to confirm meningitis impossible, every suspected case of meningitis should be considered and treated as one of meningococcal meningitis.

- Treatment: simplified treatment protocols are appropriate: long-acting oily chloramphenicol intramuscularly (100 mg/kg up to 3 grams in a single dose) is the drug of choice for all age groups, particularly in areas with limited health facilities. For patients who do not improve rapidly, an additional dose of the same antimicrobial is recommended 48 hours later.

Prevention:

a). Non-epidemic conditions:

Vaccination: Several vaccines are available to control and to prevent secondary cases around a sporadic case of meningococcal disease, vaccine can be used for close contacts of patients the disease: a meningococcal A conjugate vaccine, C conjugate vaccines, tetravalent A, C, Y and W135 vaccines and meningococcal polysaccharide vaccines are available to control the disease. However it is contraindicated in those under age 2 and pregnant women. Tetravalent vaccine should be administered to all intimate contacts of index cases at the start of chemoprophylaxis. Its immunity lasts for 3 years; a booster dose is advised every year.

Chemoprophylaxis: the aim of chemoprophylaxis is to prevent secondary cases by eliminating nasopharyngeal carriage. To be effective in preventing secondary cases, chemoprophylaxis must be initiated as soon as possible (i.e. not later than 48 hours after diagnosis of the case). Its use should be restricted to close contacts of a case, which are defined as:

- Household members (i.e. persons sleeping in the same dwelling as the case)
- Institutional contacts who shared sleeping quarters (i.e. for boarding-school pupils, roommates; for military camps, persons sharing a barracks);
- Nursery school or childcare centre contacts (i.e. children and teachers who share a classroom with the case);
- Others who have had contact with the patient's oral secretions through kissing or sharing of food and beverages.

Household and other close contacts of patients with meningococcal infections, especially children, should be given Rifampicine 600 mg twice daily for 2 days. Children under one year are given 5-mg/Kg body weight 12 hourly and those over 12 months 10 mg/kg 12 body weight hourly. In case of contraindication, Ceftriaxone/ Ciprofloxacin single dose of 250 mg for adults and 125 mg for children

b). Epidemic Conditions:

Vaccination: a mass vaccination campaign, if appropriately carried out, is able to halt an epidemic of meningococcal disease. Laboratory diagnosis and confirmation of epidemic serogroups will guide the type of vaccine needed, either meningococcal polysaccharide bivalent A/C (if serogroup A or C is confirmed as the epidemic serogroup), or meningococcal polysaccharide tetravalent vaccine A/C/Y/W135 (if serogroup W135 or Y is confirmed). Vaccination will be concentrated in the area where the epidemic is maximal.

- ***Refugee camp population:*** Following confirmation (serogroup identified) of two cases, mass vaccination is recommended if the serogroup/s identified is/are included in either the bivalent (A/C) or tetravalent (A/C/Y/W135) vaccine. At risk populations (e.g. 2-30 years of age) should be given priority.

- ***General population:*** If an outbreak is suspected, vaccination should only be considered after careful investigation (including confirmation and serogroup identification) and the assessment of the population group at highest risk.

Chemoprophylaxis: chemoprophylaxis of contacts of meningitis patients is NOT warranted during an epidemic for several reasons. In small clusters or outbreaks among closed populations (e.g. extended household, boarding schools), chemoprophylaxis may still be appropriate.

Nipah Virus

Introduction
Nipah virus (NiV) infection is a newly emerging zoonosis that causes severe disease in both animals and humans. The natural host of the virus is fruit bats of the Pteropodidae Family, Pteropus genus. Nipah virus causes severe illness characterized by inflammation of the brain (encephalitis) or respiratory diseases. Nipah virus can be transmitted to humans from animals, and can also be transmitted directly from human-to-human; in Bangladesh, half of reported cases between 2001 and 2008 were due to human-to-human transmission. Nipah virus can cause severe disease in domestic animals such as pigs.

Infectious Agent
Nipah virus (NiV). Nipah virus is closely related to Hendra virus. Both are members of the genus Henipavirus, a new class of virus in the Paramyxoviridae family.

Occurrence
The virus is named after the Malaysian village where it was first discovered. This virus along with Hendra virus comprises a new genus designated Henipavirus in the subfamily Paramyxovirinae.
NiV was first identified during an outbreak of disease that took place in Kampung Sungai Nipah, Malaysia in 1998. On this occasion, pigs were the intermediate hosts. However, in subsequent NiV outbreaks, there were no intermediate hosts. In Bangladesh in 2004, humans became infected with NiV as a result of consuming date palm sap that had been contaminated by infected fruit bats. Human-to-human transmission has also been documented, including in a hospital setting in India.

Reservoir
The natural host of the virus is fruit bats of the Pteropodidae Family, Pteropus genus. Nipah virus has been isolated from the brain and spinal fluid of victims in Malaysia. Infective virus has also been isolated from environmental samples of bat urine and partially-eaten fruit in Malaysia.

Transmission
During the initial outbreaks in Malaysia and Singapore, most human infections resulted from direct contact with sick pigs or their contaminated tissues. Transmission is thought to have occurred via respiratory droplets, contact with throat or nasal secretions from the pigs, or contact with the tissue of a sick animal.

In the Bangladesh and India outbreaks, consumption of fruits or fruit products (e.g. raw date palm juice) contaminated with urine or saliva from infected fruit bats was the most likely source of infection.

During the later outbreaks in Bangladesh and India, Nipah virus spread directly from human-to-human through close contact with people's secretions and excretions. From 2001 to 2008, around half of reported cases in Bangladesh were due to human-to-human transmission.

Incubation period
4 to 18 days.

Case Fatality Rate
Case fatality rate of NiV ranges from 9 to 75%, although it has been as high as 100% in some outbreaks.

Diagnosis
Serum Neutralization Test, ELISA, RT-PCR are used.
Nipah virus infection can be diagnosed by a number of different tests for laboratory confirmation:
- serum neutralization
- enzyme-linked immunosorbent assay (ELISA)
- polymerase chain reaction (PCR) assay
- immunofluorescence assay
- virus isolation by cell culture.

Sample taking
Procedures for the laboratory diagnosis of NiV include serology, histopathology, PCR and virus isolation.

5ml of serum and in some cases Cerebrospinal fluid (CSF) samples should be taken observing strict bio-safety measures.

Samples are taken from people and animals with suspected Nipah virus infection should be handled by trained staff working in suitably equipped laboratories.

Clinical presentation
Human infections range from asymptomatic infection to acute respiratory syndrome and fatal encephalitis, inflammation of the brain occurs leading to disorientation or coma. Infected people initially develop influenza-like symptoms of fever, headaches, myalgia (muscle pain), vomiting and sore throat. This can be followed by dizziness, drowsiness, altered consciousness, and neurological signs that indicate acute encephalitis.

Some people can also experience atypical pneumonia and severe respiratory problems, including acute respiratory distress.

Encephalitis and seizures occur in severe cases, progressing to coma within 24 to 48 hours.

Most people who survive acute encephalitis make a full recovery, but around 20% are left with residual neurological consequences such as persistent convulsions and personality changes.

A small number of people who recover subsequently relapse or develop delayed onset encephalitis. In the long term, persistent neurological dysfunctions are observed in more than 15% of people.

Management
There are currently no drugs or vaccines available to treat Nipah virus infection, but ribavarin may alleviate the symptoms of nausea, vomiting, and convulsions.The primary treatment for human cases is intensive supportive care with treatment of symptoms is the main approach to managing the infection in people.

Treatment is mostly focused on managing fever and the neurological symptoms. Severely ill individuals need to be hospitalized and may require the use of a ventilator.

Prevention and control
Although Nipah virus has caused only a few outbreaks, it infects a wide range of animals and causes severe disease and death in people, making it a public health concern.

Reducing the risk of infection in people
In the absence of a vaccine, the only way to reduce infection in people is by raising awareness of the risk factors and educating people about the measures they can take to reduce exposure to the virus.
Public health educational messages should focus on the following:
Reducing the risk of bat-to-human transmission. Efforts to prevent transmission should first focus on decreasing bat access to date palm sap. Freshly collected date palm juice should also be boiled and fruits should be thoroughly washed and peeled before consumption.

Controlling infection in health-care settings
Health-care workers caring for patients with suspected or confirmed Nipah virus infection, or handling specimens from them, should implement standard infection control precautions.

Reducing the risk of human-to-human transmission. Close physical contact with Nipah virus-infected people should be avoided. Gloves and protective equipment should be worn when taking care of ill people. Regular hand washing should be carried out after caring for or visiting sick people.
Healthcare workers caring for patients with suspected or confirmed
NiV should implement Standard Precautions when caring for patients and handling specimens from them.

Routine cleaning and disinfection of pig farms (with sodium hypochorite or other detergents) is expected to be effective in preventing infection.

Controlling infection in animals
If an outbreak is suspected, the animal premises should be quarantined immediately. Culling of infected animals – with close supervision of burial or incineration of carcasses – may be necessary to reduce the risk of transmission to people. Restricting or banning the movement of animals from infected farms to other areas can reduce the spread of the disease.

As Nipah virus outbreaks in domestic animals have preceded human cases, establishing an animal health surveillance system to detect new cases is essential in providing early warning for veterinary and human public health authorities. Reducing the risk of animal-to-human transmission. Gloves and other protective clothing should be worn while handling sick animals or their tissues, and during slaughtering and culling procedures.

Vaccine
There is no treatment or vaccine available for either people or animals.

Pertussis (Whooping Cough)

Introduction:
Pertussis is a highly contagious bacterial disease of the respiratory tract, caused by *Bordetella pertussis*. It occurs mainly in infants and young children, and is easily transmitted from person to person, mainly through droplets. The first symptoms generally appear 7–10 days after infection, and include mild fever, runny nose, and cough, which in typical cases gradually develops into a paroxysmal cough followed by whooping (hence the common name of whooping cough).

