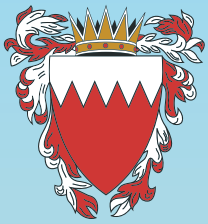
KINGDOM OF BAHRAIN

Ministry of Health



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Guideline for Communicable Diseases Surveillance & Control

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Guideline for Communicable Diseases Surveillance & Control

(Updated 2022)

Kingdom of Bahrain

Ministry of Health

Public Health Directorate

Communicable Diseases Control Group

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Message

In spite of the reduction of communicable diseases morbidity and mortality, the burden of emerging infectious diseases and resurgence of old infections might be overwhelming to the health system; there fore a functioning surveillance program should be a cornerstone of any health system.

Kingdom of Bahrain has established reporting and surveillance system since decades supported by legal frame work. Accordingly, the health system is prepared to rapidly respond to communicable disease threats in order to minimize the impact on the health of people and the health system.

The communicable diseases guidelines underwent several revisions that reflect maturity of planning and commitment of Ministry of Health to secure health of all Bahraini's residents against potential threats. Moreover, continuous review and update of this guidelines has been ensured to be in line with the latest scientific evidence.

Communicable diseases control will reduce the impact of these diseases by minimizing the number of people, who become infected, protecting critical infrastructure and essential services in our society and considerably improving the health outcomes for those who are affected. For this reason, the government of Bahrain continues to invest in planning for potential infectious diseases.

As the prevention, management and control of communicable diseases requires the active participation and cooperation of all health workers, this guideline intended to provide technical information relevant to communicable diseases surveillance and management of some communicable diseases for health care workers.

Contents

Part I -Basic Principles of Diseases Surveillance

This section provides general description of the organization and management of surveillance; role and responsibility of relevant staff at different levels; reporting; management and analysis of data; general guidelines for disease prevention and control as well as investigation of cases and outbreak management.

Section 1: Overview

Introduction

The Diseases Control section-Communicable Diseases Control Group (DCS-CDCG) at the Ministry of Health in Bahrain is responsible for planning, implementing and monitoring preventive measures to control communicable diseases, incidence and prevalence in Bahrain.

Surveillance is a core activity of CDCG as it bears relevance to communicable diseases prevention and control programs. Public health law has specified clearly the procedures that regulate all activities required for the prevention and control of communicable diseases in Bahrain. The law also mandated the notification and investigation of communicable diseases and thus paved the way to the development of the communicable disease surveillance system.

With the changing pattern of the occurrence of communicable diseases and the introduction of more effective surveillance and monitoring methods, it has become important to develop national reference guidelines for such diseases.

This manual which brings together the recommended guidelines for surveillance of Communicable diseases in Bahrain is therefore published to harmonize surveillance activities. The manual should particularly be useful to health workers at all levels of the services in approaching a standardized and integrated system for surveillance of communicable diseases in Bahrain by serving as an easily accessible reference document.

The document is to be updated on a regular basis. This reflects the changing nature of infectious diseases and accompanying diagnostic and surveillance methods. It also reflects the multi-disciplinary nature of disease surveillance in which many different partners are involved i.e. clinical, laboratory and CDCG.

This document has been divided into four parts:

Part I: General Guidelines

This section provides general description of the organization and management of surveillance; role and responsibility of relevant staff at different levels; reporting; management and analysis of data; general guidelines for disease prevention and control as well as investigation of cases and outbreak management.

Part II, Part III and Part IV: Diseases-Specific Guidelines

This section provides specific guidelines for surveillance of the diseases included in the notification list. Each notifiable disease has been discussed in

terms of its epidemiological features, and case definition. It also describes the role and responsibility of staff involved in disease control.

Part V: Syndromic Surveillance

This section provide symptomatic approach to health-related conditions to provide an early warning of human or veterinary public health threats, which require public health action.

Part VI: Communicable Diseases and International Health Regulations (IHR)

This section provide the assessment tool for events that require notification to world health organization (WHO)

Definition of Disease Surveillance:

For the purpose of this document, the term Disease Surveillance is defined as:

"The ongoing and systematic collection, analysis, interpretation, dissemination and feed-back of data, for the planning, implementation and evaluation of disease control activities; in other word *it is an information for action*"

Aim of the Communicable Disease Surveillance System in Bahrain:

The National Communicable Disease Surveillance System in the Bahrain aims at assessing the burden of communicable diseases in the community and providing guidelines for the control of these diseases.

Objectives of the Communicable Disease Surveillance System:

- Assess the burden of communicable diseases in the community (morbidity/mortality)
- Plan, develop and coordinate different surveillance activities
- Standardize national surveillance activities.
- Implement an early warning system for newly emerging and re-emerging diseases; Analysis of disease trends and risk factors;
- Develop standardized methods for interventions of targeted diseases.
- Achieve specific program objectives in collaboration with regional and international agencies (eradication, elimination, control).

Section 2: Integrated National Communicable Disease Surveillance System

Communicable disease control relies on effective disease surveillance. A functional national communicable diseases surveillance system is essential for action on communicable diseases in general and priority diseases in particular. It is a key part of public health decision-making i.e. priority setting, planning, resource mobilization and allocation, prediction and early detection of epidemics, and monitoring and evaluation of disease prevention and control programs.

A strong national surveillance system will form the basis of an effective regional and global network for the surveillance and control of communicable diseases. Strengthening of national surveillance requires substantial and long-term commitment of human and material resources, with a systematic assessment of present national surveillance activities. This will eventually lead to a national plan for surveillance of communicable diseases.

What is National Communicable Disease Surveillance?

Public health law is aimed at regulating the control of communicable diseases in the Bahrain. MOH developed surveillance activities for communicable diseases in order to control diseases, detect outbreaks or epidemics and monitor progress towards national or international control or eradication targets.

Standardized Surveillance activities would facilitate identification, reporting, investigation and control procedures of communicable diseases. It would also facilitate the use of standardized surveillance methods, terminology and reporting forms.

What is meant by an integrated approach to surveillance?

An integrated approach to communicable disease surveillance involves similar functions and very often uses the same structure, processes and personnel. Disease surveillance should be based on collecting information required to achieve the control objectives which may differ from disease to disease. However Eradication and elimination programs may require specialized surveillance systems aimed at detecting every case or suspected case. In other situations, information on outcome may also be important. For example, the rate of treatment and cure in TB control program. Other diseases may require more than one source of data for good decision-making. Despite the variety of information needs, many elements of data collected in surveillance are very similar and the data source is often the same individual or facility.

However specialized surveillance systems may require different approaches as follows:

- The specific case detection method used (active case detection vs passive).
- The speed at which data need to flow through the system (immediate vs routine).
- The rapidity of response required (immediate investigation of clusters of cases vs analysis of data on a regular basis with subsequent adjustments to a control programme).

For the system to function as an "early warning system" identification (case detection), reporting, confirmation, decision-making and response must be rapid. On the other hand, for endemic diseases, the aim may be to carefully consider data collected in order to adjust the targeted control program. The national surveillance system should therefore be able to accommodate both needs.

