Ministry of National Health Services, Regulations & Coordination
Government of Pakistan
National Institute of Health, Islamabad, Pakistan
Field Epidemiology & Disease Surveillance Division (FE&DSD)
Tel: 051-9255237, 9255575
National Focal Point for International Health Regulations (IHR)

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SEASONAL AWARENESS AND ALERT LETTER (SAAL)

For Epidemic-prone infectious diseases in Pakistan

Winter Season

OBJECTIVES OF SAAL

- To alert concerned health authorities and professionals at all levels regarding the epidemic-prone infectious diseases in the winter season.
- To facilitate the preparations for timely and efficient response to the encountered alerts / outbreaks and thus reduce the associated morbidity and mortality

DATA SOURCES

The available national data collected during 2014 to 2019, by FE&DSD, NIH, Provincial Health Departments, Provincial Disease Surveillance & Response Units (PDSRUs), Expanded Program on Immunization (EPI), Directorate of Malaria Control and laboratory-based data from NIH has been analyzed to assess the exhibited patterns of high priority communicable diseases.

The description of all priority infectious diseases has been arranged in an alphabetical order. Additionally, under the section of National Potential Public Health Events, outbreaks of Human Immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS) and *Salmonella Enterica Serovar Typhi* (extensively drug resistant strain) are included. Ebola Virus Disease (EVD), and Yellow Fever have been shared as International Potential Public Health Events.

Outbreak - Prone Diseases	Alerts
Crimean Congo Hemorrhagic Fever (CCHF)	
Chikungunya	
Dengue Fever	
Diphtheria	
Gastroenteritis (Acute)	
Leishmaniasis	
Malaria	
Measles	
Meningococcal Meningitis	
Pertussis	
Poliomyelitis	
Seasonal Influenza-A (H1N1, H5N1)	
Typhoid Fever	
Viral Hepatitis (Acute)	

	High Alert-peak occurrence in the season
	Medium Alert-cases will be countered and any show up as an outbreak

CRIMEAN-CONGO HEMORRHAGIC FEVER (CCHF)

Introduction: A tick-borne zoonotic viral disease that is asymptomatic in infected animals, but is a serious threat to humans [1]. Human infections begin with nonspecific febrile symptoms, but progress to a serious hemorrhagic syndrome with a high case fatality rate (10-40%) [2]. It is one of the most widely distributed viral hemorrhagic fevers occurring in different parts of Africa, Middle-East, Asia and Europe. CCHF is endemic in Pakistan with sporadic outbreaks [3].

Occurrence of virus is correlated with the distribution of *Hyalomma* Tick species (Principle vector) [4].

Clinical Picture: Sudden onset with initial signs and symptoms including headache, high grade fever, backache, joint pain, upper abdominal pain, vomiting, redness of eyes, flushed face, sore throat, and petechiae (red spots) on the palate. Symptoms may also include jaundice along with changes in mood and sensory perception. With progression of the illness, large areas of severe bruising, severe nose bleeding, and uncontrolled bleeding at injection sites can be seen, usually beginning on the fourth day of illness and lasting for about two weeks [5].

Infectious Agent: Crimean-Congo Hemorrhagic Fever (CCHF) Virus belongs to *Bunyaviridae* family [1].

Reservoir: *Hyalomma tick*, domestic animals, such as cattle, goats, sheep, rodents such as hedgehog, rats, hares and birds are generally resistant with the exception of Ostrich [6].

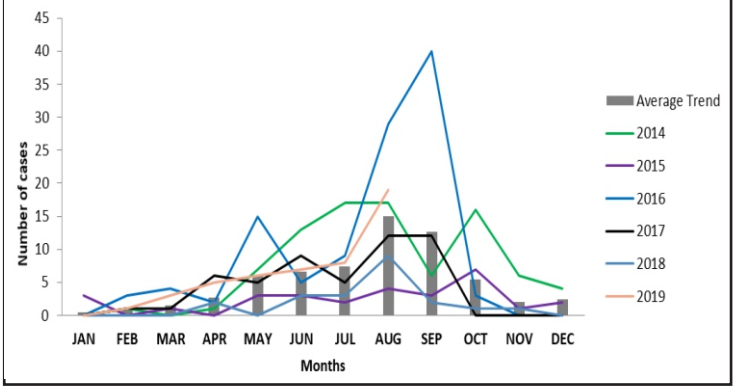
Mode of transmission: Bite of infected *Hyalomma* tick (vector), handling of tick infested animals, direct contact with blood/ tissue of infected domestic animals (slaughtering); or direct contact with blood/ tissue of infected patients. Nosocomial infections are common source of infection [7].

Incubation Period:

- 1-3 days after tick bite
- 5-6 days after exposure to infected blood or tissues with a maximum of 13 days [8].

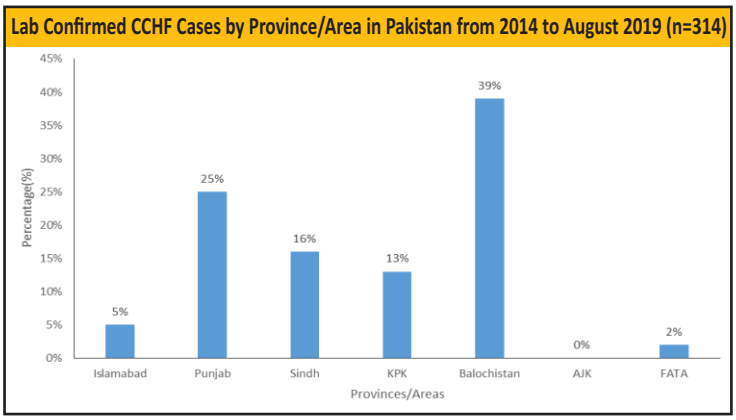
Seasonality: Peak of cases occur during Fall and Spring seasons, associated with life-cycle of ticks, exposure of new born animals, exposure of migrant animals [9].

Lab Confirmed CCHF Cases by Months in Pakistan, from 2014 to August 2019 (n=314)



Geographical Distribution in Pakistan: Since the diagnosis of first human case of CCHF in 1976, the sporadic cases have continued to occur all over Pakistan and predominantly in Balochistan [10].

Alert threshold: One probable case is an alert and requires immediate investigation [11].



Outbreak threshold: One lab confirmed case of CCHF is an outbreak [1]

Case Definitions:

Suspected Case: Any person with sudden onset of fever over 38.5°C for more than 72 hours and less than 10 days, especially in a CCHF endemic area and those in contact with livestock such as shepherds, butchers, animal handlers and health care personals [11].

Probable Case: Suspected case with history of febrile illness for 10 days or less with epidemiological link AND any two of the following: thrombocytopenia less than 50,000/mm^3, petechial or purpuric rash, epistaxis, hematemesis, hemoptysis, blood in urine and/or stools, ecchymosis and gum bleeding [11].

Confirmed Case: Suspected/ probable case confirmed through PCR and/ or serology [11].

Laboratory Confirmation:

Blood for PCR test and ELISA test [11].

Specimen collection: Collect 3-5ml of blood in a vacutainer observing strict biosafety precautions. Keep in upright positions to prevent hemolysis. Sample storage at 2-8°C. Transport to the laboratory in triple package with ice packs along with a prominent Bio-Hazard label and complete lab request form with brief history of the patient [11].

Case Management:

- Patients with probable or confirmed CCHF should be isolated and cared for using strict barrier-nursing techniques with recommended Infection Prevention & Control (IPC) measures i.e. standard plus contact precautions. Use additional precautions, (droplet/aerosol) in case of any extensive contact/ procedure.
- Only designated medical/ para-medical staff and attendants should attend the patient.
- All medical, para-medical staff and attendants should wear recommended Personal Protective Equipments (PPEs) before entering the isolation room and dispose it properly after use.
- All secretions of the patient and hospital clothing in use of the patient and attendants should be treated as infectious and where possible, should be autoclaved before incineration.
- Every effort should be made to avoid spills, pricks, injury and accidents during the management of patients. Needles should not be re-capped but discarded in a proper safety disposal box.
- All used material e.g. syringes, gloves, cannula, tubing etc. should be collected in autoclave-able bags and should be autoclaved before incineration.
- After the patient is discharged from the hospital, room surfaces should be wiped down with disinfectant like Sodium Hypochlorite (NaOCl) 10% solution and the room should be fumigated in case of risk for tick infestation [12].