The initial stage, the **catarrhal stage**, is characterized by the insidious onset of coryza (runny nose), sneezing, low-grade fever, and a mild, occasional cough, similar to the commom cold. The cough gradually becomes more severe and irritating, and after 1-2 weeks, the second, or **paroxysmal stage**, begins. The patient has bursts, or paroxysms, of numerous, rapid coughs, apparently due to difficulty expelling thick mucus from the tracheobronchial tree. At the end of the paroxysm, a long inspiratory effort is usually accompanied by a characteristic whoop.

In younger infants, periods of apnoea may follow the coughing spasms, and the patient may become cyanotic (turn blue). Pneumonia is a relatively common complication (reported 21.7% of cases in developed countries); otitis, haemorrhages (subconjunctival petechiae and epistaxis), convulsions, encephalopathies and death occur more rarely). The disease lasts 4 to 8 weeks. Complications are more frequent and severe in younger infants. In developed countries the case fatality ratio among infants less than 1 month has been reported to be around 1%. Older persons (i.e. adolescent and adults), and those partially protected by the vaccine, may become infected with *B. pertussis*, but usually have milder disease.

In the **convalescent stage**, recovery is gradual. The cough becomes less
paroxysmal and disappears over 2 to 3 weeks. However, paroxysms often recur with subsequent respiratory infections for many months after the onset of pertussis. Fever is generally minimal throughout the course of pertussis.
Pertussis can be prevented by immunization.

Infectious agent:
Bacterium- *Bordetella pertussis*

Mode of transmission:
Primarily by direct contact with discharges from respiratory mucous membranes of infected persons via the airborne route. Humans are the only hosts. Even though the disease may be milder in older persons, these infected persons may transmit the disease to other susceptible persons, including non-immunized or underimmunized infants. Adults are often found to be the first case in a household with multiple pertussis cases.

Incubation period:
The incubation period usually lasts 7 to 10 days and rarely more than 14 days.

Period of Communicability:
Pertussis is highly communicable in the early catarrhal stage. Communicability gradually decreases after the onset of the paroxysmal cough.
Untreated patients may be contagious for up to 3 weeks after the onset of paroxysmal cough in the absence of treatment or up to 5 days after onset of treatment

Seasonality:
Pertussis has no distinct seasonal pattern, but may increase in the summer and fall.

Risk Factors:
- Low DTP3 coverage (<80%).
- Crowded conditions facilitate transmission. An older sibling or a parent usually brings the disease home.

Case Definition:
Clinical case definition:
- A case diagnosed as pertussis by a physician, **or**
- A person with a cough lasting at least 2 weeks **with at least one** of the following symptoms:
  - ➢ Paroxysms (i.e. fits) of coughing
  - ➢ Inspiratory “whooping”
  - ➢ Post-tussive vomiting (i.e. vomiting immediately after coughing)

Laboratory criteria:
- Isolation of *Bordetella pertussis,* **or**
- Detection of genomic sequences by polymerase chain reaction (PCR)
- Positive paired serology

Case classification:

- **Clinical case:** A case that meets the clinical case definition
- **Confirmed case:** A clinical case that is laboratory-confirmed

Specimen Collection:

- Collect duplicate nasopharyngeal specimen using calcium alginate swabs on fine flexible wire.
- Bronchial or nasopharyngeal secretions/aspirates may provide superior specimens for culture.
- Collect throat swabs in addition to the nasopharyngeal swabs for isolation of organism on culture.
- Direct plating at bedside of the patients on a freshly prepared Bordet Gengou (BG) medium is the most reliable method for culturing Bordetella.
- In absence of direct plating the Reagan Lowe (RL) transport medium may be used for sample transportation, which is stable for 2 months if refrigerated.

Management:

- Erythromycin or erythromycin estolate or – in case of allergies to erythromycin – trimethoprim-sulfamethoxazole (contraindicated during pregnancy) should be administered for 7-14 days to all **cases** and close **contacts** of persons with pertussis, regardless of age and vaccination status. Doses recommended are 40 mg/kg/day for children and 1 g/day for adults. Drug administration both (1) modifies the course of illness (if initiated early), and (2) eradicates the organism from secretions, thereby decreasing communicability.
- Symptomatic treatment and supportive case-management
- Young infants particularly those younger than 6 months of age should be hospitalized and mild cases require only supportive treatment.
- Methadone (cough suppressant) may be helpful in controlling the severity of paroxysms
- When the illness is of long duration and vomiting is frequent, skilled nursing will be required to maintain nutrition, especially in infants and young children. Seriously ill infants should be kept in a darkened, quiet room and disturbed as little as possible, since any disturbance can precipitate serious paroxysmal spells with anoxia
- Specific attention must be devoted to the maintenance of proper water and electrolyte balance, adequate nutrition and sufficient oxygenation.

Prevention:

All household and close contacts, irrespective of age or immunization status, should receive chemoprophylaxis with erythromycin 40-50 mg/kg per day in four divided doses for 14 days.

Immunization:

- The administration of vaccines is the most rational approach to pertussis control. Active primary immunization against *B. pertussis* infection with the *whole-cell vaccine* (wP) is recommended in association with the administration of diphtheria and tetanus toxoids (DTP). No single antigen pertussis vaccine is available.

- Although the use of *acellular vaccines* (aP) is less commonly associated with adverse reactions, price considerations affect their use, and wP vaccines are the vaccines of choice for most countries, including Iraq.

- In general, pertussis vaccine is not given to persons 7 years of age or older, since reactions to the vaccine (convulsions, collapse, high temperature) may be increased in older children and adults.

- The efficacy of the vaccine in children who have received at least 3 doses is estimated to be 80%: protection is greater against severe disease and begins to wane after about 3 years.

Epidemic control

The highly contagious nature of the disease leads to large numbers of secondary cases among non-immune contacts. Prophylactic antibiotic treatment (erythromycin) in the early incubation period may prevent disease, but difficulties of early diagnosis, costs involved and concerns related to the occurrence of drug resistance all limit prophylactic treatment to selected individual cases. Priority must be given to:

- Protecting children less than 1 year old and pregnant females in the last 3 weeks of pregnancy because of the risk of transmission to the newborn.

- Stopping infection among household members, particularly if there are children aged less than 1 year and pregnant women in the last 3 weeks of pregnancy.

The strategy relies on chemoprophylaxis of contacts within a maximum delay of 14 days following the first contact with the index case. Index cases must avoid contact with daycare centres, schools and other places regrouping susceptible individuals for up to 5 days after the beginning of treatment or up to 3 weeks after onset of paroxysmal cough, or till the end of cough, whichever comes first. All contact cases must have their immunization status verified and brought up to date.

Human Plague

Introduction:
Plague is a zoonotic disease circulating mainly among small animals and their fleas. It is a bacterial disease caused by Yersinia pestis. The bacteria primarily affect swild rodents but can also infect humans. It spreads from one rodent to another by fleas. It is transmitted between animals and humans by the bite of infected fleas, direct contact, inhalation and rarely, ingestion of infective materials. Plague can be a very severe disease in people.
Humans bitten by an infected flea usually develop a bubonic form of plague, which is characterized by a bubo, i.e. a swelling of the lymph node draining the flea bite site.

If the bacteria reach the lungs, the patient develops pneumonia (pneumonic plague), which is then transmissible from person to person through infected droplets spread by coughing. Initial symptoms of bubonic plague appear 7–10 days after infection.

If diagnosed early, bubonic plague can be successfully treated with antibiotics. Pneumonic plague, on the other hand, is one of the most deadly infectious diseases; patients can die 24 hours after infection. The mortality rate depends on how soon treatment is started, but is always very high.

Infectious agent:
Bacterium - Yersinia pestis

Mode of transmission:
Bite of infected fleas especially Xenopsilla cheopis (rat fleas). Person to person transmission is rare but possible through direct exposure to infected tissues, or respiratory droplets for the pneumonic form.

Incubation period:
Ranges from 1 to 7 days

Alert Threshold:
One probable case is an alert and requires an immediate investigation.

Outbreak threshold
One confirmed case is an outbreak

Case-Fatality Ratio:
30%-60% if left untreated

Clinical Presentation:
Infected persons usually start with “flu-like” symptoms after an incubation period of 3-7 days. Patients typically experience the sudden onset of fever, chills, head and body-aches and weakness, vomiting and nausea. Clinical plague infection manifests itself in three forms depending on the route of infection: bubonic, septicaemic and pneumonic.

- Bubonic form is the most common form of plague resulting from the bite of an infective flea. Plague bacillus enters the skin from the site of the bite and travels through the lymphatic system to the nearest lymph node. The lymph node then becomes inflamed because the plague bacteria, Yersinia pestis or Y. pestis, will replicate here in high numbers. The swollen lymph node is called a "bubo" which is very painful and can become suppurated as an open sore in advanced stage of infection;
- Septicaemic form of plague occurs when infection spreads directly through the bloodstream without evidence of a "bubo". More commonly advanced stages of bubonic plague will result in the presence of Y. pestis in the blood. Septicaemic plague may result from flea bites and from direct contact with infective materials through cracks in the skin.
- Pneumonic form of plague is the most virulent and least common form of plague. Typically, pneumonic form is due to a secondary spread from advanced infection of an initial bubonic form. Primary pneumonic plague results from inhalation of aerosolized infective droplets and can be transmitted from human to human without involvement of fleas or animals. Untreated pneumonic plague has a very high case-fatality ratio.

Case Definition:
Disease characterized by rapid onset fever, chills, headache, severe malaise, prostration, **with**

- Bubonic form: extreme painful swelling of lymph nodes (buboes)
- Pneumonic form: cough with blood-stained sputum, chest pain, difficult breathing.