The core functions of the communicable disease surveillance are:

- Case detection;
- Reporting;
- Investigation and confirmation;
- Analysis and interpretation;
- Action: Control/response, Policy and feedback.
- Early response and forecasting of outbreaks

These functions are made possible by the following support functions:

- Setting of standards (e.g. case definitions, thresholds and baselines);
- Training and supervision;
- Setting up laboratory support;
- Setting up communications;
- Resource management.

Activities of communicable disease surveillance

The activities of the communicable disease surveillance are performed at the following levels:

Health Care Facility (HCF) - governmental & private:

A case is usually seen by a primary care physician, or a clinician at the hospital. Staff at this level is unlikely to have epidemiological training. Recording and reporting of information may be seen as a less important administrative matter. In order to be successful, the list of information must be simple and useful. To this end a limited number of easily recognizable diseases should be decided upon. These should not normally involve extensive confirmation procedure unless these procedures are essential. The reporting should be to the DCS-CDCU. The method of recording should be in harmony with clinical record keeping practices.

Tasks at the HFC:

- Diagnosis and case management;
- Reporting of cases;
- Collaborating with CDCG in surveillance and control for certain diseases.

Diseases Control Section - Communicable Diseases Control Unit (DCS-CDCG):

The DCS-CDCG is responsible for policies on infectious disease at the national level. It collects data from the first level. DCS-CDCG staff is responsible for implementing monitoring the different activities of surveillance of communicable diseases with collaboration with other relevant sectors. This includes analysis of reported data from the health care facilities which must be associated with responses such as investigation and intervention.

Tasks of the DCS-CDCG:

- Development and updating of national communicable disease surveillance plans.
- Overall support, coordination, monitoring and evaluation of surveillance activities.
- Facilitate laboratory diagnosis if not available at health facility level (use regional or international reference laboratories if required);
- Analysis of data from all health facilities for Epidemiological links, Trends and Achievement of control targets.

- Support health facilities in outbreak control in terms of: Case management, Laboratory, Epidemiology, and Logistics.
- Feedback to health facilities of communicable diseases surveillance.
- Provide training for all staff working in communicable disease surveillance.
- Report to Executive Office of GCC Council of Health Ministers and WHO, as required by International Health Regulations, and specific needs of control programs.
- Collaboration with non-medical sectors such as agriculture, veterinary medicine, and environment at all levels is crucial for coordinating disease control at the national level (e.g. water or food borne diseases, vector-borne diseases, zoonotic diseases);
- Participate in the activities of national preparedness committee.

Section 3: Concepts in Surveillance

Whatever the structure of the surveillance system, data on priority diseases must move smoothly through the system for appropriate response. In addition, the surveillance system must include performance indicators to monitor its validity and effectiveness for completeness and timeliness of reports.

- Zero Reporting

Each site must report for each reporting period even if that means reporting zero cases. This avoids the confusion of equating “no report” with “no cases” e.g. AFP weekly zero reporting.

- Feedback

It is essential that feedback mechanisms be built into the system. This system may be through regular epidemiological bulletins and reports with tables and graphs showing trends and progress towards attaining targets. It is crucial that the personnel involved in surveillance activities are trained at all levels, e.g., through workshop followed by close supervision in the field.

- Surveillance

The key decisions in development of surveillance are those relating to case definitions and surveillance methods. Compromises have to be made on the choice of surveillance method and the minimum data elements in order to ensure appropriate case definition.

- Case definitions

Case definition included in this document varies in their use of clinical, laboratory, and epidemiologic criteria to define cases. Some diseases have confirmatory laboratory tests. Other diseases have characteristic clinical presentation that, even in the absence of confirmatory laboratory testing, a diagnosis may be based only on clinical findings (e.g., mumps). In most instances, a brief clinical description is provided. Unless the clinical description is explicitly cited in the “Case classification” section of each definition, it is included only as background information.

As Surveillance demands uniformity, simplicity, and brevity, case definitions are intended to establish uniform criteria for disease reporting. There should not be mixed criteria for establishing a clinical diagnosis.

- Case Classification

Case classification may vary from one disease to the other but generally speaking cases are usually classified as follows:

- Suspected case: a case that is compatible with the clinical description
- Probable Case: a suspected case that has more diagnostic criteria, but short of laboratory confirmation
- Confirmed case: a suspected case that is laboratory-confirmed

Section 4: Notifying Cases of Communicable Diseases in Bahrain

Communicable diseases still occur throughout the world, and constant vigilance is required to prevent the reappearance, Inbound and outbound travel and expatriate employment to and from endemic countries warrant continuous efforts to maintain achievements in the control of Communicable disease of public health significance, Changes in lifestyle have also led to the emergence of new threats to public health from infection. Notification is vital in efforts to prevent or control the spread of infection,

Notifiable Communicable Diseases according to public health law 34 (2018), and are divided into three groups on the basis of the method of notification, the information required, and actions to be taken, These groups are all listed on the Notification of Infectious Disease Form (Attached). The list is continuously updated and amended by issued by ministerial decrees.The zoonotic diseases are included as group D

Notification forms are provided to all health care facilities (HCF). Immediate medical care is provided by the attending physician and preventive measures are undertaken by the Diseases Control section (DCS) in MOH. Certain diseases or conditions warrant case, contact and environment investigation. DCS teams in collaboration with treating (HCF) staff will coordinate such activities. Some of these activities require completion of standardized forms to allow for regional and international uniformity of data reporting which is coordinated by the DSC.

- What Does One Has To Notify?

Group A

Diseases require notification to the DCS-CDCG by telephone or fax upon initial diagnosis (suspected or confirmed) with written notification to follow immediately or within 24 hours

Group B

Diseases require written notification weekly.

Group C

Diseases which require cumulative reporting by gender, nationality and age group on weekly bases.

Group D

Zoonotic diseases

- How Does One Notify?

Once the case is suspected notify by hotline, email or sending completed notification form according to regulations to DCS-CDCG in MOH. To simplify notification the DCS-CDCG work on electronic system for Notification.

- To Whom Should One Notify?

All notifications and related enquiries should be directed to DCS-CDCG in the Public Health Directorate in MOH.

- What Happens To The Notification?

Immediate notification is used to take immediate action for prevention and control of diseases in-group A. Information in the notification form is used to complete data .For certain diseases Public Health specialist, Health Inspectors or Infection Control officers conduct further investigations. This involves the patient contacts and environment to obtain more detailed information. CDS-CDCG surveillance on Communicable diseases is aimed at prevention and control of diseases, and control of outbreaks to prevent the spread of infection.