Treatment: 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 needs to be initiated immediately in consultation with the attending physician. Studies suggest that Ribavirin is most effective if given in the first 6 days of illness. Oral Ribavirin: 30 mg/kg as loading dose, followed by 16 mg/kg every 6 hours for 4 days and then 8 mg/kg every 8 hours for 3 days [13].

Prophylaxis Protocol:

- The efficacy for post exposure Ribavirin in the management of hospital-associated CCHF, remain anecdotal.
- It may be given in a high loading dose (35 mg/kg orally followed by 15 mg/kg three times daily for 10 days) and only for high-risk settings (e.g. needle stick injury, mucous membrane contamination, emergency resuscitative contact or prolonged intimate exposure during transport) after baseline blood tests.
- Household or other contacts of the case who may have been exposed 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 temperature of 38.5°C or greater, headache and muscle pains, he/she would be considered as a probable case and should be admitted to hospital and started on Ribavirin treatment ASAP [12].

Preventive measures & vaccination: Educate public about the mode of transmission and personal protection. Persons living in endemic areas must be educated on:

- 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)
- Wearing light-colored clothing covering legs and arms and using repellents on the skin.
- 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.
- For tick control, animals dipping/ spraying in an insecticidal solution of permethrim/ pyrethrim/ DEET. Injectable insecticide i.e. Ivermectin is also recommended.
- Butchers should wear gloves and other protective clothing to prevent skin contact with freshly slaughtered meat, blood and other tissues. Meat should drain 30 minutes, before distribution to public.
- Hospitals in endemic areas should ensure universal precautions in OPD and emergency rooms. Ensure injection safety measures and maintain stock of Ribavirin and PPEs.
- Bio-safety is the key element to avoid nosocomial infection. Patients with suspected or confirmed CCHF must be isolated and cared by using barrier-nursing techniques to prevent transmission of infection to health workers and others.
- In case of death of patient positive with CCHF, family should be advised to follow safe burial practices.
- Exposed contacts: Those with high risk exposures (needle stick, sharps, blood or body fluids contacts) should be observed for fever for 14 days. If fever develops, Ribavirin should be started immediately [12].

- There is no approved vaccine available [13].

Guidelines Link:

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CHIKUNGUNYA

Introduction: Chikungunya is a mosquito-borne viral disease which was first reported from Southern Tanzania in 1952. In Pakistan, sporadic cases were reported from different areas especially from Karachi and travel associated cases were reported from Islamabad and Rawalpindi [1].

Clinical Picture: Fever, arthralgia, myalgia, headache, nausea, fatigue and rash. Serious complications are not common with occasional cases of ocular, neurological and cardiovascular complications. There are rare reports of spontaneous abortions and vertical transmission in perinatal period [1].

Infectious Agent: Chikungunya belongs to an *alpha virus* genus *Togaviridae* family, and is heat-sensitive RNA virus [1].

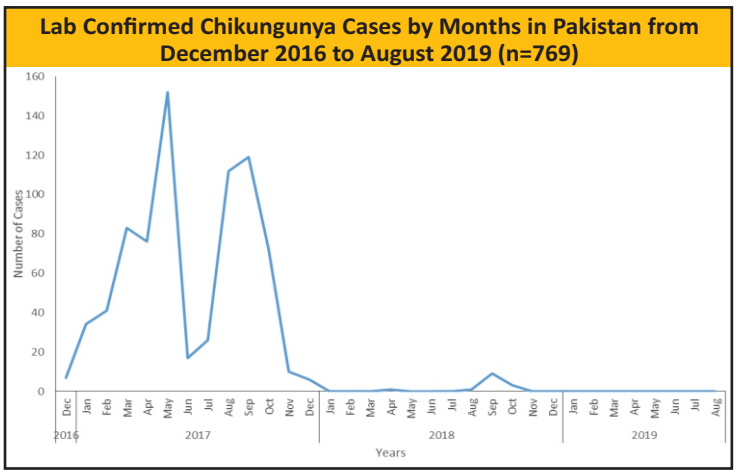
Reservoir: Non-human and human primates are most likely the main reservoirs [2].

Mode of transmission: Transmit through bite of infected female Aedes Aegypti and Aedes Albopictus mosquitoes [1].

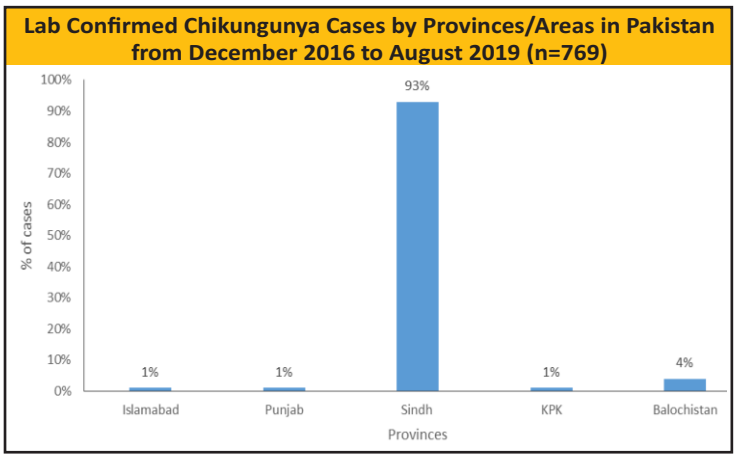
Incubation period: Onset of illness occurs usually between 4-8 days but can range from 2 to 12 days [3].

Communicability: CHIKV infection causes high level of viraemia, which typically lasts 4-6 days, but can persist for up to 12 days after the onset of illness [4].

Seasonality: Chikungunya virus can spread all year round. Warm humid weather and standing water breeds the mosquitoes that carry the virus, which is why an epidemic is most likely to occur during post-monsoon periods [5].



Geographic Distribution in Pakistan: From December 2016 to August 2019, Chikungunya cases are being reported from all over Pakistan and predominantly in Sindh [6].



Case Definitions:

Suspected Case:

Any person with acute onset of fever >102°F (38.5°C) and severe arthralgia/ arthritis not explained by other medical conditions [7].

Probable Case: Any suspected case residing or visited endemic areas within 15 days prior to the development of symptoms [7].

Confirmed case: Suspected/ probable case, confirmed by any of the following laboratory tests:

- RT-PCR within one week after onset of illness
- Serological detection by IgM ELISA after 4 days of the onset of illness
- Four-fold rising of IgG titers in samples collected at least three weeks apart [7].

Specimen Collection and Transportation: Collect 3-5 ml blood of suspected patient in sterile venoject tubes. Tight and seal it with full biosafety precautions. Label and pack it properly in triple packing with ice packs and transport to laboratory along with complete history form [8]. Transport the sample to the Virology Department of PHLD at National Institute of Health, Islamabad, if the diagnostic facility not available in the particular area.

Case Management: There is no specific antiviral drug for Chikungunya. It is a self-limiting disease and treatment is directed primarily at relieving the symptoms, including the joint pain by using anti-pyretic, optimal analgesics and rest [9].

Preventive measures & vaccination:

- No vaccine available
- Minimizing vector population: Intensifying efforts to reduce larval habitats in and around the houses
- Minimizing vector-patient contact
- Using bed-nets (preferably Permethrin-Impregnated nets)
- Wearing full-sleeved clothes to cover extremities
- Using wire-mesh/ nets on doors and windows [10].

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DENGUE FEVER

Introduction: Dengue is a mosquito-borne viral disease (also known as break bone fever), causes flu-like illness, and occasionally develops into a potentially lethal complications. The global incidence of Dengue has grown dramatically in recent decades and about half of the world's population is now at risk [1]. The first outbreak of dengue fever in Pakistan was confirmed in 1994, but a sudden rise in dengue cases and the annual epidemic trend in the provinces has been observed multiple times there after [2].

Clinical Picture:

Dengue fever: Dengue fever is defined by fever (for>3 days and <10days) as reported by the patient or healthcare provider and the presence of one or more of the following signs and symptoms i.e. nausea/ vomiting, rash, aches, headache, retro-orbital pain, joint pain, myalgia, arthralgia) and tourniquet test positive, Leukopenia (Platelets count <150,000).