Suspected case:
A case characterized by rapid onset of fever, chills, headache, severe malaise, prostration together with the following symptoms, depending upon whether it is the bubonic or the pneumonic form:

- Bubonic form: Extreme painful swelling of lymph glands (buboes)
- Pneumonic form: Cough with blood-stained sputum, chest pain, difficulty in breathing

Probable case:
A probable case is a suspected case with:
1. A positive FA test for Yersinia pestis in clinical specimen; or
2. PHA test, with antibody titre of > 1:10, specific for the F1 antigen of Y. pestis as determined by HI; or an epidemiological link with a confirmed case.

Confirmed case:
A confirmed case is a suspected or probable case laboratory- confirmed by:
1. Isolation by culture of Y. pestis from buboes, cerebrospinal fluid or sputum; or
2. PHA test demonstrating a four fold change in antibody titre, specific for F1 antigen of Y. pestis (HI test) in paired sera.

Note: Case report universally required by International Health Regulations.

Specimen Collection:
- Specimens best suited for culturing include: fluid aspirated from bubo, sputum and blood (multiple), lymph node, bone marrow and lung tissues
- Serum taken during the early and late stages of infection can be examined to confirm infection.
- Rapid dipstick tests have been validated for field use to quickly screen for *Y. pestis* antigen.
- The specimens (except blood/serum) may be placed in Cary-Blair (enteric) transport media. In the absence of CBT, any sterile container may be used for transportation to the laboratory as quickly as possible.

Management:
Rapid diagnosis and treatment is essential to reduce complications and fatality. Effective treatment methods enable almost all plague patients to be cured if diagnosed in time. These methods include the administration of antibiotics and supportive therapy.
- Streptomycin is the most effective antibiotic against Y. pestis and the drug of choice for treatment of plague, particularly the pneumonic form.
- Standard patient-care precautions should be applied to management of all suspected plague patients. This includes prescribed procedures for hand washing, wearing of gloves, gowns and protective devices to protect mucous membranes of eye, nose and mouth during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions.
- Isolation is necessary only in case of pneumonic form

Prevention:
The objective of preventive measures is to inform people to be aware of the areas where zoonotic plague is active and to take precautions against flea bites and handling carcass while in plague-endemic areas. People should avoid having direct contact with infective tissues, or from being exposed to patients with pneumonic plague.
Case recognition, medical intervention and field investigation
- Identify the most likely source of infection in the area where the human case(s) was exposed, typically looking for clustered areas with large numbers of small animal die-offs. Institute appropriate sanitation and control measures to stop the exposure source;
- Rats should be controlled.
- Powder containing 1.5% dieldrin or 2% Aldrin should be applied to household floor and blown into rat holes kill all the fleas and remain active for 9-12 weeks.
- Ensure dissemination of information concerning areas with active plague transmission, the clinical features of plague and the case definition to health workers;
- Verify that patients have been placed on appropriate antibiotic treatment and that local supplies of antibiotics are adequate to handle further cases;
- Isolate pneumonic plague patients; attendants must wear gowns, masks and gloves. Health personnel conducting laboratory tests or post-mortem exam should take strict precautions.
- Obtain specimens for laboratory confirmation.
- In endemic areas people should avoid handling and skinning wild animals.
- Persons in close contact with pneumonic plague patients should receive antibiotic prophylactic therapy (tetracycline 2g daily or chloramphenicol for a week) within 6 days if they have:
  - ➢ Been exposed to Y. pestis-infected fleas
  - ➢ Had direct contact with body fluids or tissues of a Y. pestis-infected mammal
  - ➢ Been exposed during a laboratory accident to known infectious materials

Immunization:
Plague vaccines at one time were widely used but have not proven to be an approach that could prevent plague effectively. Vaccines are not recommended for immediate protection in outbreak situations. Vaccination is only recommended as a prophylactic measure for high-risk groups (e.g. laboratory personnel who are constantly exposed to the risk of contamination).
Surveillance and control:
- Conduct investigation to identify animals and flea species that are implicated in the plague enzootic cycle in the region and develop a programme on environmental management to limit its potential spread.
- Active long-term surveillance of zoonotic foci and rapid response to reduce exposure during epizootic outbreaks have been successful in reducing human plague.

Poliomyelitis

Introduction:
Poliomyelitis has now been eradicated in the Western hemisphere and most industrialized countries. Incidence is highest in developing countries, where immunization coverage is low and sanitation is poor. The disease is seasonal, occurring more frequently during the rainy season in tropical climates and in summer and early autumn in temperate climates. In Pakistan, transmission starts to increase in midsummer and peaks in the month of September and October. The exact timing of the pattern varies somewhat in the different provinces. In November it starts declining but in southern part of the country it persists through November.

Polio Eradication Initiative:
World Health Assembly in 1988 adopted the goal of eradicating polio by the end of 2000, using the four recommended strategies:

(1) **Improving Routine Immunization Coverage** with polio and other recommended vaccines, to reach a goal of 90% coverage with all doses of recommended vaccines by age 1 year.

(2) **Supplementary Immunization Activities (SIAs),** National Immunization Days (NIDs) and Sub National Immunization Days (SNIDs), in which all children under 5 years of age are given polio vaccine; these days are conducted in two rounds 4 to 6 weeks apart during the low polio season.

(3) **Surveillance for Acute Flaccid Paralysis (AFP),** includes rapid reporting and investigation of all cases of acute flaccid paralysis in children < 15 years of age, with collection of two stool specimens within 14 days of paralysis onset and follow up 60 days after onset for evidence of residual paralysis of each case in which 2 adequate specimens are not obtained.

(4) **Mopping up Immunization,** door-to-door vaccination of all children less than 5 years of age in areas of continued wild virus transmission. Mopping up campaigns are an “endgame” strategy used once most of a country is polio free and the virus is confined to limited geographic areas.

These strategies have resulted in an appreciable decrease in the global burden of disease from poliomyelitis.

Infectious agent:
Polio viruses are from enterovirus subgroup, family Picornaviridae, having three serotypes of poliovirus, labeled P1, P2, and P3, defined by the fact that infection with one serotype does not confer protection against disease caused by either of the other two. Within a serotype, different strains can also be recognized, chiefly on the basis of differences in nucleic acid sequence. The most frequent cause of epidemic polio is poliovirus type 1. It has been observed in countries with successful eradication programs that the first poliovirus serotype to disappear is P2 due to the high immunogenicity of the vaccine against that strain. In fact, P2 is now thought to have been successfully eradicated as it has not been detected anywhere in the world since October of 1999.

In general, 1% of infections with a serotype 1 virus progress to clinical poliomyelitis, the figure being tenfold lower for serotype 3, and even lower for serotype 2. This means that virus, particularly P3, can be very widespread before the first paralytic case is seen, and circulate unobserved for many months if the surveillance is not very sensitive. The reasons for the differences between the serotypes and why some individuals succumb to poliomyelitis, whereas most people are asymptomatic, are not known. The symptoms of the major disease of poliomyelitis are the same for all three serotypes.

Reservoir:
Poliovirus infects only human beings and there is no animal reservoir. The virus does not survive long in the environment outside the human body. There is no long-term carrier state.

Mode of Transmission:
Poliovirus is spread through person-to-person, fecal-oral contact. The virus is intermittently excreted in the stool for one month or more after infection. After initial infection with poliovirus, the virus is shed intermittently in faeces (excrement) for several weeks. The heaviest faecal excretion of the virus occurs just prior to the onset of paralysis and during the first two weeks after paralysis occurs. Individuals with antibody deficiencies may excrete virus for a prolonged period of time,
perhaps years and are at higher risk of paralytic disease. Where hygiene and sanitation are poor, young children are especially at risk of infection and young children who are not yet toilet-trained are a ready source of transmission, regardless of their environment. Polio can also be spread by food or drink contaminated by faeces, but is more often spread directly from child to child. There is also evidence that flies can passively transfer poliovirus from faeces to food. Because of the silent transmission and the rapid spread of the disease, one case of paralytic illness generally represents widespread circulation of virus in a community.

Poliomyelitis is preventable either by vaccination or by the administration of immune-globulins containing antibodies that are specific for poliovirus. The rationale of either approach is to prevent the virus reaching the nervous system and producing irrevocable damage. However, even children protected from paralytic illness by vaccination, may have

transient virus replication in the intestine and be able to spread it to other children. OPV is the most effective means of boosting intestinal immunity and stopping transmission.

Survival of Wild Polioviruses in the Environment		
Environment	**Time for virus infectivity to fall by 90%**	
1. Soil	Summer	1.5 days
	Winter	20 days
2. Sewage	At 23 ^{o} C	26 days
	At 2 ^{o} C	180 days
3. Surface water	Fresh	5.5 days
	Sea	2.5 days

Immunity:
Protective immunity against poliovirus infection develops by immunization or natural infection. Immunity to one poliovirus type does not protect against infection with other poliovirus types. Immunity following natural infection or administration of live oral polio vaccine (OPV) is believed to be lifelong. The duration of protective antibodies after administration of inactivated polio vaccine (IPV) is unknown, and does not result in the same level of intestinal immunity as OPV. Therefore, IPV may not be as effective as OPV in preventing carriage and spread of wild virus from immunized individuals Infants born to mothers with high antibody levels against poliovirus are protected for the first several weeks of life. In endemic countries such as Pakistan, nearly all children have acquired natural immunity by the age of 5 years.

Communicability:
Poliovirus is highly infectious and cases are most infectious from 36 hours after infection, for 4-6 weeks

Incubation period:
The time between infection and onset of paralysis is 4-30 days

Alert Threshold:
One case is an alert requires an immediate notification and sample for confirmation.

Outbreak threshold:
One confirmed case is an outbreak.

Clinical description:
All 3 types of wild poliovirus may cause paralysis, although most infections (at least 95%) remain asymptomatic.

Most symptomatic cases report merely a non-specific febrile illness lasting a few days, and corresponding to the **viremic** phase of the disease. In a few cases the fever can be followed by the abrupt onset of **meningitic** and **neuro-muscular** symptoms, such as stiffness in the neck, and pain in the limbs. Initial symptoms can also include fatigue, headaches, vomiting, constipation (or less commonly diarrhoea).