Notifiable Diseases in Bahrain

Group "A" Diseases *To be repoerted within 24 hours*	Cases
Acute Flaccid Paralysis ✆	
Poliomyelitis (Suspected) ✆	
Measles	
Mumps	
Rubella	
Congenital rubella syndrome	
Febrile rash	
Diphtheria	
Whooping cough	
Tetanus	
AIDS/HIV	
Cholera ✆	
Plague ✆	
Yellow Fever ✆	
Acute Haemorrhagic Fever ✆	
Leprosy	
Pulmonary TB	
Meningococcal meningitis ✆	
Meningitis (Specify)	
Food Poisoning ✆	
Viral hepatitis A	
Viral hepatitis E	
Typhoid Fever	
Paratyphoid Fever	
Salmonellosis	
Shigellosis	
SARI – (Sever acute respiratory infection)	
Rabies (Suspected)	
Any unusual event Specify:	

Group "B" Diseases *To be reported within one week*	Cases
Extra pulmonary TB	
Viral hepatitis B	
Viral hepatitis C	
Viral hepatitis (Specify)	
Gonorrhea	
Syphilis	
Other STD's (Specify)	
Malaria (Specify)	
Legionellosis	
Brucellosis	
Pneumococcal infection (Specify)	
Rota virus GE	
Respiratory Syncytial Virus (RSV)	
Campylobacter	

Group "C" Diseases *To be reported within one week*	Cases
Human Papilloma Virus Infection	
Genital Warts	
Amoebiasis	
Intestinal Helminthiasis	
Relapsing Fever	
Herpes zoster (Shingles)	
Scabies	
Leishmaniasis	
Otitis Media	
Influenza	
Chickenpox	
Hand & foot & mouth diseases	

Group (D) Zoonotic Disease	Cases
Anthrax	
Avian and Other Zoonotic Influenza	
Botulism	
Brucellosis	
Campylobacter	
Chagas Disease	
Chikungunya	
Dengue	
E. Coli	
Echinococcosis	
Foodborne Trematode Infections	
Japanese Encephalitis	
Leishmaniasis	
Leptospiroris	
Middle East Respiratory Syndrome Coronavirus (MERS-CoV)	
Plague	
Rabies	
(Salmonella (non typhoidal	
Severe Acute Respiratory Syndrome (SARS)	
Spongiform Encephalopathies	
Steptococcus Suis	
Taeniasis Cysticercosis	
Variant Creutzfeldt-Jakob Disease	
Zika Virus	
Zoonotic Tuberculosis	
Epidermophytosis	
(.Mange (Scarcoptes sp	
(Poliomyelitis (Monkey	
Q Fever	
Glanders	
Haemorrhagic Fevers	
Haemorrhagic Fevers, Viral	
Crimean-Congo Haemorrhagic Fever (CCHF)	
Dengue Dengue Haemorrhagic Fever	
Ebola Virus Disease	
Lassa Fever	
Marburg Virus Disease	
Rift Valley Fever	

Section 5: Case Investigation

Taking appropriate action on a notified case is one of the primary responsibilities of DCS-CDCG in MOH. Most of the diseases listed in _the notification Form need to be investigated. Investigation of sporadic cases of a notifiable disease is important for the following reasons:

- A case may be an index case to an outbreak
- Plan prevention and control measures for the spread of further infection from the case
- Identify any potential cases among close contacts
- Identify potential spread of the disease among high risk groups
- Provide health education to the case, contacts and public at large.

- Aim of Case Investigation

The ultimate aim of performing case investigation is to collect enough information for appropriate action to prevent healthy population from contracting a disease.

- Objectives of Case Investigation

- Confirm that the person notified has the same disease as notified
- Identify the source of infection
- Identify potential threat of transmitting infectious agent to immediate contacts
- Identify the presence of disease among close contacts
- Identify methods of the spread of disease from the case to the environment
- Inform and collaborate with other concerned agencies about the occurrence of the disease and its potential spread in the environment.

- Time of investigation

- For all IMMEDIATELY NOTIFIABLE diseases case investigation must be initiated immediately.

- For other NOTIFIABLE diseases investigation must be started once the notification forms is received to complete the information about the case for timely and appropriate action.

Steps for Case Investigation

i. Contact the person who notified the case:

- Inform her/him that the notification has been received
- Obtain further information if necessary;
- Inform her/him that the patient will be contacted for investigation;
- Inform her/him that feedback will be provided about the progress of investigation of the case.

ii. Interview the notified case (patients):

Interviewing the patient is an important part of a case investigation. The primary objective of any interview is to obtain as accurate information as possible, through establishing contact with the patient and assuring him/her that the information provided shall be kept confidential and used strictly for surveillance purposes. While -interviewing the patient, use the appropriate questionnaire to determine the following:

- Descriptive information about the case
- Confirm the address and phone number for future contact
- Identify symptoms and confirm the diagnosis
- Take travel history (if relevant)
- Inquire about environmental exposure
- Ask about food history (if applicable)
- Inquire about laboratory investigations (if applicable)
- Inform the patient about preventive measures and make sure that he/she has received them
- Inform the patient about the illness, its possible impact on his family, friends and community
- Provide the patient with your phone number and address for future use

- Inform the patient about follow-up plan and confirm the next appointment with her/him (if necessary).

Special case investigation forms have been developed or modified for most of the notifiable diseases;

Public Health Specialists are required to use disease-specific forms case instigation.

iii. Risk factors assessment and management

These could be broadly classified as follows:

a) Factors related to the case (PERSON):

- Vaccination status (occurrence of disease in a fully vaccinated person)
- Occupation
- Contact with another case
- Other possible sources of infection (food, water, environment, etc...)

b) Factors related to the PLACE of occurrence of disease (such as travel history):

c) Factors related to the TIME of occurrence of disease (such as season);

iv. Health promotion opportunities:

Case investigation provides good opportunity to educate the case and the contacts about the disease, its control and prevention.

v. Analysis:

Analysis of information collected is undertaken at DCS-CDCG and the action is taken accordingly.

Section 6: General Guidelines for Case for Investigation

The scope, methods and steps for investigating a case may vary from disease to disease and from case to case. These guidelines can be divided into:

- Issues related to notified cases
- Issues related to contacts
- Issues related to environment

- Issues related to NOTIFIED CASES:

a) Case investigation:

This involves detailed investigation of the notified case, to confirm the disease status. This includes the following:

- Doctors have initiated management of the case
- Laboratory investigations have been sent (if necessary)
- Appropriate case investigation forms have been filled and concerned authorities (including DCS-CDCG) have been informed of the condition of the case and its follow-up plan
- Case investigation and follow-up plans vary from disease to disease (please refer to 'case investigation, prevention and control requirements' sections of disease specific guidelines -section Two- of this document).

b) Isolation requirements:

- The term 'isolation' means separation for the period of communicability of infected persons or animals from others in such places and under such conditions, as to prevent or limit direct or indirect transmission of the infectious agent from those infected to those who are susceptible, or who may spread the agent to others.
- Isolation requirements vary from case to case, depending on the nature of disease and characteristics.

c) Quarantine requirements:

- The term ‘quarantine’ means limitation of freedom of movement of such well persons or domestic animals exposed to communicable disease for a period of time no longer than the longest usual incubation period of the disease, in such a manner as to prevent effective contact with those not so exposed;
- In contrast to isolation, quarantine applies to restrictions on healthy contacts of an infectious disease;

d) Specific treatment requirements:

- It is the responsibility of the treating physician to treat the patients. Public Health Specialist or other surveillance staff may not interfere with the treatment of the patient.
- DCS-CDCG should be well aware of the treatment requirements of the notified case and should be in contact with the treating physician and the patient to make sure that the patient gets appropriate treatment till appropriate outcome is achieved
- Certain diseases have specific guidelines in case management: both DCS-CDCG and treating physician need to comply with the guidelines.