Dengue Hemorrhagic Fever: Defined as dengue fever with any one or more of the warning signs i.e. severe abdominal pain or persistent vomiting, red spots or patches on the skin, bleeding from the nose or gums, blood in vomiting, black tarry stools (feces, excrement), drowsiness or irritability, pale, cold or clammy skin, difficulty in breathing, a total white blood cells count of <50,000/mm^3 and Platelets count <100,000.

Dengue shock syndrome (DSS): Defined as a syndrome due to dengue virus with any one or more of the following scenarios:

- Severe plasma leakage evidenced by hypovolemic shock and/or extravascular fluid accumulation (e.g. pleural or pericardial effusion, ascites) with respiratory distress,
- Severe bleeding from the gastrointestinal tract and
- Vital organs involvement [3].

Note: The disease develops into the life-threatening dengue hemorrhagic fever (DHF) in 1-3% cases and sometimes progressing into dengue shock syndrome (DSS) [4].

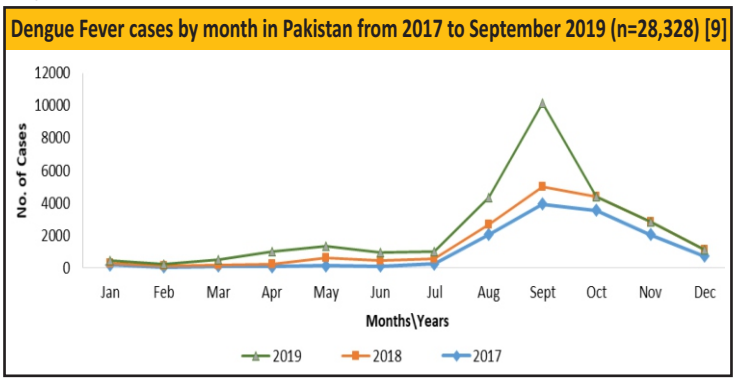
Infectious Agent: Belonging to *Flavivirus* group; four different serotypes of dengue viruses are known as *DEN1, DEN2, DEN3,* and *DEN4* [5].

Mode of transmission: Bite of infected mosquitoes, Aedes Aegypti and Aedes Albopictus [6].

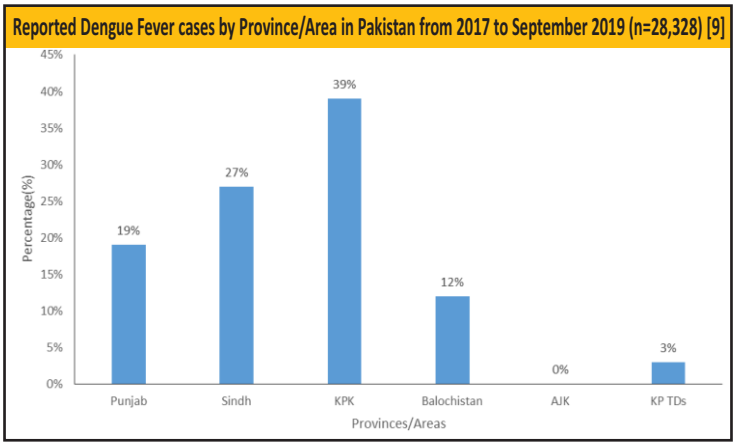
Incubation period: 3-14 days (average 4–7 days) after the infective bite [7].

Period of communicability: 2-7 days [7].

Seasonality: Cases are increased during and after rainy seasons as compared to winter and summer seasons. Relatively humidity, temperature and rain remained significant predictors of dengue incidence in Pakistan. Surge of cases occurred during July to October [8].



Geographical distribution: From January 2017 to September 2019 KPK remained the most affected province with 39% of cases followed by Sindh with 27%.



Alert threshold for dengue fever: Cluster of 3 suspected cases with at least one epidemiologically confirmed case [10].

Alert threshold for Dengue hemorrhagic fever: One probable case is an alert and requires an immediate investigation to assess differential diagnosis with CCHF.

Outbreak threshold: Cluster of 6 suspected cases and one lab confirmed case is an outbreak [10].

Case Definitions:

Suspected Case: A clinically compatible case of dengue fever, or dengue hemorrhagic fever [11]

Probable Case: A clinically compatible case of dengue fever, or dengue hemorrhagic fever with an epidemiologic linkage and laboratory results indicative of probable infection [11].

Confirmed Case: A clinically compatible case of dengue fever, or dengue hemorrhagic fever with confirmatory laboratory results [11].

Lab confirmation:

Probable: Detection of IgM anti-DENV by validated immunoassay in the specimen in those areas where multiple flaviviruses are circulating.

Confirmatory:

- PCR test,
- Non Structural Protein 1 (NS1) antigen.

Timings:

- PCR: Initial 4–5 days of onset of illness
- NS1: One day post onset of symptoms (DPO) up to 18 DPO Serology:
  - IgM antibodies are detectable after 4th day of onset of illness (acute).
  - IgG is used for the detection of past Dengue infection and usually can be detected during 2nd week of illness [11].

Specimen Collection and Transportation: Collect 5 ml of blood, centrifuge, and separate serum for analysis, observing strict safety precautions. Transport serum specimens to the lab in triple container packing with ice packs (for long distance) along with a prominent bio hazard label and complete lab request form with brief history of the patient [10].

Case Management

Febrile Phase: In the early febrile phase, it is not possible to distinguish DF from DHF. The treatment during febrile phase is symptomatic and mainly supportive, as follows:

- Paracetamol 10 mg/kg/dose in children and 500-1,000 mg/dose in adult. Maximum adult dose is 4 grams/day. Do not give Aspirin or other NSAID like Ibuprofen.
- Extra amounts of fluids Oral rehydration therapy (ORT/ ORS) is recommended for patients with moderate dehydration.
- Complete blood count (CBC/CP) with follow up is an important tool in the management of suspected dengue patients.
- Provide brochure for families about the "warning signs" together with other recommendation.
- All dengue patients must be carefully observed for the signs of shock at least for 24 hours after recovery from fever.
- The patient who does not have any evidence of circulatory disturbance and who has been afebrile for > 24 hours does not need further observation and may be discharged [10].

Protocol for management according to Phases of DHF

a. Dengue hemorrhagic fever (DHF) Grades I and II:

As in DF, during the afebrile phase of DHF Grades I and II, the patient has the same symptoms as during the febrile phase. The clinical signs plus thrombocytopenia and rise in hematocrit are sufficient to establish a clinical diagnosis of DHF. During this situation hospitalized the patient and treat accordingly.

b. DHF Grades III and IV (DSS):

Common manifestations observed during the afebrile phase of DHF Grade III are circulatory failure manifested by rapid and weak pulse, narrowing of the pulse pressure characterized by high diastolic pressure relative to systolic pressure, e.g. 90/80 mm of Hg (this is usually due to plasma leakage) or hypotension (possibly due to bleeding), the presence of cold clammy skin and restlessness or lethargy.

- Immediately shift the patient to Intensive care unit (ICU) and treat accordingly.
- The mortality is up to 30%, without treatment but less than 1%, providing adequate treatment by experienced physician in a dedicated facility [10].

Preventive measures:

- Community survey to determine density of vector adaes mosquitoes.
- Identify and destroy mosquito larval habitats and indoor breeding sites.
- Community mobilization should be conducted in schools, through religious leaders, aiming to promote health education campaigns.
- Proper solid waste disposal and improved water storage practices, including covering containers to prevent access by egg-laying female mosquitoes.
- Protection against mosquitoes including use of screening, protective clothing and repellents [10].

Vaccination: In late 2015 and early 2016, the first Dengue vaccine, Dengvaxia (CYD-TDV) was registered in several countries for use in individuals aged 9-45 years living in endemic areas [12].

WHO recommends that countries should consider introduction of the Dengue vaccine CYD-TDV only in geographic settings (national or subnational) where epidemiological data indicate a high burden of disease [13].

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DIPHTHERIA

Introduction: An acute, toxin-mediated Vaccine Preventable (VPD) upper respiratory illness that affects the throat and sometimes tonsils. Diphtheria causes a thick covering in the back of the throat and can involve almost any mucous membrane. Classification based on site of disease are anterior nasal, pharyngeal, tonsillar & laryngeal membrane [1].