In a very small percentage of cases (1 or less per 100 infected susceptible persons), the gradual onset (2-4 days) of flaccid paralysis can then follow. **Paralytic** disease usually affects the lower limbs, is typically asymmetric and is more severe proximally. Bulbar paralysis may also occasionally occur, leading to respiratory muscle involvement and death unless artificial respiration is resorted to. The mortality from paralytic poliomyelitis is between 2 and 10%, mainly due to bulbar involvement and/or respiratory failure.

- Risk factors for paralytic disease are a large inoculum of virus, increasing age, pregnancy, recent tonsillectomy, strenuous exercise and intramuscular injections during the incubation period.

- After the acute illness there is often a degree of recovery of muscle function. 80% of eventual recovery is attained within 6 months, although recovery of muscle function may continue for up to 2 years.

- After many years of stable neurologic impairment, in 25-40% of patients new neuromuscular symptoms (weakness, pain and fatigue) develop (post-polio syndrome).

Clinical case definition:

- Acute flaccid paralysis (AFP) in a child aged <15 years, including Guillain-Barré syndrome*; **or**
- Any paralytic illness in a person of any age when polio is suspected.

(*) For practical reasons, Guillain-Barré syndrome will be considered as poliomyelitis until proven otherwise

Case Definition:

Suspected: a case that meets the clinical case definition

Confirmed: AFP with laboratory-confirmed wild poliovirus in stool sample

Polio-compatible: AFP clinically compatible with poliomyelitis, but without adequate virological investigation

Suspected case [acute flaccid paralysis (AFP)]:
Any child under 15 years of age with recent onset of floppy weakness of any cause including Guillian-Barre Syndrome or any person of any age with a paralytic illness, in whom poliomyelitis is suspected.
Confirmed Poliomyelitis cases as per Virological Classification
"An AFP case, from which, the wild poliovirus is cultured". This definition is applied if a country programme has non-polio AFP rate of 1/100,000 children under 15 years of age, two adequate specimens collected from at least 60% of all AFP cases and all specimens processed in a WHO-accredited laboratory. Adequate stool specimens are two stools collected at least 24 hours apart, within 14 days of onset of paralysis, and arriving lab with proper documentation, maintained reverse cold chain, sufficient quantity for laboratory analysis without drying or leakage.
Compatible case:
A case of acute flaccid paralysis (AFP) in which a diagnosis of poliomyelitis cannot be excluded with confidence based on all available clinical and epidemiological information in the absence of good viral cultures, by the Expert Review Committee.
Discarded case:
A discarded case is an AFP case, which is neither diagnosed as confirmed nor compatible with a polio case definition.
Specimen Collection:

- Collect 2 stool samples about 8 grams each (about the size of the tip of thumb) at an interval of 24 to 48 hours for virus isolation as soon as possible or within 14 days of onset of illness in a clean, leak proof, screw-capped container, preferably in a transport medium like Minimal Essential Medium or Eagle's medium.
- Seal the container with tape.
- Place samples immediately after collection in refrigerator at 2-8^{o}C or in a cold box with frozen ice packs.
- Transport specimens to the lab maintaining cold chain with duly filled request form within 72 hours after collection.
- The set of specimens from a single patient should be placed in a single plastic bag just large enough to hold both the containers.

Management:
Management depends on the severity of infection and includes recognition of disease and extent of damage it has caused. Management in different phases is as below: -
Inapparant Poliovirus Infection without symptoms (90-95% infections)
Infection is not apparent and there are no symptoms. Infected person with virus shed virus in stool, and are able to transmit the virus to others.
Abortive Poliovirus Infection (4 8% of infection)
This has non-specific illness with three syndromes observed usually: - upper respiratory tract infection (sore throat and low grade fever), gastrointestinal disturbances (nausea, vomiting, abdominal pain, constipation or, rarely, diarrhoea), and influenza-like Illness. These syndromes are difficult to distinguish from other viral illnesses. Treatment is Symptomatic and recovery is rapid and complete.
Nonparalytic poliomyelitis (l-2% of poliovirus infection)
Non-paralytic aseptic meningitis may cause stiffness of neck, back and/or legs, usually following several days of prodromal symptoms. Increased or abnormal sensations can also occur. Symptoms last from 2 to 10 days and typically there is complete recovery.
Paralytic Poliovirus Infection (<1% of infection)
Polio virus invades and replicates in motor neurons of the anterior horn and brain stem resulting in cell destruction and causing the typical clinical manifestations of poliomyelitis. The actual clinical signs depend on which region of the central nervous system is affected. There could be Spinal polio, most common, Bulbar Polio and Bulbo-spinal Polio. Of paralytic cases, as many as 5-10% is fatal, 10% recover completely and the remainder may have partial recovery with residual paralysis/ weakness
Spinal paralysis
Results from the infection of the lower motor neurons and typically affects only one leg having acute flaccid paralysis. Paralytic illness usually starts 1 to 10 days after prodromal symptoms. Progression to maximum paralysis is rapid (24 days). Paralysis is usually associated with fever and muscle pain and spasms that rarely continue after the temperature has returned to normal. Spinal paralysis is typically asymmetric (i.e. one side affected to a greater degree

than the other), more severe proximally than distally, and deep tendon reflexes are absent or diminished. There is no sensory loss or change in cognition. Treatment includes bed rest, symptomatic treatment, Orthopaedic/ re-constructive surgery and rehabilitation physical and social.
Bulbar Poliomyelitis: -
This is more serious and involves neurons in the brainstem and, therefore, affects breathing. Encephalitis results from the infection of the brain itself; it makes up ~1% of all cases and is usually fatal. Treatment is artificial breathing, if breathing muscles affected and other treatment same as above for paralytic polio.

Prevention:
All children aged 0-59 months should be vaccinated with Oral Polio Vaccine (OPV) through routine and supplementary immunization activity, such as National Immunization days (NIDs) regardless of vaccination status.

There are two types of polio vaccine: 1) trivalent oral (live, attenuated) polio vaccine (OPV) and 2), inactivated or killed polio vaccine (IPV).

Trivalent Oral Polio Vaccine (OPV):
Trivalent oral polio vaccine consists of live, attenuated polioviruses, and is a safe and effective vaccine.

OPV is the vaccine recommended by WHO for polio eradication

WHO currently recommends a formulation of trivalent OPV with 10^6, 10^5, $10^{5.8}$ $TCID_{50}$ per dose for types 1,2, and 3, respectively, for both routine and supplementary immunization. Three doses of OPV will protect at least 80-85% of immunized children from paralytic disease, in most countries but protection may be as low as 70% in the Indian subcontinent.

OPV is given by mouth and its cost is low. The vaccine produces both intestinal and serologic immunity. As a result, children immunized with OPV are unlikely to spread wild poliovirus to other children. When administered during a mass campaign, OPV can interrupt wild poliovirus transmission in the community by inhibiting the spread of virus from infected to non-infected children through boosting intestinal immunity and blocking cellular receptors. Inhibiting transmission of wild virus for long periods of time will allow existing pools of virus in the community to die out.

A disadvantage of OPV is that, for every 10 million doses administered, fewer than 3 children will experience vaccine-associated paralytic polio. This risk goes down with each additional dose. The highest risk dose is the first one received.

Inactivated or Killed Polio Vaccine (IPV):
Inactivated polio vaccine prevents paralytic polio by producing sufficient antibodies in the serum to prevent the poliovirus from entering the nervous system. IPV poses no risk of vaccine-associated paralysis. However, compared to OPV, it produces lower levels of intestinal immunity. Consequently, a person immunized with IPV may be more likely to spread wild poliovirus to other children, compared to a person immunized with OPV. IPV is more expensive than OPV, must be injected by trained personnel, and requires additional equipment and supplies.

Vaccine Schedule:
WHO currently recommends that children receive four doses of OPV before one year of age. In endemic countries, a dose should be given at birth or as close to birth as possible. This is called the “birth dose”, or “zero dose”. The other three doses should be given four to six weeks apart and usually at the same time as DPT. If the zero dose is not given, then a fourth dose of OPV should be given at least one month after the third one, for example at the time of measles immunization.

Doses administered during the Supplemental Immunization Activities (NIDs and SNIDs) do not replace the primary schedule and they are only ***supplemental to*** the primary doses.

Dosage and Administration:
One dose of OPV from most manufacturers consists of 2 drops of vaccine administered directly into the mouth. Due to the safety of the vaccine, there is no upper limit to the number of doses of OPV that can be administered. The only requirement is that at least four weeks are required between two doses for an effective humoral response to occur.

Contraindications:
Children with congenital immune deficiencies, or who are iatrogenically immuno-compromised (e.g. cancer patients) should receive IPV. Otherwise there are no contraindications for administration of OPV. If OPV is given to a child with diarrhoea, the dose should be repeated one month later.

It is important that even sick and hospitalized children receive OPV during immunization campaigns

Rabies

Introduction
Rabies is a viral zoonotic disease, present in all continents except Antarctica and infects domestic and wild animals. It spreads to the people through close contact with infected saliva through bites or scratches. It may be fatal when left untreated. Although it is a vaccine-preventable disease, still poses a significant public health problem in many countries in Asia and Africa, where 95% of human deaths occur due to this infection.

Infectious agent:
Rabies virus, a Rhabdovirus of the genus *Lyssavirus*

Mode of transmission
Usually by the bite of an infected mammalian species (dog, cat, fox, bat, etc.).
No human to human transmission has been documented.

Incubation Period
The incubation period usually ranges from 2 to 10 days but may be longer (up to 7 years)

Period of communicability
In dogs and cats, usually for 3-7 days before onset of clinical signs (rarely over 4 days) and throughout the course of the disease. Longer periods of excretion before onset of clinical signs have been observed with other animals.

Seasonality
No specific seasonality reported

Alert Threshold
One case in a susceptible animal species and /or human must lead to an alert

Clinical description
- Paresis or paralysis, delirium, convulsions
- Without medical attention, death in about 6 days, usually due to respiratory paralysis.