- Issues Related to CONTACTS:

(a) Contact tracing, investigation and management:

- Contact tracing is used to identify, locate, investigate and treat all suspected persons, having contact with the patient
- Contacts may include immediate family members of the patient, friends, colleagues and any other persons who have come in contact with the patient
- Public Health Specialist should carefully identify all contacts of the patient and prepare a list of them (including name, age, sex, relationship with the patient, immunization status if applicable, etc.)

Contacts may not all be susceptible to the specific disease. A Public Health Specialist should classify contacts into susceptible and resistant, note the physical condition of sensitive contacts and follow them for disease-specific incubation period.

(b) Immunization of contacts and others:

- A Public Health Specialist should identify if there is any immunization requirement for a specific disease.
- (c) Educational measures
- A Public Health Inspector should educate patients and contacts about the nature of disease, how it is spread, who can get affected, consequences of infection and how best the disease can be prevented (see disease specific guidelines).

- Issues related to ENVIRONMENT:

(a) Report to local health authority:

Public Health Specialist should identify, if there are any notification requirements to other collaborating agencies, such as local municipality, Malaria Control Office, agriculture and forest department, and veterinary section.

(b) Preventive and control measures;

- Prevention and control process may include specific measures to be taken, depending on the type of disease;
- This may include steps taken to control rodents, arthropods, etc...
- This may be done in collaboration with other departments or-in collaboration with the family of the patient
- A Public Health Specialist should make sure that specific steps have been taken to control the spread of disease in the environment.

Section 7: Outbreak Investigation

Disease surveillance has two basic components:

1. An information system that provides information on the three fundamental epidemiological variables of time, place and person, to answer:

   a. When does the disease occur? (Time distribution).

   b. Where does the disease occur? (Place distribution).

   c. In whom the disease occurs? (Person distribution).

2. 2-An outbreak / epidemic system, which collects and analysis further information to answer the questions of how did the outbreak occur? And hence, how can the current outbreak be controlled and how can similar outbreaks be prevented in the future.

Outbreak investigation to identify the source of infection needs patients and commitment. Outbreak investigation also depends on circumstantial evidence and nature of the outbreak. In practice, almost every outbreak will be unique in some way, requiring a degree of flexibility in the approach to recognition and investigation.

Many epidemiologists use the terms “outbreak” and “epidemic” interchangeably, but the public is more likely to think that “epidemic” implies a crisis situation. Some epidemiologists restrict the use of the term “epidemic” to situations involving larger numbers of people over a wide geographic area. “Outbreak” should be applied to defined geographical areas.

This is a brief summary of the principles of disease outbreak investigation. Any outbreak (or suspected outbreak) should be reported promptly to Diseases Control section-Communicable Diseases Control Unit (DCS-CDCG). Personnel from DCS-CDCG will then conduct the investigation.

An outbreak (or epidemic) is considered when the number of cases of a disease (or condition) exceeds the number expected in a given time and place. In some instances, a single case will constitute such an unusual occurrence e.g. poliomyelitis, newly introduced. In other situations two related food poisonings are considered an outbreak.

Epidemic potentiality

A criterion for considering the surveillance of specific disease is its epidemic potential i.e. the likelihood to emerge as an outbreak or epidemic, constituting a national or even international threat.

Completeness and accuracy of data may be less than ideal in the situation of a field investigation. The following steps are only a guide, and subsequent steps will not necessarily be followed in sequence.

- Determining the existence of an Outbreak

  Check the diagnosis and compare with previous data on the disease.

  Remember to allow for causes of spurious 'outbreaks', such as new or improved laboratory tests, better reporting, or a change in the size or structure of the population.

- Developing a Case Definition

  Establish an aetiological diagnosis if possible. If not, define the condition clinically and epidemiologically.

  Use case investigation forms.

- Determining the Extent of an Outbreak

  Conduct a quick telephone/record survey of hospitals, clinics/physicians if necessary.

  Determine absenteeism rates from school and industries (if indicated).

- Characterizing the Data

  Time: Determine date and/or hour of onset. Construct epidemic curve of cases.

  Place: Prepare spot map of cases with respect to home, work, recreational places and special meetings.

  Person: Determine age, sex, occupation and ethnic groups.

- Formulating a Working Hypothesis of the Source and Manner of Spread

- Test hypothesis:

  Determine infection and/or illness rates in persons exposed and not

exposed to the putative source/s by questionnaire, interviews or laboratory tests.

Try to isolate the agent from the expected source/so

- Analyze data: On the basis of the data analysis, initiate short/long-term control measures.
- Disseminate information: Inform physicians, other health officials and departments, as appropriate on the nature of the outbreak and the control measures being implemented.

Practical Steps for an Outbreak Investigation

For the investigation of an outbreak, it is important to adopt a systematic approach. Such approach ensures that the investigation proceeds without missing important steps along the way.

The steps described below are in conceptual order. In practice, however, several steps may be done at the same time, or circumstances of the outbreak may dictate that a different order be followed. For example, control measures should be implemented as soon as the source and mode of transmission are known or suspected, which may be early or late in any particular outbreak investigation.

1. Prepare for fieldwork.

2. Establish the existence of an outbreak.

3. Verify the diagnosis.

4. Define and identify cases:

a) Establish a case definition

b) Identify and count cases

5. Describe the outbreak by person, place, and time.

6. Identify risk groups

7. Develop hypotheses

8. Evaluate hypotheses

9. Refining hypotheses by additional epidemiological, laboratory, environmental studies.

10. Implement control and prevention measures

11. Documentation and reporting.

1. Preparing for Field Work

Preparations can be grouped into two categories: (a) investigation, (b) administration. Good preparation in the two categories will facilitate a smooth field experience.

a. Investigation

The field investigator must have the appropriate scientific knowledge, supplies, and equipment to carry out the investigation. He/ she should discuss the situation with someone knowledgeable about the disease and about field investigations, review applicable literature and assemble useful references such as journal articles and sample questionnaires.

Before He/ she leaves for a field investigation, consultation of laboratory staff must be done to ensure taking the proper laboratory material and knowing the proper collecting, storing, and transporting techniques. Arrange for a portable computer, camera, and other supplies.

b. Administration

The field investigator must pay attention to administrative procedures such as travel arrangements and get them approved. He/ she may also need to take care of personal matters before leaving, especially if the investigation is likely to be lengthy.