Clinical Picture: Sore throat, low grade fever and an adherent pseudo-membrane on the tonsils, pharynx and/or nasal cavity. Symptoms range from sore throat to toxic life-threatening diphtheria of the larynx or of the lower and upper respiratory tracts. The toxin produced by bacteria may also get into the blood stream and can cause damage to the heart, kidneys, and nerves [1].

Infectious Agent: *Corynebacterium diphtheriae*, an aerobic toxin producing gram positive bacillus. *C. diphtheriae* has 4 biotypes i.e. gravis, intermedius, mitis and belfant [1].

Reservoir: Humans are the reservoir for *C. diphtheriae* and are usually asymptomatic [2]

Mode of Transmission: Transmitted from person to person, usually through respiratory droplets (coughing or sneezing). Infection may come by contact/ touching open sore (skin lesions) and material objects(cloths, fomites) used by the patient of diphtheria [2].

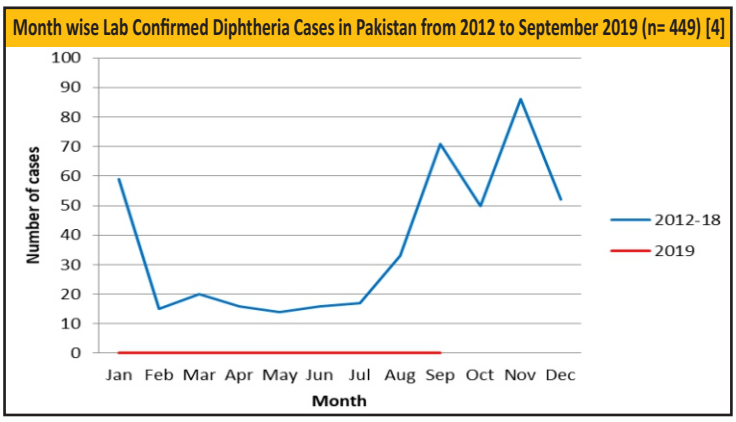
Incubation Period: Usually 2-5 days, occasionally longer [2].

Infectivity/Communicability: Organisms usually persist 2 weeks or less and seldom more than 4 weeks. Chronic carriers may shed organisms for 6 months or more [2].

Seasonality: Throughout the year; higher incidence in winter and spring [3].

Alert Threshold: One probable case is an alert [3]

Outbreak Threshold: One laboratory confirmed case is an outbreak [3]



Case Definition:

Probable Case: In the absence of a more likely diagnosis, an upper respiratory tract illness with each of the following:

- An adherent membrane of the nose, pharynx, tonsils, or larynx AND
- Absence of lab confirmation AND
- Lack of epidemiological linkage to a lab confirmed case of diphtheria [4].

Confirmed Case: Any confirmed case is a probable case that has been laboratory confirmed or linked epidemiologically to a laboratory confirmed case [4].

Carrier: A person with no symptoms but has laboratory confirmation of a toxigenic strain

Discarded: Any suspected or probable case in whom other compatible organisms are isolated or if C. diphtheriae/ C. ulcerans/ C. pseudotuberculosis is isolated but is confirmed to be a non-toxigenic strain [3]

Lab Confirmation:

- Conventional culture method (bacteriological culture testing)

Specimen Collection and Transportation:

- Collect nasopharyngeal and throat swabs by using polyester, or nylon swabs.
- Pieces of pseudo-membrane may also be submitted in sterile saline [not formalin] for culture
- The swabs should be placed in transport media such as Amies or Stuart medium and transport it at ambient temperature [3].

Timings: Specimens for culture should be obtained as soon as diphtheria [involving any site] is suspected, even if treatment with antibiotics has already begun [1].

Case Management:

For Patients:

- Do not wait for laboratory results before starting treatment/ control activities. All cases must receive diphtheria antitoxin (DAT)
  - For mild pharyngeal or laryngeal disease, the dose: 20,000 – 40,000 units
  - For moderate nasopharyngeal disease, the dose: 40,000 - 60,000 units
  - For severe, extensive or late [3 or more days] the dose: 80,000 – 100,000 units
- Removal of membrane by direct laryngoscopy or bronchoscopy may be necessary to prevent or improve airway obstruction.
- Either penicillin 250 mg orally 6 hourly daily or erythromycin 500 mg orally 6 hourly is effective therapy, although erythromycin is slightly more effective in eliminating the carrier stage, should be continued for 14 days.
- Other microlides are probably as effective as erythromycin.
- The patient should be isolated until three consecutive cultures at the completion of therapy have documented elimination of the organism from oropharynx.

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. Unless immunized, children and adults may repeatedly be infected with the disease. All close contacts should remain under surveillance for 7 days [1]

Preventive measures

- Standard plus droplet precautions are recommended with single room isolation.
- Primary prevention of disease by ensuring high population immunity through immunization.
- Secondary prevention of spread by the rapid investigation of close contacts to ensure their proper treatment.
- Tertiary prevention of complications and deaths by early diagnosis and proper management [1].

Vaccination

- Routine immunization consists of 3 doses of 0.5 ml DPT-Hep-B-Hib (Pentavalent Vaccine) administered IM to all the children less than one year of age with the schedule of:
  a. 1stdose at the age of 6 weeks;

b. 2nd at 10 weeks;
c. 3rd at 14 weeks, a booster DTP at 18 months to 4 years.

- If children or adults have not been immunized with three-dose series, children < 5 years should receive DT vaccine, and children ≥ 5 years and adults should receive Td vaccine to complete a series of three doses [1]

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LEISHMANIASIS

Introduction: Leishmaniasis is a parasitic disease and is classified as a Neglected Tropical Disease (NTD). It can present as cutaneous, mucosal and visceral forms but the most common form is cutaneous Leishmaniasis (1).

Leishmaniasis is found in areas of more than 90 countries in the tropics, subtropics, and southern Europe. The annual incidence of new cases is estimated between 1.5 and 2 million. Geographical distribution of the disease depends on sand fly species acting as vectors [2].

Leishmaniasis is one of public health issue in Pakistan and is endemic in Khyber Pakhtunkhwa and Balochistan provinces from where, disease is continuously reported through DHIS since 2011. The KP has reported more than 10,000 cases and Karak, Peshawar, Lower Dir and Malakand are the most affected districts. There are more than 6,000 cases reported from Merged Districts of KP where most affected tribal districts are Khyber and Bajaur. In Balochistan, DHIS has reported more than 68,000 cases from 2007 to 2018 and more than 2,000 cases reported in 2019. The most affected districts are Quetta, Killa Abdullah, Pishin, Sibi, Jhal Magsi and Khuzdar.

Infectious agent: Leishmaniasis is caused by a *protozoa parasite* from over 20 Leishmania species [1].

Mode of transmission: Spread by the bite of the sand fly on the skin. If animals are the primary host reservoirs, it is called Zoonotic Leishmaniasis, if humans are the primary host reservoirs is called Anthroponotic Leishmaniasis. (Human-sand fly-human)[1].

Incubation period: Considered to be at least a week but may extend up to several months [3].

Clinical Features:

(A) Visceral Leishmaniasis (VL): Also known as kala-azar is fatal if left untreated in over 95% of cases. It is characterized by irregular bouts of fever, weight loss, enlargement of the spleen and liver, and anemia [4].

(B) Cutaneous Leishmaniasis (CL)-Oriental sore: It is the most common form of Leishmaniasis and causes skin lesions without involvement of the mucosa, mainly ulcers, on exposed parts of the body, leaving life-long scars and serious disability [4].

(C) Mucocutaneous Leishmaniasis (MCL): MCL is due to L. braziliensis and L. Panamensis. It has two stages.

During the first stage, there is development of a primary cutaneouslesion, which eventually is followed by nasal mucosal involvement, later on destroying the nasal septum. During the second stage, disease can progress to lips, palate and larynx [4].

(D) Post Kala-Azar Dermal Leishmaniasis (PKDL): After a latent period of one year following kala-azar cure, skin lesionscan appear in around 20% of cases [4].