Clinical case definition
An acute neurological syndrome (encephalitis) dominated by forms of hyperactivity (furious rabies) or paralytic syndrome (dumb rabies) that progresses toward coma and death, usually by respiratory failure, within 7-10 days after the first symptom.

Laboratory Diagnosis
One or more of the following:
- Detection of rabies viral antigens by direct fluorescent antibody (FA) in clinical specimens, preferably brain tissue (collected *post-mortem*)
- Detection by FA on skin or corneal smear (collected *ante-mortem*)
- FA positive after inoculation of brain tissue, saliva or CSF in cell culture, in mice or in suckling mice
- Detectable rabies-neutralizing antibody titre in the CSF of an unvaccinated person
- Identification of viral antigens by PCR on fixed tissue collected post mortem or in a clinical specimen (brain tissue or skin, cornea or saliva)
- Isolation of rabies virus from clinical specimens and confirmation of rabies viral antigens

Case classification
HUMAN RABIES:
- **Suspected:** A case that is compatible with the clinical case definition
- **Probable:** A suspected case plus history of contact with a suspected rabid animal

Confirmed: A suspected case that is laboratory-confirmed

Human Exposure to Rabies:
Possibly exposed: A person who had close contact (usually a bite or a scratch) with a rabies-susceptible animal in (or originating from) a rabies-infected area.
Exposed: A person who had close contact (usually a bite or a scratch) with a laboratory-confirmed rabid animal.

Mnagement
There is no specific treatment for rabies, which is a fatal disease.
The most effective mechanism of protection against rabies is to wash and flush a wound or point of contact with soap and water, detergent or plain water, followed by the application of ethanol, tincture or aqueous solution of iodine. Anti-rabies vaccine should be given for Category II and III exposures, as soon as possible according to WHO recognized

regimens. Anti-rabies immunoglobulin should be applied for Category III exposures only. Suturing should be postponed, but if it is necessary immunoglobulin must first be applied. Where indicated, anti-tetanus treatment, antimicrobials and drugs should be administered to control infections other than rabies.

Recommended treatments according to type of contact with suspect animal:

Category	Type of contact with suspect animal	Recommended treatment
I	Touching or feeding an animal Licks on intact skin	None, if reliable case history is available
II	Nibbling of uncovered skin Minor scratches or abrasions without bleeding	Administer vaccine immediately, and stop if 10-day observation or laboratory techniques confirm suspect animal to be rabies negative
III	Single or multiple trans-dermal bites or scratches Contamination of mucous membrane with saliva	Administer rabies immunoglobulin and vaccine immediately and stop if suspect animal confirmed as rabies negative
* If a person develops the disease, death is inevitable. * Universal nursing barrier practices are necessary for the sick people.		

Epidemic Control

Immediate notification if one or more suspected cases are identified

- Confirm the outbreak, following WHO guidelines
- Confirm diagnosis and insure prompt management

Prevevtion

a). Human rabies prevention through:

- Well-targeted post-exposure treatment using modern vaccine types and, when appropriate, antirabies immunoglobulin
- Increased availability of modern rabies vaccine

b). Dog rabies elimination through mass vaccination of dogs and dog population management

Immunization

Human preventive mass vaccination is generally not recommended but can be considered under certain circumstances for the age group 5 to 15 years

Severe Acute Respiratory Syndrome (SARS)

Introduction
Severe Acute Respiratory Syndrome (SARS) is an acute viral infection of respiratory tract, first recognized on 26th February 2003 in Hanoi, Viet Nam. Out of 8,447 persons infected that year, 811 died (9.6% CFR) in 33 countries in Asia, Europe, Middle East, North, Central and South America.

Infectious agent
The infectious agent has been presumptively identified as a novel Coronavirus, provisionally named as SARS-CoV.

Mode of transmission
SARS is primarily transmitted through inhalation of aerosol and/or droplet infection of an affected individual but also by direct contact through contaminated hands, surfaces and body fluids.

Incubation Period
Up to 10 days

Clinical picture
Initially flu-like symptoms, rapid onset of high-grade fever (>38°C) followed by muscle aches, headache, sore throat. In some cases, there may be bilateral pneumonia, progressing to acute respiratory distress requiring assisted breathing on respirator. It may be associated with other symptoms like loss of appetite, malaise, confusion, rash and diarrhoea. Early lab findings may include thrombocytopenia and leucopoenia.

Case definition
Suspected case
1. A person presenting after 1st November 2002 with history of:
- High grade fever (>38ºC) AND
- Cough or breathing difficulty AND
- One or more exposures during the 10 days prior to the onset of symptoms:
  - Close contact with a person who is a suspect or probable case of SARS
  - History of travel, to an area with recent local transmission of SARS
  - Residing in an area with recent local transmission of SARS

2. A person with an unexplained acute respiratory illness resulting in death after 1st November 2002, but on whom no autopsy has been performed AND
- one or more of the following exposures during 10 days prior to onset of symptoms:
  - ➢ Close contact with a person who is a suspect or probable case of SARS.
  - ➢ History of travel to an area with recent local transmission of SARS.
  - ➢ Residing in an area with recent local transmission of SARS.

Suggested laboratory investigations in a suspected case of SARS require the collection and safe transport of the following specimens to the reference laboratory;
- Throat and/or nasopharyngeal swab
- Bronchial lavage
- Blood culture
- Urine specimen
- Blood for complete examination and serology

Probable Case
- A suspect case with radiographic evidence of infiltrates consistent with pneumonia or respiratory distress syndrome (RDS) or chest X-ray.
- A suspect case of SARS that is positive for SARS coronavirus by one or more assays. ELISA, IFA and RT-PCR have been developed but have not been evaluated for routine use.
- A suspect case with autopsy findings consistent with the pathology of RDS without an identifiable cause.

Prevention and Control measures
Care and management of cases
- Good supportive care including intensive therapy has been shown to improve the prognosis.
- No vaccine or chemoprophylaxis is available yet.
- Antibiotics attributed no clinical improvement..
- Avoid public places
- Ribavirin, an antiviral agent, used intravenously in combination with corticosteroids clinically improved some critically ill patients in Hong Kong.

Management of suspected case
- Patients with suspected SARS symptoms should be isolated and cared for using barrier-nursing techniques and by providing surgical mask to the patient.
- Detailed clinical, contact and travel history including occurrence of acute respiratory diseases in contact persons during the last 10 days.
- X-ray chest (CXR) and complete blood count.
- If CXR is normal, discharge the patient with advice to seek medical care if respiratory symptoms worsen, use best personal hygiene, avoid public areas and transportation, confine at home until well.

If CXR demonstrates unilateral or bilateral infiltrates with or without interstitial infiltrations, see management of probable case.

Management of probable case

- Hospitalise under isolation or cohorted with other SARS patients.
- Lab investigation to exclude known cause of atypical pneumonia.
  - Urine examination.
  - Complete blood picture.
  - Blood for culture and serology. Specimens should be collected on alternate days and investigated in the laboratories with proper containment facilities (BL3).
  - Throat and/or nasopharyngeal swabs and cold agglutinin.
  - Bronchoalveolar lavage.
  - Post-mortem examination as appropriate.
- CXR as clinically indicated.
- Treat as clinically indicated (symptomatic treatment).
- Broad-spectrum antibiotics have not appeared to be proven effective in halting SARS progression to date.
- Intravenous Ribavirin in combination with corticosteroids has been shown effective in some cases.

Management of contact of suspected and probable cases

- Reassure.
- Record name and contact in detail.
- Advise to seek medical assistance in the event fever or respiratory symptoms worsen, and immediately report to the health authority.
- Do not report to the work until advised by the physician.
- Minimize contact with family members and friends.

Scabies

Introduction :
Scabies is a contagious skin infection that spreads rapidly in crowded conditions and is found worldwide. Personal hygiene is an important preventive measure and access to adequate water supply is important in control.

The principal sign of the disease is a pimple-like rash that is most commonly found on the hands, especially the webbing between the fingers, the skin folds of the wrist, elbow or knee, the penis, the breast or the shoulder. Infestation often causes intense itching all over the body, especially at night. Scratching of itchy areas results in sores that may become infected by bacteria. A more severe form of scabies, known as Norwegian scabies, is more common among people with weakened immune systems. In this form of the disease, vesicles are present along with thick crusts over the skin. The itching in this type of scabies may be less severe or totally absent.

Infectious agent:
Microscopic *Sarcoptes scabiei mite*

Mode of transmission:
Skin contact with an infected person or contact with towels, bedclothes and undergarments contaminated by infested persons with in last 4-5 days. The mites cannot jump or fly. Adult scabies mites can survive off the skin for up to 48 hours in indoor conditions.

The fertilized female mite Sarcoptes scabei burrows into the skin, depositing eggs in the tunnel behind her. After the eggs are hatched, larvae migrate to the skin surface and eventually change into the adult form. Mating occurs on the skin surface. An adult mite can live up to about a month on a person. Once away from the human body, mites only survive 48-72 hours. The characteristic itchy rash of scabies is an allergic response to the mite. Individuals who are infested with scabies for the first time typically experience symptoms after 4 to 6 weeks. With subsequent infestation, symptoms appear within days.

Scabies spreads principally by direct skin-to-skin contact and to a lesser extent through contact with infested garments and bedclothes. Environments that are particularly vulnerable to the spread of scabies include hospitals, childcare facilities and any crowded living conditions. Infestation is easily passed between sexual partners.

Incubation period:
Ranges from 2 to 6 weeks before itching occurs in a person not previously exposed. Symptoms develop more quickly if a person is re-exposed, often with in one to 4 days.

Alert Threshold:
Case count greater than 1.5 times the mean number of cases over the previous 3 weeks requires investigation.

Outbreak threshold
To be determined by trend.