The field investigator must also know his/her expected role in the field. Before departure, all parties should agree on his/her role, particularly if they are coming from "outside" the local area. For example, is he/she expected to lead the investigation, provide consultations to the local staff that will conduct investigation, or simply lend a hand to the local staff. In addition he/she should know whom his/her local contacts would be. Before leaving, he/she should know when and where they are going to meet with local officials and contacts when you arrive in the field.

2. Verifying the Existence of an Outbreak

Most outbreaks come to the attention of health departments in one of two ways:

- By regular analysis of surveillance data. Unusual rise of the frequency of disease can be detected promptly if surveillance data collection and analysis are timely.

- The second, and probably more common way is through calls from a health care provider or a person who knows of “several cases” or from the mass media.

One of the first tasks as a field investigator is to verify that a reported outbreak is indeed an outbreak. Some will turn out to be true outbreaks with a common cause, some will be sporadic cases of the same disease, and others will turn out to be unrelated cases of a similar disease. Often, the expected number of cases must be first determined before deciding whether a cluster is indeed an outbreak.

Thus, the observed and the expected frequency of the disease can be compared. Usually the current number of cases and the number from the previous few weeks or months or from a comparable period during the previous few years are compared.

3. Verifying the Diagnosis

Closely linked to verifying the existence of an outbreak is establishing what disease is occurring. In fact, as an investigator, you frequently will be able to address these two steps at the same time. Your goals in verifying the diagnosis are:

- to ensure that the problem has been properly diagnosed and

- to rule out laboratory error as the basis for the increase in diagnosed cases.

Reviewing the clinical findings and laboratory results are important for verifying the diagnosis. If there is any question about the laboratory findings that is the laboratory tests are inconsistent with the clinical and epidemiologic findings, a qualified laboratory person should review the laboratory techniques used.

Clinical findings with frequency distributions must always be summarized. Such frequency distributions are useful in characterizing the spectrum of illness, verifying the diagnosis, and developing case definitions.

Finally, the field investigator should visit several patients with the disease. If he/she does not have the clinical background to verify the diagnosis, a qualified clinician should do so. Nevertheless, regardless of background, he/she should see and talk to some patients to gain a better understanding of the clinical features, and to develop a better picture of the disease and the patients affected by it. In addition, he/she may be able to gather critical information from these patients on:

- What were their exposures before becoming ill?
- What they think caused their illness?
- Whether they know anyone else with the disease?
- Having anything in common with others who have the disease?

Conversations with patients are very helpful in generating hypotheses about disease etiology and spread.

4. Define and Identify Cases

a. Establishing a Case Definition

The next task for an investigator is to establish a case definition. A case definition is a standard set of criteria for deciding whether an individual should be classified as having the disease. A case definition includes clinical criteria and - particularly in the setting of an outbreak investigation - restrictions by time, place, and person. Clinical criteria must be based on simple and objective measures such as elevated antibody titers, fever of 39°F, three or more loose bowel movements per day, or myalgia severe enough to limit the patient's usual activities. The case definition may be restricted by time (for example, to persons with onset of illness within the past 2 months), place (for example, to residents of certain area or to employees of a particular plant) and person (for example, to persons with no previous history of musculo-skeletal disease, or to pre-menopausal women). Whatever the criteria, they must be applied consistently and without bias to all persons under investigation.

Ideally, the case definition will include most if not all actual cases, but very few or none of what called "false-positive" cases (persons who actually do not have the disease in question but nonetheless meet the case definition). Recognizing the uncertainty of some diagnoses, investigators often classify cases as confirmed or probable.

To be classified as confirmed, a case must usually have laboratory verification. A case classified as probable usually has typical clinical features of the diseases without laboratory confirmation.

b. Identifying and Counting Cases:

As noted earlier, many outbreaks are brought to the attention of health authorities by concerned health care providers or citizens. However, the cases which prompted the concern are often only a small and non-representative fraction of the total number of cases. It is therefore important to determine the geographic extent of the problem and the populations affected by using as many sources as possible. Methods for identifying cases must be appropriate for setting and disease in question.

First, case finding must be directed to health care facilities where the diagnosis is likely to be made: physicians' offices, clinics, hospitals, and laboratories. Sending out a letter describing the situation and asking for reports that is called "passive surveillance". Alternatively, calling by telephone or visiting the facilities to collect information on cases is called "active surveillance".

In some outbreaks, public health officials may decide to alert the public directly, usually through the local media to avoid the implicated product and to see a physician immediately if they had symptoms compatible with the disease in question.

If an outbreak affects a restricted population, such as a school, or at a work site, and if a high proportion of cases are unlikely to be diagnosed (mild or asymptomatic), a survey of the entire population may need to be conducted through a questionnaire to determine the true occurrence of clinical symptoms, or collecting laboratory specimens to determine the number of asymptomatic cases.

Finally, the patients can be asked if they know anyone else with the same condition. Frequently, one person with an illness knows or hears of others with the same illness.

Regardless of the particular disease investigated, the following types of information about every case must be collected:

- Identifying information
- Demographic information
- Clinical information
- Risk factor information
- Reporter information

Identifying information - name, address, and telephone number - allows investigators to contact patients for additional questions, and to notify them of laboratory results and the outcome of the investigation. Names will help in checking for duplicate records, while the addresses will allow mapping the geographic extent of the problem.

Demographic information - age, sex, race, and occupation - provides the "person" characteristics needed to characterize the populations at risk.

Clinical Information - allows verifying the case definition. Date of onset allows you to chart the time course of the outbreak. Supplementary clinical information, including whether hospitalization or death occurred, will help to describe the spectrum of illness.

Risk factor information - must be tailored to the specific disease in question. For example, in an investigation of hepatitis A, exposure to food and water sources must be ascertained. Finally, by identifying the person who provided the case report, additional clinical information and report back the results of investigation made possible.

Report information- finding- including laboratory information- that could be sought is collected in a standard case report form, questionnaire, or data abstraction form. A line listing format used for an abstract of selected critical items.

In line listing, each column represents an important variable, such as name or identification number, age, sex, and case classification, etc…, while each row represents a different case. New cases are added to a line listing as they are identified. Thus, a line listing contains key information on every case, and can be scanned and updated as necessary, Even in the era of microcomputers, many epidemiologists still maintain a handwritten line listing of key data items, and turn to their computers for more complex manipulations such as cross tabulations.

5. Conducting Descriptive Epidemiology

Once some data is collected, characterization of an outbreak by time, place, and person must be started. This step may be performed several times during the course of an outbreak, as it is critical for several reasons. First, by looking at the data carefully, one become familiar with details and learns which information is reliable and informative (whether cases report the same unusual exposure) and which may not be reliable (many missing or "I don't know" responses to a particular question). Second, comprehensive description of an outbreak is provided by portraying its trend over time, its geographic extent (place), and the populations (persons) affected by the disease. Description of the outbreak can be assessed in light of what is known about the disease (usual source, mode of transmission, risk factors and populations affected, etc.) to develop a casual hypothesis. This hypothesis can be tested in turn at step (evaluating hypothesis)

Note that descriptive epidemiology must be started early, and update as additional data is collected. To keep an investigation moving quickly and in the right direction, errors and clues in the data must be identified as early as possible.