Case Definition:

1. Visceral Leishmaniasis (VL)

Suspected case: A Person with prolonged irregular fever >2 weeks, weight loss, splenomegaly, hepatomegaly, ascites, diarrhea, cough, anemia and bleeding etc.

Confirmed case: A suspected/ probable case of Visceral Leishmaniasis with serological/parasitological confirmation[5].

2. Cutaneous Leishmaniasis (CL)

Suspected Case: A person presenting with one or more lesions (skin or mucosal), skin lesions typically present on uncovered parts of the body; the face, neck, arms and legs which are the most common sites. The site of inoculation may present with a nodular appearance followed by indolent ulcer [5].

Probable case: A suspected case of VL with serological evidence of infection [5].

Confirmed case: A suspected/probable case confirmed by a positives mear or culture [5].

Diagnostic criteria:

(1) History of residence and travel to Leishmaniasis endemic areas

(2) Clinically compatible findings

(3) Laboratory confirmation

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

Specimen Collection:

Cutaneous Leishmaniasis: Skin biopsy is the standard dermatologic technique for obtaining specimen. No preservatives are required for examining LD bodies or for Leishmania culture [5].

Visceral Leishmaniasis: Collect 5ml of clotted blood or serum for serologic studies. Splenic or bone marrow aspirate collected in a tube with anticoagulant is required for the demonstration of amastigote. Specimen may be transported at room temperature without delay[5].

Lab diagnosis: Examination of slides (e.g. of biopsy specimens, impression smears, and dermal scrapings). Serologic testing for detection of antibodies against organisms useful primarily for visceral Leishmaniasis.

Culture: Aspirates of pertinent Tissue/fluid (e.g., skin lesion, bonemarrow, lymph node, blood/Buffy coat) [6].

Case Management: The treatment of Leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographic location. Leishmaniasis is a treatable and curable disease which requires an immuno competent system because medicines will not help rid parasites from the body, thus risk of relapse may occurs with immuno suppression of the patient. All patients diagnosed with visceral Leishmaniasis require prompt and complete treatment.

Detailed information on treatment of the various forms of the disease by geographic location is available in the WHO technical report series 949,''Control of Leishmaniasis'' [7].

Prevention:

- The majority of the recommended precautionary measures are aimed at reducing the contact with phlebotomies (sand fly).
- Prevention of ACL is very similar to Malaria, as sand flies bite at night and indoors.
- Permethrin treated bed nets, should be used in endemic areas. Sand flies are generally more sensitive than mosquitoes toinsecticide, i.e. residual spraying of indoor rooms for 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 [6].

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PERTUSSIS (WHOOPING COUGH)

Introduction: A toxin-mediated disease that can affect people of all ages but can be very serious even deadly among infants. According to a study published in Lancet 2017, it was estimated that globally there were 24·1 million pertussis cases and 160,700 deaths in 2014 from pertussis in children younger than 5 years, with the African region contributing the largest proportions [1]. Despite generally high coverage with childhood pertussis vaccines, it is one of the leading causes of vaccine-preventable deaths worldwide [2].

Clinical Picture: The clinical course of the illness is divided into three stages: Catarrhal, Paroxysmal and Convalescent. Characterized by uncontrollable, violent coughing which often makes it hard to breathe. The disease usually starts with cold-like symptoms and maybe a mild cough or fever. Coughing fits due to pertussis infection can last for up to 10 weeks or more. Some people know this disease as the “100 days cough". Infants may have a symptom known as "apnea." Pneumonia is the most common complication in all age groups; seizures and encephalopathy generally occur only among young infants [2].

Infectious agent: *Bordetella pertussis* [3]

Reservoir: Humans are the only known reservoir [3]

Mode of transmission:

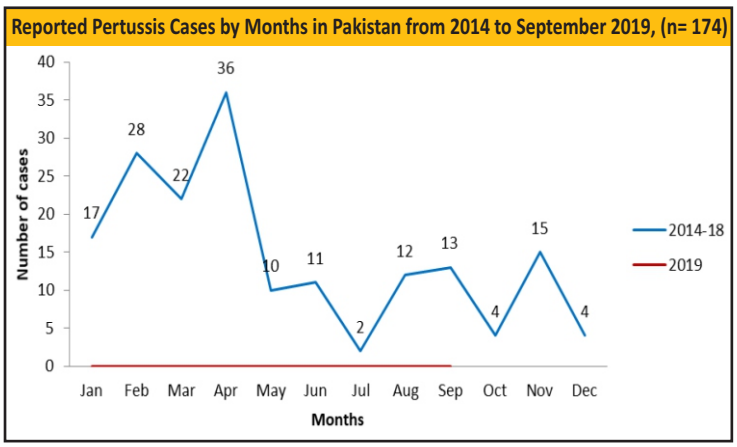
- By direct contact with discharges from respiratory mucous membranes of infected persons
- Airborne [3]

Incubation period: 9 -10 days (range 6-20 days) [3]

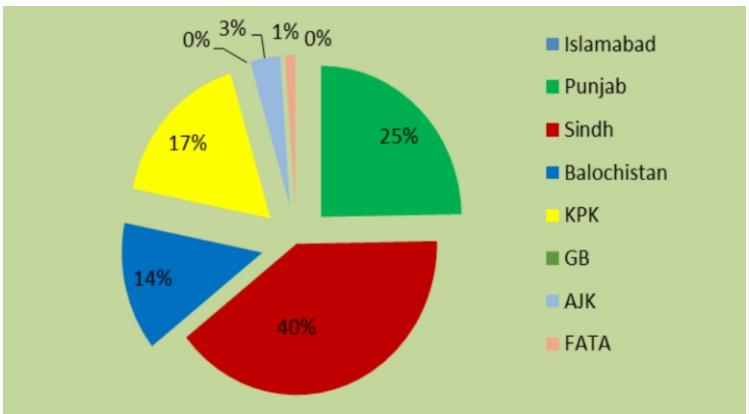
Communicability:

- Highly communicable in the early catarrhal stage and gradually decreases after paroxysmal cough.
- Untreated patients may be contagious for up to 3 weeks after the onset of paroxysmal cough or up to 5 days after onset of treatment [3]

Seasonality: Pertussis has no distinct seasonal pattern [3]



Geographical distribution: During 2014-2019, Sindh province remained most affected with 40% cases from a total of 174 cases of Pakistan.



Alert Threshold: One suspected case [4]

Outbreak threshold: Five suspected cases with one lab confirmed case [4]

Case Definition:

Suspected: A person with cough lasting at least 2 weeks with at least one of the symptoms i.e. paroxysms/ fits of coughing, inspiratory “whooping”, post-tussive vomiting and apnea in infants with or without cyanosis [5]

Probable case: A clinical suspected case with an epidemiological linkage [5]

Confirmed case: Suspected/Probable case confirmed with positive lab test [5]

Lab confirmation:

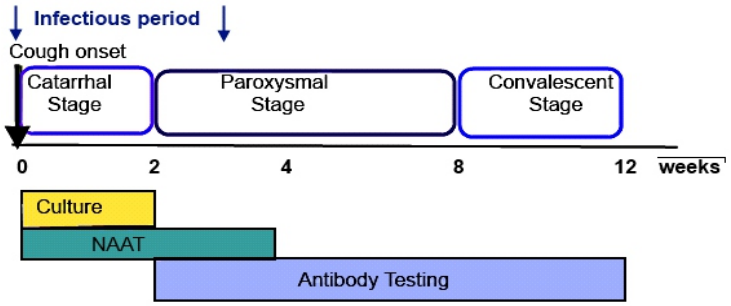
- Culture is the gold standard test

Specimen Collection:

- Collect two 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 [6].

Timing:



Storage: 4-8°C [6]
Packaging: Triple packaging [6]
Transportation: Reagan Lowe (RL) transport medium [6]

Case Management:

- Antimicrobial treatment is more effective in the catarrhal phase, prior to paroxysmal coughing.
- Antibiotic treatment should be initiated in all suspected cases.

Treatment options include:

- Erythromycin 500mg, 6 hourly for 7 days
- Clarithromycin 500mg orally twice daily for 7 days
- Other macrolides as prescribed by the physician
- Trimethoprim-Sulfamethoxazole, 160-800 mg orally twice a day for 7 days
- Young infants particularly those younger than 6 months of age should be hospitalized
- Supportive case management including cough suppressant and good nursing care
- Maintenance of proper water and electrolyte balance, adequate nutrition and sufficient oxygenation [7].