Case Definition:
Skin infection characterized by rash or lesions and intense itching especially at night. Lesions prominent around finger webs, wrists, elbows, axillaries, beltlines, thighs, external genitalia, nipples, abdomen, lower portion of buttocks, head, neck, palm and soles of infants may be involved.

Management:
- Application of permethrin cream (2 days) or lotion (3days) is treatment of choice.
- It should be applied to all cutaneous surfaces, particularly the hands, fingernails, waist and genitalia at bedtime after taking shower.
- Apply cream or lotion daily on whole of the body.
- Put on clean clothing daily.
- All bed linen and clothing should be washed in hot water and dried in sun and ironed on both sides. If not possible, place the plastic bag away from the family for 5 days.
- All members of the house including regular guests should be treated simultaneously.
- If secondary infection occurs, antibiotics may be indicated.

Prevention:
- Hygiene promotion and education about the disease is most effective means of prevention.
- General cleanliness including body washing and washing of clothes and bed linens.
- Bedding material such as mattresses, bed linens, blankets and clothing should be kept in sun (from 10:00 a.m. to 1:00 p.m.), which will kill the parasites.
- Improved personal hygiene plays an important part in the prevention and control of scabies and depends on access to adequate water-supply. Treatment of patients is with acaricide ointments preceded by a hot bath with liberal use of soap. Infested clothing should be sterilized or washed in hot soapy water. Bedding, mattresses, sheets and clothes may require dusting with acaricides.

Neonatal Tetanus

Introduction

Tetanus is caused by the bacterium *Clostridium tetani*, the spores of which are widespread in the environment and are universally present in the soil.. The disease is caused by the action of a neurotoxin, produced by the bacteria when they grow in the absence of oxygen, e.g. in dirty wounds or in the umbilical cord if it is cut with a non-sterile instrument.

People of all ages can get tetanus. But the disease is particularly common and serious in newborn babies. This is called neonatal tetanus. Most infants who get the disease die. Neonatal tetanus is particularly common in rural areas where most deliveries are at home without adequate sterile procedures

Tetanus is characterized by muscle spasms, initially in the jaw muscles. As the disease progresses, mild stimuli may trigger generalized tetanic seizure-like activity, which contributes to serious complications and eventually death unless supportive treatment is given.

Tetanus can be prevented by the administration of tetanus toxoid, which induces specific antitoxins. To prevent maternal and neonatal tetanus, tetanus toxoid needs to be given to the mother before or during pregnancy, and clean delivery and cord care needs to be ensured.

Infectious agent:

Bacterium - *Clostridium tetani*

Mode of transmission:

Contamination of wound with dust containing spores derived from animal excreta, if childbirth takes place in an unhygienic environment, tetanus neonatorum may result from infection of the umbilical stump or the mother may develop the disease by surgical procedure.

Incubation period:

From 3 days to 21 days, average 10 days.

Alert Threshold:

One case requires investigation for safe birth practices.

Outbreak threshold

None.

Case Definition:

Suspected case:

Any neonatal death between 3 and 28 days of age in which the cause of death is unknown **or** any neonate reported as having suffered from neonatal tetanus between 3 and 28 days of age and not investigated

Confirmed case:

Any neonate with normal ability to suck and cry during the first 2 days of life, and who between 3 and 28 days of age cannot suck normally and becomes stiff or has convulsions (i.e. jerking of the muscles) or both Hospital-reported cases are considered confirmed.

Note:The diagnosis is entirely clinical and does not depend on bacteriological confirmation by the lab. NT cases reported by physicians are considered to be
confirmed. However, investigators should examine NT case records during annual hospital record reviews.

Surveillance and Monitoring:

Routine monthly surveillance: the number of confirmed NT cases should be
included in all routine reports and should be reported separately from
other (non-neonatal) tetanus.

Zero reporting: Designated reporting sites at all levels should report at a specified frequency (e.g. weekly or monthly) even if there are zero cases (often referred to as “zero reporting”).

Active surveillance: major health facilities should be visited regularly (at least
monthly) to identify any NT case admitted or diagnosed in them. Such visits should preferably be made by staff not attached to the health facilities concerned. During these visits, hospital inpatient and outpatient registers should be checked and key clinical staff (e.g. in paediatric and emergency wards) should be asked whether any new NT case has been identified in the hospital since the previous visit.

Management:

- Debridement of any associated wound
- Tetanus immune globulin (Tlg) is given to neutralize the toxin.
- Inj: Penicillin 600mg-6 hourly IV for 7 days (metronidazole if allergic to penicillin) to kill the toxin producing C. tetani.

- Muscle spasms may be treated with muscle relaxants such as chlorpromazine (50-150 mg every 4-8 hours in adults) and diazepam (2-20 mg/IV every 2-8 hours) to control spasms and convulsions.
- Bed rest with a non-stimulating environment is also recommended (dim light, reduced noise and stable temperature).
- Respiratory support with oxygen, endo-tracheal tube and mechanical ventilation may be necessary.
- General measures: Maintain hydration, nutrition and treat secondary infections.

Prevention:
Toxoid as DTP, DT, TT or Td - at least three primary doses given by the intramuscular route

Tetanus is completely preventable by active tetanus immunization, which begins in infancy as a series of DPT shots (D= diphtheria, P= pertussis and T= tetanus). Boosters are given to teenagers and older adults specially who have been injured.

The immediate danger of tetanus can be greatly reduced by the injection of 1200 mg of penicillin followed by 7 days course of oral penicillin.

Thorough cleaning of all injuries and wounds and the removal of dead or severely injured tissue (debridement) may reduce the risk of developing tetanus.

When the risk of tetanus is judged to be present, an injection of 250 units of Human Tetanus Antitoxin should be given and an intra-muscular injection of toxoid that should be repeated 1 month and 6 months later. For those already protected; only a booster dose of toxoid is required.

*In areas or countries where more than 85% of newborns with tetanus die, this definition will be practical for surveillance purposes even though children who survive will be excluded. Where the survival rate is higher, removing death as a criterion may modify the definition.

Tuberculosis

Introduction

Tuberculosis, or TB, is an infectious bacterial disease caused by Mycobacterium tuberculosis, which most commonly affects the lungs. It is transmitted from person to person via droplets from the throat and lungs of people with the active respiratory disease. It is a contagious disease. Like the common cold, it spreads through the air. Only people who are sick with TB in their lungs are infectious. When infectious people cough, sneeze, talk or spit, they propel TB germs, known as bacilli, into the air. A person needs only to inhale a small number of these to be infected.

Left untreated, each person with active TB disease will infect on average between 10 and 15 people every year. But people infected with TB bacilli will not necessarily become sick with the disease. The immune system "walls off" the TB bacilli which, protected by a thick waxy coat, can lie dormant for years. When someone's immune system is weakened, the chances of becoming sick are greater.

- Overall, one-third of the world's population is currently infected with the TB bacillus.
- 5-10% of people who are infected with TB bacilli (but who are not infected with HIV) become sick or infectious at some time during their life. People with HIV and TB infection are much more likely to develop TB.

In healthy people, infection with Mycobacterium tuberculosis often causes no symptoms, since the person's immune system acts to “wall off” the bacteria. The symptoms of active TB of the lung are coughing, sometimes with sputum or blood, chest pains, weakness, weight loss, fever and night sweats. Tuberculosis is treatable with a six-month course of antibiotics.

Infectious agent:

Bacterium: *Mycobacterium tuberculosis.* This complex includes *M. tuberculosis* and *M. africanum* primarily from humans, and *M. Bovis* primarily from cattle.

Mode of transmission:

- Exposure to tubercle bacilli in airborne droplet nuclei produced by people with pulmonary or laryngeal tuberculosis during expiratory efforts, such as coughing and sneezing. Extra-pulmonary tuberculosis (other than laryngeal) is usually noninfectious.

- Bovine tuberculosis results from exposure to tuberculous cattle, usually by ingestion of unpasteurized milk or dairy products, and sometimes by airborne spread to farmers and animal handlers

Progression to active disease:

Progression to active disease can take from weeks to years; latent infections may persist throughout life. The risk of TB occurrence is relatively high during the first year following TB infection, then progressively decreases by half within the 4-5 following years.

Only 10% of infected people with normal immune system will develop clinically evident TB at some point in life: 5% will have an early progression of the disease (primary tuberculosis); the remaining 5% will have a late progression of the disease (post-primary tuberculosis) after a period of initial containment.

Period of communicability:

As long as viable tuberculosis bacilli are being discharged in the sputum. Effective treatment usually eliminates communicability within 2 weeks.

Incubation period:

Incubation period is about 4-10 weeks, but latent infections may persist all life.

Alert Threshold:

An increase in number of cases in crowded settings must lead to an alert and requires an immediate investigation.

Seasonality:

No specific seasonality is reported

Risk Factors:

Population movement/ displacement, overcrowding, the interruption of treatment is the most important cause of development of multi-drug resistant TB (MDR-TB), poor nutritional status increases vulnerability to TB infection and development of active disease,

Case definition:

A case of tuberculosis:

- A patient in whom tuberculosis has been bacteriologically confirmed, or has been diagnosed by a clinician.

A definite tuberculosis case:

- A patient with culture positive for the *M. tuberculosis* complex.
- If culture is not routinely available, a patient with two sputum smears positive for acid-fast bacilli (AFB) is also considered a “definite case”.