Time

Drawing a histogram of the number of cases by their date of onset must depict the time course of an epidemic. This graph, called an epidemic curve, gives a simple visual display of the outbreak's magnitude and time trend. An epidemic curve will provide a great deal of information about an epidemic. First, it will

usually show the time course of an epidemic, and what the future course might be. Second, by identifying the disease and knowing its incubation period a probable time period of exposure can be deduced. A questionnaire focusing on that time period can be developed. Finally, inferences about the epidemic pattern can be drawn.

Place

Assessment of an outbreak by place not only provides information on the geographic extent of a problem, but may also demonstrate clusters or patterns that provide important etiologic clues. A spot map is a simple and useful technique for illustrating where cases live, work, or may have been exposed.

On a spot map of a community, clusters or patterns may reflect water supplies, wind currents, or proximity to a restaurant or grocery.

Person

Characterizing an outbreak by person is to determine what populations are at risk for the disease. Populations are usually defined by host characteristics (age, race, sex, or medical status) or by exposures (occupation, leisure activities, use of medications, tobacco, drugs). Rates are used to identify high risk groups. In order to calculate rates, both numerators (numbers of cases) and denominators (number of people at risk) are needed.

Usually, age and sex are the first two host factors assessed. The categories used for age and sex in a frequency distribution should be appropriate for the particular disease and match the available denominator data.

In many outbreaks, occupation is another important person characteristic. Although calculating rates is important, it may be difficult to get denominator data for occupation. Nonetheless, the distribution of the cases themselves may suggest a hypothesis worth pursuing.

Person characteristics are more specific to the disease under investigation and the setting of the outbreak. For example, an outbreak of hepatitis B was investigated; the usual high risk exposures for that infection should be considered, such as intravenous drug use, sexual contacts, and health care setting.

6. Developing Hypotheses

Usually generating hypotheses starts with the first phone call. But at this point in an investigation, after talking with some case-patients and with local public health officials, and having characterized the outbreak by time, place, and person, the hypotheses will be sharpened and more accurately focused. The hypotheses should address the source of the agent, the mode (e.g. and

vehicle or vector) of transmission, and the exposures that caused the disease. Also, the hypotheses should be testable, since evaluating hypotheses is one of the goals of the next step in an investigation.

Hypotheses are generated in a variety of ways. First, considering what is known about the disease itself:

- What is the agent's usual reservoir?
- How it is usually transmitted?
- What vehicles are commonly implicated?
- What are the known risk factors?

Another useful way for generating hypotheses is talking to few patients. Conversations about possible exposures should be open-ended and wide range and not necessarily confined to the known sources and vehicles. In some difficult investigations, investigators have to conduct meetings with several patients to search for common exposures. In addition, investigators have sometimes found it useful to visit the homes of patients and look through their refrigerators and shelves for clues.

7. Evaluating Hypotheses

After developing hypotheses to explain an outbreak it is important to evaluate the credibility of those 'hypotheses. In a field investigation, evaluation of hypotheses is conducted in one of two ways: either by comparing the hypotheses with the established facts, or by using analytic epidemiology to quantify relationships and explore the role of statistical chance.

The first method should be used when the clinical, laboratory, environmental, and/or epidemiologic evidence obviously supports the hypotheses.

In many other settings, however, the circumstances are not as straightforward. In those instances, analytic epidemiology is used to test hypotheses. The key feature of analytic epidemiology is the comparison group. With a comparison group, it is possible to quantify relationship between exposures and disease, and to test hypotheses about casual relationships. The comparison groups can be used in two types of studies; cohort and case - control.

Statistical Significance Testing:

Tests of statistical significance are used to determine how likely the results could have occurred by chance alone, if exposure was not actually related to disease.

8. Refining Hypotheses and Executing Field Studies

Unfortunately, analytic studies are sometimes unrevealing. This is particularly true if the hypotheses were not well founded at the outset. It is an axiom of field epidemiology that if you cannot generate good hypotheses (by talking to some cases or local staff and examining the descriptive epidemiology), then proceeding to analytic epidemiology, such as case control study, is likely to be a waste of time.

When analytic epidemiology is unrevealing, you need to reconsider your hypotheses. This is the time to convene a meeting of the case-patients to look for common links, to visit their homes to look for clues and to consider new vehicles or modes of transmission.

9. Control and Prevention Measures

In most outbreak investigations, the primary goal will be control and prevention. Indeed, although it is discussed in step 9, control measures should be implemented as soon as possible. Control measures are usually implemented early if the source of an outbreak is known. In general, control measures are directed to the weak link or links in the chain of infection. Control measures may be directed to the specific agent, source, or reservoir. For example, an outbreak may be controlled by destroying contaminated food, sterilizing contaminated water, or destroying mosquito-breeding sites, or an infectious food handler could be removed from the job and treated.

In other situations, control measures may be directed at interrupting transmission or exposure.

Finally, in some outbreaks, control measures could be directed to reduce the susceptibility of the host. Two such examples are immunization against rubella and malaria chemoprophylaxis for travelers.

10. Documentation and Reporting

The final task in an epidemiological investigation is to document and report findings. This may take two forms: (a) an oral briefing for local authorities and (b) a written report.

a. The oral briefing should be attended by the local health authorities and persons responsible for implementing control and prevention measures. Usually these persons are not epidemiologists, so the findings must be presented in clear and convincing manner with appropriate and justifiable recommendations for action. This presentation is an opportunity to describe what is done, what found, and what should be done about it. The findings should be presented in a scientifically objective manner, and conclusions and recommendations should be well defended.

b. A written report should be provided. It should follow the usual scientific format of introduction, background, methods, results, discussion, and recommendations. By formally presenting the recommendations, the report provides a blueprint for action. It also serves as a record of performance and a document for potential legal issues. It will be a reference if the health department encounters a similar situation in the future. Finally, a report that finds its way into the public health literature serves the broader purpose of contributing to the knowledge base of epidemiology and public health.

Part II- Communicable Diseases under surveillance: Group A Diseases

This section provides specific guidelines for surveillance of the diseases included in the notification list. Each notifiable disease has been discussed in terms of its epidemiological features, and case definition. It also describes the role and responsibility of staff involved in disease control.

Poliomyelitis

Polio is a highly infectious viral disease. It attacks the nervous system, and it may cause total paralysis rapidly. Initial symptoms are fever, fatigue, headache, vomiting, and stiffness in the neck and pain in the limbs. Polio mainly affects children under five years of age.

Infectious Agent:

enterovirus; Poliovirus types 1, 2 and 3 .

Mode of Transmission:

- Wild poliovirus is spread by fecal-oral route (faeces and saliva).
- less frequently, Poliovirus can be transmitted by a common vehicle (e.g. contaminated water or food) and multiplies in the intestine
- Oral polio vaccine (OPV) virus can be shed in the faeces for six weeks and may lead to infection in unvaccinated contacts.