Preventive measures & vaccination

- Timely treatment of the cases decreases the risk of transmission
- Chemoprophylaxis: Erythromycin 40-50 mg/kg per day in four divided doses for 14 days
- Immunization:
  - Active primary immunization against *B. pertussis* infection with the whole-cell vaccine (WP) is recommended
  - Children who have received at least 3 doses are estimated to be protected especially against severe disease. However, protection begins to wane after about 3 years [8].

Vaccination during pregnancies

- It is important for women to get the whooping cough vaccine during 27th week through 36th week of pregnancy [8].
- Return to school: Infected child should avoid school / day care until they have completed 5 days course of therapy or if not treated 21 days after the onset of symptoms [8].

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POLIOMYELITIS

Introduction: A potentially fatal viral infectious disease that can affect nerves and can lead to partial or full paralysis among a proportion of infected children; mainly under 5 years of age. Once affected, the paralysis has no cure, but it can be easily prevented through safe and effective vaccines administered orally (OPV) as well as through injections (IPV].

The disease is marked for global eradication through the World Health Assembly resolution in 1988. The efforts so far reduced endemic countries from 125 to only 3 including Pakistan, Afghanistan and Nigeria. The annual case count during the time has been reduced from over 350,000 to only 33 in 2018.

Polio was declared a Public Health Emergency of International Concern (PHEIC) by WHO on 5th May, 2014 and continues to stay such till date. The Government of Pakistan has also declared Polio as a national public health emergency and an annually updated National Emergency Action Plan (NEAP) is implemented nationwide under the overall supervision of the National Task Force led by the Prime Minister of Pakistan and having on board all provincial chief ministers as well as Prime Minister of AJK.

Province/Area wise distribution of Polio cases in Pakistan, 2012-September 2019

Province/Area	2012	2013	2014	2015	2016	2017	2018	2019
Islamabad	0	0	0	0	0	0	0	0
Punjab	2	7	5	2	0	1	0	5
Sindh	4	10	30	12	8	2	1	6
KPk	27	11	68	17	8	1	2	37
(KPTD)	20	65	179	16	2	0	6	11
Balochistan	4	0	25	7	2	3	3	5
GB	1	0	0	0	0	1	0	0
AJK	0	0	0	0	0	0	0	0
Total	**58**	**93**	**307**	**54**	**20**	**8**	**12**	**64**

Clinical Picture: There are three basic phases of Polio virus infection: subclinical, non-paralytic, and paralytic. Mostly Infection remains asymptomatic but Poliovirus may cause Acute Flaccid Paralysis (AFP); one in 200 infections. The onset of asymmetric paralysis is usually sudden coupled with fever. The severity of weakness also varies with the levels of immunity

among the affected child rendered through immunization. Weakness is ascending and may vary from one muscle or group of muscles, to quadriplegia, and respiratory failure. Proximal muscles usually are affected more than distal muscles and lower limbs more than the upper limbs. Reflexes are decreased or absent while sensory examination may be normal.

Infectious Agent: Poliovirus belongs to genus *Enterovirus* subgroup, family *Picornaviridae,* having three serotypes; labelled as P1, P2, and P3.

Reservoir: Humans are the only known reservoir.

Mode of transmission: Primarily person to person spread through the fecal-oral route. After initial infection with the poliovirus, the virus is shed intermittently in faeces for several weeks.

Incubation Period: 7 - 14 days for paralytic cases (range 3 - 35 days)

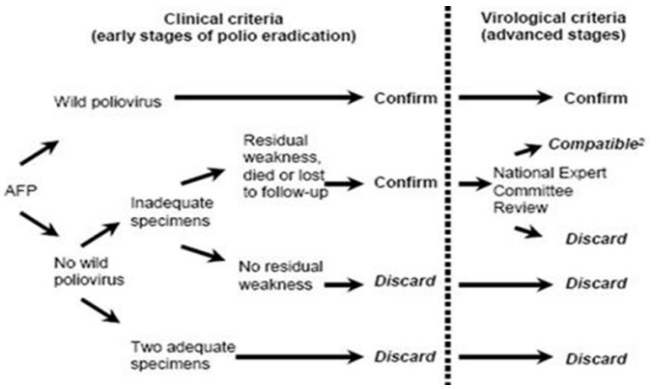
Alert & outbreak threshold: One suspected case of polio is an alert/outbreak and requires an immediate notification and stools sample collection for confirmation.

Case Definitions: This sensitive case definition will capture acute Poliomyelitis but also other diseases, including Guillain-Barre syndrome, transverse myelitis and traumatic neuritis, such that each case with limping must be investigated carefully.

Suspected Case: Acute/ Sudden onset of weakness and floppiness in a child aged <15 years, **OR** paralytic illness in a person of any age whom polio is suspected.

Polio-compatible AFP: A case in which adequate stool specimen could not collected from probable case within 2 weeks of the onset of paralysis, and there is either an acute paralytic illness with polio-compatible residual paralysis at 60 days, or death takes place within 60 days, or the case is lost to follow-up.

Confirmed Polio Case: A case with acute paralytic illness, with or without residual paralysis, and isolation of wild poliovirus from the stools of either the case or its contacts.



Specimen Collection & Transportation: Collect 2 stool samples about 8 grams each (about the size of the tip of both thumbs) 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 and place samples immediately after collection in refrigerator at 2-8°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.

Public Health Measures:

- Achieving a high level of coverage with at least 4 doses of the oral poliovirus vaccine (OPV) and one dose of IPV in routine.
- Providing supplementary doses of OPV to all children<5years old during NIDs, SNIDs as well as the case response planned by the Polio Eradication Programme.
- Active and passive surveillance for all suspected cases of acute flaccid paralysis as well as from the sewerage sample collection.
- Community awareness about vaccination as well as the personal hygiene and sanitation.

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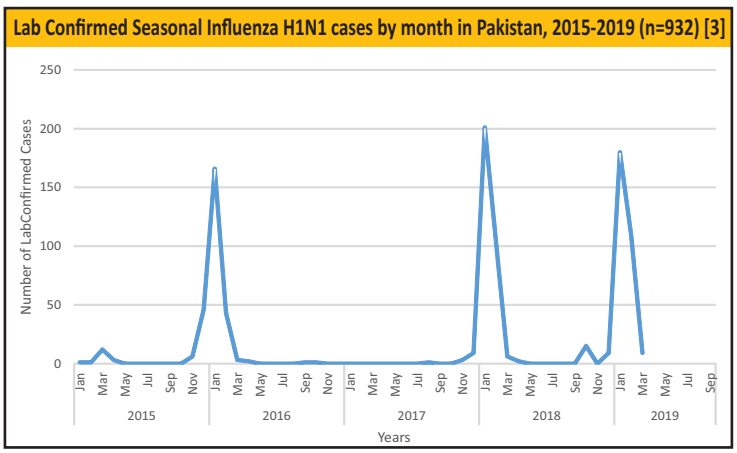
SEASONAL INFLUENZA

Influenza is a contagious respiratory illness caused by *influenza virus.* It can cause mild to severe illness. An older people, young children and people with certain health conditions are at high risk for serious complications. There are 3 types of seasonal influenza viruses, types A, B, and C. Influenza type A viruses are further classified into subtypes and currently circulating among humans are influenza-A(H1N1) and A(H3N2) subtypes. The influenza A (H1N1) emerged in 2009 and caused global influenza pandemic with low mortality rate (0.45%) [1]. During 2010, WHO announced the end of the pandemic period and considered it as normal seasonal flu strain, but recommended clinicians to remain vigilant for influenza cases[2]. In Pakistan, the influenza activity typically starts increasing from September and reaches peak during the winter months. Clinicians to remain meticulous and treat all suspected cases of severe influenza appropriately [3].

Clinical Picture: Seasonal influenza is characterized by a sudden



onset of fever, cough (usually dry), headache, muscle and joint pain, severe malaise (feeling unwell), sore throat and a runny nose. The cough can be severe and can last 2 or more weeks. Most people recover from fever and other symptoms within a week without requiring medical attention. Influenza can cause severe illness or death especially in people at high risk [4].