TB suspect:

Any person who presents with symptoms or signs suggestive of pulmonary TB, in particular cough of long duration

- May also have haemoptysis, chest pain, breathlessness, fever/night sweats, tiredness, loss of appetite and significant weight loss
- All TB suspects should have three sputum samples examined by light microscopy; early morning samples are more likely to contain the TB organism than a sample later in the day.
  - ➢ 1st day: patient provides an “on-the-spot” sample when he presents to the health facility (sample 1)
  - ➢ 2nd day: patient brings from home a sample collected in the night or early morning (sample 2)
  - ➢ 3rd day: patient provides another “on-the-spot” sample at the healthfacility (sample 3)

Classification by localisation and bacteriology:

Smear-positive pulmonary tuberculosis (PTB+):
Diagnostic criteria should include:
- Two or more initial sputum smear examinations positive for acid fast bacilli (AFB),
  or
- One sputum smear examination positive for AFB **plus** radiographic abnormalities consistent with active pulmonary TB as determined by a clinician,
  or
- One sputum smear examination positive for AFB **plus** sputum culture positive for *M. tuberculosis*

Smear-negative pulmonary tuberculosis (PTB-):
- A case of pulmonary tuberculosis that does not meet the above definition for smear-positive TB.
- Diagnostic criteria should include:
  - ➢ At least three sputum smear specimens negative for AFB,
    and
  - ➢ Radiographic abnormalities consistent with active pulmonary TB,
    and
  - ➢ No response to a course of broad spectrum antibiotics,
    and
  - ➢ Decision by a clinician to treat with a full course of anti-tuberculosis chemotherapy.

Extra-Pulmonary tuberculosis:
TB of organs other than lungs: e.g. pleura, lymph nodes, abdomen, genito-urinary tract, skin, joints and bones, meninges, etc. Diagnosis should be based on one culture-positive specimen, or histological or strong clinical evidence consistent with active extra-pulmonary TB, followed by a decision by a clinician to treat with a full course of anti-TB chemotherapy. Note**:** a patient diagnosed with both pulmonary and extra-pulmonary TB should be classified as a case of pulmonary TB.

Specimen Collection:
Sputum (Expectorated)
- Collect 3 early morning specimens on different days having the volume of 5 to 10 ml containing recently discharged material from the bronchial tree with minimal saliva content.

Sputum (Induced)
- If the patient has difficulty in producing sputum, then induction should be considered by inhalation of a warm aerosol of sterile 5-10% sodium chloride in water produced by a nebulizer.
- The specimen should be clearly marked "INDUCED" on the request slip since nebulized sputum is watery in consistency and could be mistaken for saliva.

Gastric Lavage
- This procedure can be employed where sputum production is unsuccessful. This technique requires professional attention and should only be attempted in the hospital.
- Gastric lavage is performed early in the morning before eating and at least 8 hours after the patient has eaten or taken oral drugs.
- 5-10ml specimen is required and neutralized with 100 mg of sodium carbonate.

Urine
- An early morning midstream specimen should be collected.
- Multiple specimens over several days may be required to obtain a positive specimen.
- Due to contamination and deterioration, 24-hour urine specimens are NOT acceptable. Keep specimen refrigerated until transport.

Blood
- Collect specimens in an Isolator tubes. Store tubes at room temperature and transport on the same day.

Fluids

- Collect body fluids like spinal, pleural, pericardial, synovial, ascitic, blood, pus, and bone marrow by aseptic technique.

Tissue

- Any tissue to be cultured must be collected aseptically in a sterile container without fixatives or preservatives.
- Add sterile saline to keep the specimen moist. Do not place tissue specimen for culture in formalin. Keep refrigerated until transport.
- Be sure specimen is sealed inside double bag, and form is inserted into outer pocket, separated from the specimen itself.
- Transport to lab at 4-8^{o}C (using ice packs to prevent overgrowth of respiratory flora) along with requisition form in the biohazard bag.

Management:

Standardized short-course chemotherapy using regimens of 6 to 8 months.

Good case management includes directly observed therapy (DOT) during the intensive phase for all new sputum-smear positive cases, the continuation phase of rifampicin-containing regimens and the whole of the retreatment regimen.

There are primarily three types of regimens: category 1 regimen for new smear positive (infectious) pulmonary cases, category 2 regimen for retreatment cases, and category 3 regimen for smear negative pulmonary or extra-pulmonary cases.

The chemotherapeutic regimens are based on standardized combinations of 5 essential drugs: Rifampicin (R), Isoniazid (H), Pyrazinamide (P), Ethambutol (E) and Streptomycin (S).

Each of the standardized chemotherapeutic regimens consist of 2 phases:

- Initial (intensive) phase: 2-3 months, with 3-5 drugs given daily under direct observation
- Continuation phase: 4-6 months, with 2-3 drugs given 3 times a week under direct observation, or in some cases (e.g. during repatriation of refugees) 2 drugs for 6 months given daily unsupervised, but in fixed dose combination form.

Staff should observe all doses of rifampicin-containing regimens. Actual swallowing of medication should be checked.

Hospitalized patients should be kept in a separate ward for the first two weeks of treatment.

Immunization:

BCG has been shown to be effective in preventing severe forms of TB such as meningitis in children.

BCG is strongly recommended for all newborn children and any children up to the age of 5 years who have not already received it.

The vaccination of newborns should be incorporated into the immunization programme for all children. Re-vaccination is not recommended.

Prevention and Control:

Detection and treatment of smear positive (infectious) TB cases is the most effective preventive measure.

To ensure the appropriate treatment and cure of TB patients, strict implementation of the DOTS strategy is important. The DOTS strategy is the recommended strategy for TB control, and has the following components:

- Government commitment to ensuring sustained, comprehensive TB control activities
- Case detection by sputum smear microscopy among symptomatic patients self-reporting to health services
- Standardized short-course chemotherapy using regimens of 6 to 8 months, for at least all confirmed smear positive cases. Good case management includes directly observed therapy (DOT) during the intensive phase for all new sputum-smear positive cases, the continuation phase of rifampicin-containing regimens and the whole retreatment regimen.
- A regular, uninterrupted supply of all essential anti-TB drugs.
- A standardized recording and reporting system that allows assessment of case-finding and treatment results for each patient and of the TB control programme's performance overall.

Complementary control strategies:

- Health education to improve awareness and reduce stigma
- Maintaining good ventilation and reducing overcrowding in health clinics, and ensuring hospitalized patients are kept in a separate ward for the first two weeks of treatment.
- Isoniazid prophylaxis is not recommended in refugee situations, except for children being breast-fed by smear positive mothers. If the child is well, BCG vaccination should be postponed and isoniazid should be given to the child for 6 months. In the event of a sudden disruption to the programme, isoniazid may be stopped, and BCG should be given before the child leaves the refugee camp (preferably after a one week interval)

Typhoid and Paratyphoid

Introduction:
Typhoid and paratyphoid fevers are infections caused by bacteria which are transmitted from faeces to ingestion. Clean water, hygiene and good sanitation prevent the spread of typhoid and paratyphoid. Contaminated water is one of the pathways of transmission of the disease.
Typhoid and paratyphoid fevers are caused by the bacteria Salmonella typhi and Salmonella paratyphi respectively. Paratyphoid fever has similar symptoms to typhoid fever but is generally a milder disease.Typhoid and paratyphoid germs are passed in the faeces and urine of infected people. People become infected after eating food or drinking beverages that have been handled by a person who is infected or by drinking water that has been contaminated by sewage containing the bacteria. Once the bacteria enter the person's body they multiply and spread from the intestines, into the bloodstream.
Even after recovery from typhoid or paratyphoid, a small number of individuals (called carriers) continue to carry the bacteria. These people can be a source of infection for others. The transmission of typhoid and paratyphoid in less-industrialized countries may be due to contaminated food or water. In some countries, shellfish taken from sewage-contaminated beds is an important route of infection. Where water quality is high, and chlorinated water piped into the house is widely available, transmission is more likely to occur via food contaminated by carriers handling food.
Infectious agent:
Bacterium - *Salmonella typhi*

Mode of transmission:
Faecal-oral route, particularly contaminated water and food
Fecal oral route, particularly ingestion of water and food contaminated by faeces and urine of patients and carriers.

Faecal carriers occur in about 2% of infected adults. Patients with concurrent
Schistosoma haematobium infection are at higher risk of becoming urinary carriers of *Salmonella typhi.*

Incubation period: Usually between Incubation period is usually 8-14 days but may be from 3 days up to one month

Period of communicability:
From the symptomatic period for 2 weeks. 2-5% of infected cases remain carriers for several months. Chronic carriers are greatly involved in the spread of the disease

Alert Threshold:
Two or more linked cases are an alert and require an immediate investigation.

Risk Factors:
The general population the risk is related to the lack of availability of safe
food and water. Most important risk factor is Lack of safe water and poor sanitation,overcrowding, population movement and poor access to health facilities

Case Fatality Rate:
Case fatality rate is high (10-20%) in absence of a proper treatment

Case Definition:
Suspected case (clinical case definition):
Clinical diagnosis is difficult. In absence of laboratory confirmation, any case with fever of at least 38^0C for 3 or more days is considered suspect if the
epidemiological context is conducive

Confirmed case:
A suspected case with isolation of *S. typhi* from blood or stool cultures

Carriers:
S. typhi organisms persisting in stools or urine for >1 year after onset of the disease

Suspected case:
Any person with acute illness and demonstrates: Insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhoea and abdominal tenderness progressing to prostration. Pulse is often slower than expected due to the elevation of the temperature.
Confirmed case:
A suspected case that is laboratory confirmed by: Isolation of Salmonella typhi from blood, stool or urine specimens or a suspected case that has positive Widal Test, i.e. a fourfold increase in agglutination titer against S. typhi O and H antigens, in the 3rd week of illness.

In the 1st week of fever, blood culture is the most important diagnostic method in suspected cases. During the 2nd and 3rd weeks, the faeces will contain the organism more frequently.

Specimen Collection:

- Blood culture is one of the most important factors in the isolation of *S. typhi* from typhoid patients.
- Collect 10-15 ml of blood from school children and adults in order to achieve optimal isolation rates; 2-4 ml is required from toddlers and preschool children.
- For blood culture inoculate media at the time of drawing blood.
- Once specimens are inoculated, blood culture bottles should not be kept cold. They should be incubated at 37°C or in tropical countries, left at room temperature, before being processed in the laboratory.