Incubation Period:

It range from 3 to 35 days, with 7 to 14 days for paralytic cases.

Period of Communicability:

The risk of transmission of infection is greatest for the seven to ten days prior to and following the onset of symptoms. The virus persists in the pharynx for approximately one week and in the faeces for up to six weeks, or longer in the immunosuppressed. Transmission of the virus is possible for as long as the virus is excreted.

Case definition

Suspected case:

Sudden onset of weakness (acute flaccid paralysis) in any limb in any individual less than 15 years of age.

Confirmed case:

- Any suspected case from which poliovirus is isolated from the stool, CSF or oropharyngeal secretions

- A case that meet the clinical case definition and in which the patient has neurologic deficit 60 days after onset of initial symptom, had died or has unknown follow-up.

Exclusion:

For at least 14 days from onset, medical certificate of recovery is required from the treating physician.

Notification:

- Group A disease, notification should be done immediately by telephone followed by written notification within 24 hours.
- Communicable disease group should notify National International Health Regulation Focal Point (NFP) about the case.

Preventive measures

Polio vaccine given in multiple doses, can prevent the disease and protect children for life.

Control of Case(s):

- Refer the suspected cases to secondary care for expert evaluation and management.
- No specific treatment against poliovirus
- Early physiotherapy may decrease the risk of physical deformities as a result of paralytic polio.
- Enteric precautions should be followed in hospital settings.
- Faeces and urine from infected patients can be disposed of directly into toilet without preliminary disinfection as the sewage systems in Bahrain is modern.
- Potentially contaminated items should be disinfected.

Control of Contacts:

- Unvaccinated household contacts of a case should be vaccinated at the same time.

- Hand washing is important for parents following nappy changing and disposal.
- Active case finding, especially among children, for early detection and control.

Outbreak measures

- In Bahrain, a single case of polio is considered a public health emergency.
- The case should be investigated to determine the source of infection whether it is endogenous, imported or vaccine associated paralytic polio (VAPP) case.
- Detail investigation of VAPP case including taking vaccine history, patch number, virus type, severity and the residual paralysis 60 days after onset.

Measles

It is a highly communicable viral disease with fever, conjunctivitis, coryza, cough, and small spots with white or blue centers on an erythematous base on the buccal mucosa (Koplik spots). Red blotchy rash appears on the 3rd to 7th day, beginning on the face, becoming generalized, lasting 4-7 days, sometimes ending in brawny desquamation.

Measles is targeted by WHO for elimination.

Infectious agent:

Measles virus

Mode of transmission:

By airborne spread, also by direct contact with nasal or throat secretions of infected persons, and less commonly, by articles freshly soiled with nose and throat secretions.

Incubation period:

About 10 days (7-18 days) from exposure to onset of fever.

Period of communicability:

Usually about 4 days before rash onset to 4 days after appearance of rash.

Children with clinical or subclinical vitamin A deficiency are at particularly high risk.

Acquired immunity after illness is long lasting.

Case definition

Suspected case:

Any person with:

- fever and maculopapular (non-vesicular) rash.
- or in whom a health-care worker suspects measles.

Confirmed case:

Suspected case that is laboratory confirmed or epidemiologically linked to a confirmed case

Laboratory confirmation is by one of the following tests:

- Presence of measles-specific IgM antibodies or
- At least a 4-fold increase in measles-specific IgG antibody titer or
- Detection of viral RNA by RT PCR(from urine or gum and throat swab)
- Isolation of measles virus

Note that final classification of measles cases is done by expert committee.

Exclusion

5 days from the appearance of the rash

Notification

Group A disease, notification should be within 24 hours for suspected and confirmed cases.

Preventive measures

- Live attenuated vaccine in the form of measles, mumps and rubella (MMR) is recommended for all children at the age of 1 year and at preschool examination.
- MMR is recommended for health care workers.
- MMR is recommended for females who are rubella non-immune during premarital examination or post-natal period.

Control of Case(s)

- Investigation of the case
- Blood and urine should be collected at the health facility for all suspected cases.
- Oral specimen (gum swab or throat swab) for genotyping will be arranged by public health specialist .
- Isolation: Patient should be isolated for 5 days after appearance of the rash.

Control of Contacts:

- Contacts of the case during the infectious period should be identified.
- In general, contacts who have not received two doses of MMR on or after the first birthday separated by at least 1 month are considered susceptible and should be vaccinated as soon as possible

Outbreak measures

- Single case of measles is considered as an outbreak.
- Control measures and vaccination campaign to be conducted in residency block, contacts in workplace or school/ nursery and other governmental and private sector to ensure complete vaccination with two doses MMR.

Mumps

Mumps is an acute contagious disease that is caused by the mumps virus. Mumps usually starts with a few days of fever, headache, muscle aches, and loss of appetite, which is followed by swelling and tenderness of one or more salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. Anyone who is not immune from either previous mumps infection or from vaccination can get mumps, however not all parotitis are caused by mumps viral infection.

Mumps is typically a mild childhood disease. It most often affects children between five and nine years old, but can also infect adults. When it infects adult, complications are more likely to be serious.

Infection with mumps virus may also present as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, or pancreatitis.

Infectious agent:

Paramyxovirus of the genus Rubulavirus.

Mode of transmission:

It is spread by airborne droplets released when an infected person sneezes or coughs and by direct contact with an infected person.

Incubation period:

16-18 days (range 14-25days).

Period of communicability:

The infectious period is considered to be from 1-2 days before onset of parotitis; Virus has been isolated from saliva 7 days before to 9 days after the onset of parotitis. Asymptomatic infection can be communicable

Case definition:

Suspected case:

An acute illness of unilateral or bilateral tender, self-limited swelling of parotid or other salivary glands lasting one day or more.

Probable case:

A case that meets the clinical case definition without laboratory confirmation and is epidemiologically linked to a clinically compatible case.

Confirmed case

A suspected case that is epidemiologically linked to laboratory confirmation case or that is laboratory confirmed by:

- Presence of mumps-specific IgM antibodies or
- At least a 4 fold increase in mumps-specific IgG antibody titer or
- Isolation of mumps virus

Exclusion:

Until 9 days after the onset of the swelling

Notification:

Group A disease, notification should be done within 24 hours.

Preventive measures

- Live attenuated vaccine in the form of measles, mumps and rubella (MMR) is recommended for all children at the age of 1 year and at preschool examination.
- MMR is recommended for health care workers.
- MMR is recommended for females who are rubella non-immune during premarital examination or post-natal period.

Control of Case(s)

- Blood should be collected at the health facility for all suspected cases.
- Infection control measures including hand hygiene, respiratory precautions, and cough etiquette.
- Exclude children from school and adults from school or work during infectious period.

Control of Contacts:

- Contacts of the case during the infectious period should be identified.
- In general, contacts who have not received two doses of MMR on or after the first birthday separated by at least 1 month are considered susceptible and should be vaccinated as quickly as possible.

Outbreak measures

- Single case of mumps is considered as an outbreak.
- Control measures and vaccination campaign to be conducted in residency block, contacts in workplace or school/ nursery and other governmental and private sector in order to ensure vaccination with two doses MMR.