Case definitions for influenza surveillance: As of January 2014, the WHO global influenza surveillance standards define the surveillance case definitions for influenza-like illness (ILI) and severe acute respiratory infections (SARI) [5].

Influenza Like illness (ILI): An acute respiratory infection with measured fever of ≥ 38°C with cough **AND** onset within the last 10 days [5].

Severe Acute Respiratory Illness (SARI): An acute respiratory infection with history of fever of ≥ 38°C and cough with onset within the last 10 days **AND** requires hospitalization [5].

Sample Collection & Transportation: Respiratory specimens including throat or nasal/nasopharyngeal swabs and nasopharyngeal aspirates/ broncho-alveolar lavage fluid from intubated patients may be collected and placed immediately in Viral Transport Medium (VTM). The samples may be transported to lab at 4 °C within 4 days, or frozen at -20 °C in case of prolonged storage.

Management:

- The symptoms in mild illness are relieved by providing warm fluids and taking rest along with analgesics and antipyretics. Analgesics such as Paracetamol 500mg –1G every 4-6 hours usually relieves headache and generalized pains and cough suppressants such as pholcodine 5-10 mg, 3-4 times daily are generally sufficient. Antimicrobial agents are not effective against viruses, treatment with antibiotics for complications such as bronchitis and pneumonia may be necessary [7].
- Currently, most seasonal Influenza A/H1N1 viruses are sensitive to Neuraminidase Inhibitors, Oseltamivir (Tamiflu) and Zanamivir. Anti-viral treatment should be initiated within the first 2 days of symptoms to ensure positive clinical outcome and to treat 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 years 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-viral agents [7].
- Recommended antiviral medications are not licensed for treatment of children (restrictions are for under 1 year of age for Oseltamivir and under 7 years of age for Zanamivir) [7].

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 [7].

Public Health Measures: Annual winter vaccination (seasonal anti-influenza vaccine) is recommended for health care workers, pregnant women, young children and immuno-compromised patients specially patients with pulmonary, cardiac or renal diseases. About two weeks after vaccination, antibodies develop that protect against influenza virus infection. General precautions include improved ventilation in living places; avoiding close contact with ill people and crowded settings, avoiding touching mouth and nose and regular hand washing with soap. Patients should be encouraged to cover their faces with a mask or handkerchief when coughing and sneezing [8].

Procedures should be developed to ensure proper implementation of administrative controls, environmental controls, and use of personal protective equipment (PPEs). Administrative policies that address adequate staffing and supplies, training of staff, education of patients and visitors, and a risk communication strategy is particularly needed [8].

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TYPHOID

Introduction: Typhoid fever, also known as enteric fever, is a potentially severe and occasionally life-threatening febrile illness, caused by *Salmonella enterica serotype typhi* and also by *Salmonella paratyphi* bacteria. It is transmitted by contaminated water and food and tends to spread in areas with poor sanitation. Asia also has the highest regional frequency rate of 274 cases per 100,000 population, which is five times greater than the second highest, Latin America. Pakistan is highly endemic region and with highest incidence rate 451.7 per 100,000 persons per year of typhoid fever followed by India (214.2 per 100,000 persons/ year).

In Pakistan the first large-scale emergence and spread of a novel *S. typhi* clone harbouring resistance to first and second line antimicrobials including fluoroquinolones. The Sindh is

predominantly affected by this extensively drug resistant (XDR) strain and now cases are being reported from other parts of the country as well. Additionally, travel associated XDR typhoid cases have been identified from abroad also.

Years	Karachi	Hyderabad	Other Districts	Sindh Total
2016	0	12	0	12
2017	175	485	4	664
2018	3712	891	207	4810
2019	3416	1208	715	5339
Total	7303	2596	926	10825

Clinical Picture: The acute illness is characterized by prolonged fever (103°F to 104°f), headache, weakness, nausea, loss of appetite, and constipation. In some cases, patients have a rash of flat, rose-colored spots. Symptoms are often non-specific and clinically non-distinguishable from other febrile illnesses. Complications includes liver disease. While paratyphoid fever can result in death, this is fortunately rare in treated cases.

Infectious Agent: Typhoid fever: *Salmonella enterica serovar typhi.*

Paratyphoid fever: *Salmonella Paratyphi A, B or C.*

Reservoir: Humans are the only reservoir for *Salmonella typhi*, whereas *Salmonella paratyphi* also has animal reservoirs.

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

Incubation period: Ranges from 8-14 days but may be from 3 days up to two months.

Infectivity: The disease is communicable for as long as the infected person excretes *S.typhi* in their excreta, usually after the 1st week of illness through convalescence. Approximately 10% of untreated cases will excrete *S. typhi* for 3 months and between 2-5% of all cases become chronic carriers.

Alert Threshold: The alert threshold for typhoid is 1 case.

Outbreak Threshold: 5 suspected/confirmed cases per 50,000 population.

Case Definitions:

Suspected Cases: Any person with acute illness and fever of at least 38°C for 3 or more days with abdominal symptoms; diarrhea, constipation, abdominal tenderness, prostration and relative bradycardia

Probable Case: A suspected case with a positive sero-diagnosis or antigen detection test but no *S. typhi* isolation.

OR A clinical compatible case that is epidemiologically linked to a confirmed case in an outbreak.

Confirmed Case: A suspected/probable case that is laboratory confirmed by Isolation of *Salmonella typhi* from blood, stool and rarely bone marrow (Gold Standard) specimens.

Chronic Carrier: An individual excreting *S. typhi* in the stool or urine for longer than one year after the onset of acute typhoid fever. (1-5% of patients, depending on age, become chronic carriers harboring *S.typhi* in the gallbladder/kidneys).

Lab confirmation: Blood, Stool and rarely bone marrow (Gold Standard) samples for culture and sensitivity

Specimen Collection:

Blood:

- Collect 3 ml blood for 30 ml broth for culture of Children specimen while 6 ml blood for adult samples
- For blood culture, shift sample in broth bottle at the time of drawing blood.
- Once specimens inoculated, blood culture bottles should not be kept cold.

Stool:

- Collect stool sample in a sterile wide-mouthed plastic container from acute patients, which is useful for the diagnosis of typhoid carriers.

Storage:

Blood: After inoculation, blood culture bottles should be sent as soon as possible. If not possible, keep them in ambient temperature.

Stool sample/ rectal swab for culture: Specimens should preferably be processed within two hours after collection. If there is any delay, then transfer the specimen in transport medium and can keep it in ambient temperature till 72 hours days

If transport medium is not available then transport the sample within 12 hours to the lab or store at 2-4°C or in a cool box with freezer packs up-to 24-48 hours.

Packaging & Transportation: Blood culture bottles should be transported to the referral laboratory as soon as possible at ambient temperature.

Stool and rectal swabs inoculated into Carry Blair transport medium and transport it at ambient temperature and properly packed (Triple Packaging).

Case Management:

Uncomplicated cases: The total treatment duration is 14 days. Antimicrobial agents should be recommended based on culture and sensitivity test report and consultation of medical specialist. However; general recommendations are:

- 1st line antimicrobial agents are ampicillin, trimethoprim & sulfamethoxazole and chloramphenicol.
- 2nd line antimicrobial agents are ceftriaxone and cefixime
- 3rd antimicrobial agent is azithromycin

Complicated cases: Imipenem and meropenem

Do not use Ciprofloxacin/ Quinolones as majority of the isolates are now resistant.

Supportive Care: Oral or intravenous rehydration, antipyretics with appropriate nutrition also plays an important role.

Preventive measures & vaccination

General Preventive measures:

Avoid contaminated food and water, raw vegetables and fruits that can't be peeled off. Avoid half cooked foods also.

Outbreaks may occur through person-to-person contamination (faecal-oral transmission via contaminated hands or instruments), and direct faecal contamination through untreated water.

Typhoid vaccination: Vaccine is not recommended in children under 2 years of age. Two types of vaccines are currently available. TAB for all antigens (I/M Injection) and oral vaccine for S.typhi only.

A new conjugate vaccine TCV is recently approved and is used as a ring vaccination in the regions with XDR salmonella outbreaks.