Serum

- Collect 1-3 ml of blood inoculated in a tube without anticoagulant for serological purposes.
- 2nd sample should be collected at the convalescent stage, at least 5 days later.
- Separate serum after clotting and store in aliquots of 200 ml at +4°C.
- Testing can take place immediately or storage can continue for a week without affecting the antibody titre.
- For longer storage the serum may be frozen at -20°C.

Stool

- Collect stool sample in a sterile wide-mouthed plastic container from acute patients, which is useful for the diagnosis of typhoid carriers.
- Specimens should preferably be processed within two hours after collection. If there is any delay, then stored at 4°C or in a cool box with freezer packs and should be transported to the lab in a cool box.
- If stool sample cannot be obtained, rectal swabs inoculated into Carry Blair transport medium can be used but it is less successful.

Management:

Early antimicrobial treatment, selected according to the antimicrobial resistance pattern of the strain:

- Quinolones (e.g. oral ciprofloxacin) are the drugs of choice. Cotrimoxazole, chloramphenicol, ciprofloxacine and ampicilline are also used, but some strains have developed widespread resistance to these antibiotics in the past 30 years. More recently, in some areas resistance to ciprofloxacin has emerged.
- Supportive care such as oral or intravenous rehydration, antipyretics and appropriate nutrition also plays an important role.

Epidemic Control

Epidemics often occur as point-source epidemics, ranging from healthy carriers to food (including use of contaminated utensils). Outbreaks may occur through person-to-person contamination (faecal-oral transmission via contaminated hands or instruments). Direct faecal contamination of untreated water supplies may cause extensive outbreaks.

Investigations must pinpoint the source and mode of infection to identify corrective measures for application (chlorination/boiling of water, selective elimination of suspect food).

- Inform the Health Authorities if one or more suspected cases are identified
- Confirm the outbreak, following WHO guidelines
- Confirm the diagnosis and ensure prompt treatment

Prevention:

Two basic actions can protect from typhoid fever; avoid risky foods and drinks and get vaccinated against typhoid fever. Eat only thoroughly cooked and still hot foods. Avoid raw vegetables and fruits that cannot be peeled. Avoid salads, food and beverages from street vendors. Flies must not be allowed to access food.

Immunization:

- Mass immunization may be an adjunct for the control of typhoid fever during a sustained, high incidence epidemic. This is especially true when access to wellfunctioning medical services is not possible or in the case of a multi-drug resistant strain
- A parenteral vaccine containing the polysaccharide Vi antigen is the vaccine of choice amongst displaced populations. An oral, live vaccine using *S. typhi* strain Ty21a is also available
- Neither the polysaccharide vaccine nor the Ty21a vaccine is licensed for children under two years old. The Ty21a vaccine should not be used in patients receiving antibiotics

Steps for Management of a Communicable Disease Outbreak

1. Preparation

Health Co-ordination meetings: identification of tasks and responsible persons
Surveillance system – Weekly Health Reports to WHO
Stockpiles – specimen kits, appropriate antibiotics, IV fluids
Epidemic Investigation kits
Contingency plans for isolation wards in hospitals
Laboratory support

2. Detection

If you diagnose a case of the following diseases/syndromes:

- *Bloody diarrhoea*
- *Acute watery diarrhoea*
- *Suspected cholera*
- *Measles*
- *Meningitis*
- *Acute haemorrhagic fever syndrome*
- *Acute jaundice syndrome*

or *a cluster of deaths of unknown origin*

- ➢ Inform your Health Co-ordinator as soon as possible
- ➢ Health Co-ordinator shall inform WHO
- ➢ Take a clinical specimen for laboratory confirmation (e.g. stool, serum, CSF)
- ➢ Include the case in Weekly Health Report

3. Confirmation

- MoH will investigate cases reported to verify that an outbreak exists, in collaboration with WHO where appropriate
- Clinical specimens will be sent for testing
- MoH will set up an Outbreak Control Team with membership from relevant organizations - WHO, health NGOs, water and sanitation NGOs, veterinary experts, UNICEF
- Experts from WHO-Global Outbreak Alert and Response Network may be mobilised to provide field support for investigation and control if necessary.

4. Response

a). Investigation

- Collect/analyse descriptive data to date (e.g. age, date of onset, location of cases)
- Develop hypothesis for pathogen/source/transmission
- Develop outbreak case definition
- Follow up of cases and contacts
- Conduct further investigation/epidemiological studies

b). Control

- Implement control measures specific for the disease
- Treat cases with recommended treatment as in WHO guidelines
- Prevent exposure (e.g. isolation of cases in viral haemorrhagic fever outbreak)
- Prevent infection (e.g. immunization in measles outbreak)

5. Evaluation

- Assess timeliness of outbreak detection and response, cost
- Change public health policy if indicated (e.g. preparedness)
- Write outbreak report and disseminate

Resources Needed for Outbreak Response

- Personnel (trained staff)
- Supplies (e.g. oral rehydration salts, intravenous fluids, water containers, water purifying tablets, drinking cups, vaccines, vitamin A, monitoring forms, vaccination cards, tally sheets)
- Treatment facilities (location, beds available, stocks of basic medical supplies)
- Laboratory facilities (location, capacity, stocks of reagents, etc.)
- Transport (sources of emergency transport and fuel, cold chain)
- Communication links (between health centres; between Ministry of Health, nongovernmental organizations and United Nations agencies)
- Computers (not essential)
- In an outbreak requiring an immunization campaign:

    - ➢ Safe injection equipment (e.g. auto-destruct syringes and safety boxes (puncture-resistant boxes)
    - ➢ Immunization facilities (location, capacity)
    - ➢ Cold chain equipment (number and condition of refrigerators, cold boxes, vaccine carriers, ice-packs

Risk Factors for Outbreaks in Emergency Situations

Acute respiratory	➢ Infections ➢ Inadequate shelter with poor ventilation ➢ Indoor cooking, poor health care services ➢ Malnutrition, overcrowding ➢ Age group under one year old ➢ Large numbers of elderly ➢ Cold weather
Diarrhoeal diseases	➢ Overcrowding ➢ Inadequate quantity and/or quality of water ➢ Poor personal hygiene ➢ Poor washing facilities ➢ Poor sanitation ➢ Insufficient soap ➢ Inadequate cooking facilities
Malaria	➢ Movement of people from endemic into malaria-free zones or from areas of low endemicity to a hyperendemic areas. ➢ Increased population density promoting mosquito bites. ➢ Interruption of vector control measures ➢ Inadequate health care services ➢ Stagnant water ➢ Flooding, Changes in weather patterns
Measles	➢ Measles immunization coverage rates below 80% in country of origin ➢ Population movement Overcrowding
Meningococcal meningitis	➢ Meningitis belt. ➢ Dry season ➢ Dust storms ➢ Overcrowding ➢ High rates of acute respiratory infections
Viral haemorrhagic fever	➢ Tick-infested areas (Crimean-Congo haemorrhagic fever)

Safe Water and Sanitation

The following are effective methods to obtain safe drinking water:

Boiling
To make water safe for drinking and hygiene purposes, bring water to a vigorous, rolling boil and keep it boiling for 1 minute. This will kill, or inactivate, most of the organisms that cause diarrhoea.

Household filtration
Household filtration should considerably reduce the pathogens in the water. It should be followed by disinfection through chlorination or boiling.

Disinfection through chlorination
The following guidelines should be translated into messages that take into account locally available products and measuring devices. To make water safe by chlorination, the first step is to make a stock solution of chlorine.

A stock solution can be prepared by adding the following products to one liter of water:

Product (% concentration by weight of available chlorine)	**Amount for 1 litre**
Calcium hypochlorite (70 %); or	15g
Bleaching powder or chlorinated lime (30%); or	33g
Sodium hypochlorite (5%); or	250 ml
Sodium hypochlorite (10 %); or	110 ml

The stock solution must be stored in a closed container, in a cool dark place and used within one month. It should be used to prepare safe water as follows:

Stock solution	**Added volume of Water**
0.6 ml or 3 drops	1litre
6 ml	10 liters
60 ml	100 liters

Mix by stirring and allow the chlorinated water to stand for at least 30 minutes before using it. The free residual chlorine level after 30 minutes should be between 0.1 to 0.5 mg/litre. If the free residual chlorine is not within this range the number of drops of the stock solution should be adjusted so the final product falls within this range.

If the water is cloudy or turbid it must either be filtered before chlorination or boiled vigorously rather than chlorinated.
Chlorination of turbid water might not make it safe.

Sanitation
Good sanitation can markedly reduce the risk of transmission of intestinal pathogens, especially where its absence may lead to contamination of clean water sources. High priority should be given to observing the basic principles of sanitary human waste disposal, as well as to ensuring the availability of safe water supplies.

Appropriate facilities for human waste disposal are a basic need of all communities; in the absence of such facilities there is a high risk of water-related diseases. Sanitary systems that are appropriate for the local conditions should be constructed with the co-operation of the community.

People will need to be taught how to use latrines, about the dangers of defecating on the ground, or in or near waters, and about the importance of thorough hand-washing with soap or ash after any contact with excreta. The disposal of children's excreta in latrines needs to be emphasized.

Alert Thresholds

Acute watery diarrhoea	5 cases in the 5 years and over age group
Bloody diarrhoea	5 cases
Measles	1 case
Meningitis - suspected	5 cases or 1.5 times the baseline
Acute haemorrhagic fever syndrome	1 case
Acute jaundice syndrome	5 cases or 1.5 times the baseline
Malaria	5 cases or 1.5 times the baseline
Acute flaccid paralysis (suspected poliomyelitis)	1 case
Neonatal tetanus	1 case
Fever of unknown origin	1.5 times the baseline
Other communicable diseases	1.5 times the baseline
Unknown disease occurring in a cluster	report any cluster

General Line List

Reporting Mechanisms

- ➢ In each health facility, a daily register of consultations should be kept
- ➢ Suggested layout of register in health facility:

OPD no	Date	Name	Location	Sex	Date of birth	New case/ Follow up	Diagnosis	Treatment