Note: *Investigations must pinpoint the source and mode of infection to identify corrective measures for application (chlorination/ boiling of water, selective elimination of suspected food; carriers and food handlers).*

- Inform the health authorities if one or more suspected cases are identified.
- Confirm the outbreak, confirm the diagnosis and ensure prompt treatment.
- Mass immunization during sustained, high incidence epidemics.

- All food handlers (domestic or commercial) to be screened for carrier state.

Advisory link: https://www.nih.org.pk/wp-content/uploads/2019/02/Advisory-for-Typhoid-5-oct.pdf

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National Public Health Events

The human immunodeficiency virus (HIV)

Human Immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS): The human immunodeficiency virus (HIV) infects cells (CD4 cell a type of T cell) of the immune system, destroying or impairing their function. Infection with the virus results in progressive deterioration of the immune system, leading to "immune deficiency." The immune system is considered deficient when it can no longer fulfill its role of fighting infection and disease. Infections associated with severe immunodeficiency are known as "opportunistic infections", because they take advantage of a weakened immune system. Acquired immunodeficiency syndrome (AIDS) is a term which applies to the most advanced stages of HIV infection and is often characterized by the presence of any of the more than 20 associated opportunistic infections, complications or cancers.

Present situation in Pakistan: According to Pakistan National AIDS Control Program, there are more than 1,650,000 (1.6 million) people living with AIDS. HIV/AIDS is endemic in many parts of the country. In most recent outbreak of Ratodero, Sindh till September 21, 2019, more than 1000 cases have been confirmed for HIV, in which 80% are children while remaining 20% are adults. All suspected HIV cases were referred to HIV treatment center for confirmation.

Preventive measures and control: Promote Injection safety practices which includes, safe phlebotomy practices, safe disposal of sharps and healthcare waste. Reduce sexual transmission of HIV by the uptake of appropriate HIV preventive measures including safe sex practices and promotion of the use of condoms. Modify the risk behavior of people in the community through “behavior change communication” (BCC). Sexually transmitted infections (STIs) control especially for sex workers, using the syndromic STIs management approach with partner notification and promotion of safer sex. Preventing the transmission of HIV through infected pregnant women to infants by the use of antiretroviral therapy (ART) i.e. Teneforvir, Emtricitabine and Raltegravir throughout pregnancy. Women who have not been received ART during pregnancy should be given intravenous Zidovudine during labor and the neonate should be given oral Zidovudine for the duration of 6 weeks. Unnecessary obstetrical invasive procedures such as artificial rupture of membranes or episiotomy should be avoided.

Occupational exposure: If a person has had occupational exposure to HIV, the following regimen is preferred; Emtricibine plus Tenofovir along with Raltegravir or Dolutegravir for a duration of 4 weeks depending on the type of exposure.

Salmonella Enterica Serovar Typhi (extensively drug resistant strain)

Information incorporated in Typhoid Fever

Potential International Public Health Events

Ebola Virus Disease (EVD)

Introduction: Ebola Virus Disease (EVD) or Ebola hemorrhagic fever (EHF) is the most virulent human viral hemorrhagic disease caused by the *Ebola virus*; with the average case fatality rate is around 50%. Symptoms may appear from 2 to 21 days after exposure which typically include fever, headache, joint and muscle aches, weakness, diarrhea, vomiting, stomach pain, lack of appetite and may be followed by rash, red eyes, difficulty in breathing and swallowing, bleeding from different sites of the body. A person infected with Ebola virus is not contagious until symptoms appear. Ebola cannot spread through the air, food and water. The virus can spread through direct contact with the body fluids of an infected person. No specific drug available however early supportive clinical treatment and management are essential and can improve the chances of recovery.

On 17 July 2019, the Director-General of the WHO declared the current Ebola outbreak in the Democratic Republic of the Congo as a Public Health Emergency of International Concern (PHEIC) under the International Health Regulations (IHR 2005). This is the tenth outbreak of Ebola virus disease over the last four decades in the Democratic Republic of Cong. Till 22 September 2019, there

are total of 3168 cases have been reported in which 3057 are confirmed while 111 are probable cases. Out of these cases 2118 have been died (Surveillance dashboard; WHO 2019).

Risk assessment: The risk is low at global level due to the remoteness and inaccessibility of the area as well as the rapid response launched by the Democratic Republic of Congo MoH, WHO, and all the other coordinating partners.

Public Health Measures: WHO recommends the implementation of proven strategies for the prevention and control of Ebola outbreaks. These strategies include (i) coordination of the response, (ii) enhanced active surveillance, (iii) laboratory confirmation, (iv) contact identification and follow-up, (v) case management, (vi) infection prevention and control, (vii) safe and dignified burials, (viii) social mobilization and community engagement, (ix) logistics, (x) risk communication, (xi) vaccination, (xii) partner engagement, (xiii) research and (xiv) resource mobilization.

Guidelines link: https://www.nih.org.pk/wp-content/uploads/2019/07/Advisory-CCHF-July-2019.pdf

Yellow Fever:

Introduction: An arbovirus of the *Flavivirus* genus and is transmitted by mosquitoes, belonging to the *Aedes* and *Haemogogus* species. Occasionally, infected travelers from areas where yellow fever occurs have exported cases to other countries.

Sign & Symptoms: Once contracted, the yellow fever virus incubates in the body for 3 to 6 days. Many people do not experience symptoms, but when these do occur, the most common are fever, muscle pain with prominent backache, headache, loss of appetite, and nausea or vomiting. In most cases, symptoms disappear after 3 to 4 days.

A small percentage of patients, however, enter a second, more toxic phase within 24 hours of recovering from initial symptoms. High fever returns and several body systems are affected, usually the liver and the kidneys. In this phase people are likely to develop jaundice (yellowing of the skin and eyes, hence the name 'yellow fever'), dark urine and abdominal pain with vomiting. Bleeding can occur from the mouth, nose, eyes or stomach.

Prognosis: Half of the patients who enter the toxic phase die within 7 - 10 days.

Endemicity: Forty seven countries in Africa, thirteen countries in Central and South America are either endemic for, or have regions that are endemic for, yellow fever.

Yellow fever has never been reported from Pakistan but there are vulnerabilities for importation and its potential transmission through presence of vector mosquito (Aedes Aegypti), warm humid environment, susceptible hosts and movements of ships, containers, aircrafts and international travelers. Unvaccinated travelers heading to areas with active yellow fever outbreaks pose a risk of introducing the virus into areas where yellow fever risk factors (human susceptibility, prevalence of competent vector, and animal reservoirs) are present.

Public Health Measures:

- Ensuring the implementation of active disease surveillance, vaccination for travelers, risk communications, community mobilization, vector control, quickly developing diagnostic capacity and case management measures must be in place. Blood tests to detect yellow fever-specific IgM antibodies or virus genome by PCR must be conducted by a highly trained laboratory staff with specialized equipment and materials.
- There is no specific treatment for yellow fever except supportive care. Yellow fever can be prevented by adapting effective vector control strategies.
- Vaccination is the most important means of preventing yellow fever. The yellow fever vaccine is safe, affordable and a single dose provides life-long protection against yellow fever disease. A booster dose of yellow fever vaccine is not needed. WHO recommends vaccination for all travelers older than 9 months of age in areas where there is evidence of persistent or periodic yellow fever virus transmission

Link: https://www.who.int/news-room/fact-sheets/detail/yellow-fever

Mosquito Alert Pakistan ماسکیٹو الرٹ پاکستان

GET IT ON Google Play

The National Institute of Health (NIH) has launched its first-ever android-based application named “Mosquitoes Alert Pakistan”. The app will help to collect information on different mosquito species present in different areas which will ultimately help in mapping out the magnitude of burden related to different mosquito species.

Through this Mosquito Alert app, anyone can send photo of mosquitoes or breeding places. These photos will be part of a common database and will be used for investigation, monitoring and control of mosquitoes.

This information is key for generating a participatory alert system to improve the management of mosquito’s species, minimize the risk of disease transmission and raise awareness among general public. Link of app: https://maa.nih.org.pk/

Produced by the Field Epidemiology & Disease Surveillance Division (FE&DSD)
National Institute of Health, Islamabad

This document can also be accessed at NIH Website www.nih.org.pk , Email: eic.nih@gmail.com
Ph: +92-51-9255237, Fax: +92-51-9255575