Rubella

Rubella is a mild febrile viral disease with a diffuse maculopapular rash. Post auricular, occipital and posterior cervical lymphadenopathy is the most characteristic clinical feature and precedes the rash by 5-15 days. Leucopenia is common and thrombocytopenia, arthralgia, and arthritis. Up to 50% of rubella infections are subclinical. Rubella is important because of its ability to produce congenital anomalies in the fetus. Congenital Rubella Syndrome occurs in up to 90% of infants born to women who acquired rubella during the first trimester of pregnancy.

Infectious agent:

Togavirus, genus Rubivirus.

Mode of transmission:

- Contact with nasopharyngeal secretions of infected people.
- Airborne transmission or droplets shed from the respiratory secretions of infected persons.
- Transplacental infection of the fetus occurs during viremia.

Incubation period:

14-17 days (range 14-21 days).

Period of communicability:

Approximately one week before and at least 7 days after onset of rash.

Infant with CRS might shed the virus 4 months after birth or more (up to one year).

Case definition:

Any person with:

- fever and maculopapular (non-vesicular) rash
- whom a healthcare worker suspects rubella. A healthcare worker should suspect rubella when a patient presents with the following: fever, maculopapular rash and cervical, suboccipital or postauricular adenopathy or arthralgia/ arthritis.

Confirmed case:

Suspected case that is laboratory confirmed or epidemiologically linked to a confirmed case

Laboratory confirmation is by one of the following tests:

- Presence of rubella-specific IgM antibodies or
- At least a 4 fold increase in rubella-specific IgG antibody titer or
- Detection of viral RNA by RT PCR(from urine or gum and throat swab)
- Isolation of rubella virus

Exclusion

7 days from the appearance of the rash

Notification

Group A disease, notification should be within 24 hours for suspected and confirmed cases.

Preventive measures

- Live attenuated vaccine in the form of measles, mumps and rubella (MMR) is recommended for all children at the age of 1 year and at preschool examination.
- MMR is recommended for health care workers.
- MMR is recommended for females who are rubella non immune during premarital examination or post natal period.

Control of Case(s)

- Investigation of the case
- Blood and urine should be collected at the health facility for all suspected cases.
- Oral specimen (gum swab or throat swab) for genotyping will be arranged by public health specialist .
- Isolation: Patient should be isolated for 7 days after appearance of the rash.

Control of Contacts:

- Contacts of the case during the infectious period should be identified.
- In general, contacts who have not received two doses of MMR on or after the first birthday separated by at least 1 month are considered susceptible and should be vaccinated as quickly as possible

Outbreak measures

- Single case of measles is considered as an outbreak.
- Control measures and vaccination campaign to be conducted in residency block, contacts in workplace or school/ nursery and other governmental and private sector in order to ensure vaccination with two doses MMR.

Diphtheria

An acute bacterial disease caused by toxigenic strains of Corynebacterium diphtheriae, it involves mainly tonsils, pharynx, larynx, and nose. Infrequently, other mucous membranes, skin, conjunctiva or vagina can be affected.

The lesion is marked by a patch or patches of an adherent grayish membrane with a surrounding inflammation. Cervical lymph nodes are enlarged and tender with pharyngeal disease and in its severe form neck swelling may develop giving a characteristic 'bull neck appearance'.

Neuropathy and cardiomyopathy from systemic absorption of the toxin can result in early death or later neurological complications.

Diphtheria is a widespread severe infectious disease that has the potential for epidemics.

Infectious agent:

Corynebactereium diphtheriae of gravis, mitis or intermedius biotype.

Mode of transmission:

- Contact with a patient or carrier, rarely contact with articles soiled with discharges from lesions of infected people.
- Raw milk may serve as a vehicle.

Incubation period:

Usually 2-5 days range (occasionally longer).

Period of communicability:

Transmission may occur as long as virulent bacilli are present in discharges and lesions. The time is variable, but organisms usually persist 2 weeks or less, and seldom more than 4 weeks, without antibiotics. Chronic carriers may shed organisms for 6 months or more. Effective antibiotic therapy promptly terminates shedding.

Susceptibility:

Any person out of the following categories is considered susceptible:

- Infants born to immune mothers have passive protection, which is usually lost before the 6th month.
- Disease or subclinical infection usually but not always induces lifelong immunity.
- Immunization with toxoid produced prolonged but not lifelong immunity.

Case definition

Suspected case:

- an illness of the upper respiratory tract characterized by the following: pharyngitis, nasopharyngitis, tonsillitis or laryngitis AND
- adherent pseudomembrane of the pharynx, tonsils, larynx and/or nose. A diphtheria pseudomembrane is an exudate that is greyish, thick, firmly adherent and patchy to confluent. Dislodging the pseudomembrane is likely to cause profuse bleeding

Confirmed case:

A laboratory-confirmed case is a person with Corynebacterium spp. isolated by culture and positive for toxin production, regardless of symptoms. Toxigenicity must be confirmed by the phenotypic Elek test in all instances. Polymerase chain reaction (PCR) can complement surveillance and may qualify as laboratory confirmed after reviewing the epidemiology and clinical manifestations of the case.

Laboratory confirmed cases may be further classified into three subcategories based on the type of surveillance occurring in the country.

- Laboratory-confirmed classic respiratory diphtheria cases meet the suspected case definition and are laboratory-confirmed as defined above.
- Laboratory-confirmed mild respiratory/ asymptomatic diphtheria cases have some respiratory symptoms such as pharyngitis and tonsillitis, but no pseudomembrane, or no symptoms (usually identified via contact tracing).
- Non-respiratory laboratory-confirmed diphtheria cases have a skin lesion or non-respiratory mucosal infection (for example, eye, ear

orgenitalia) from which Corynebacterium spp. Is isolated by culture and tests positive for toxin production.

Exclusion:

- Case: should be excluded until a medical certificate of recovery is received following at least two negative throat swabs. The first should be 24 hours or more after finishing a course of antibiotics and the second 48 hours later.
- Close contacts identified as diphtheria carriers: exclude until two negative swabs, the first not less than 24 hours after finishing the antibiotics and the other 48 hours later.

Notification:

Group A disease, notification should be done within 24 hours.

Preventive measures:

Diphtheria vaccination in the of Diphtheria, tetanus, pertussis (DPT) or TD vaccine in child hood immunization Vaccination or Td for adult.

Control of Case(s)

- Collection of specimens: throat and nasopharyngeal swabs should be taken from suspected cases.
- Strict isolation until two cultures are clear (taken not less than 24 hours apart, and more than 24 hours after cessation of antibiotics).
- Use standard infection control measures with extra respiratory precautions for pharyngeal diphtheria and with extra contact precautions for cutaneous diphtheria, until the case is shown to be clear of carriage.
- Treatment of cases includes antitoxin and proper antibiotic.

Control of Contacts:

close contacts (household contacts, people with direct contact (e.g. caretakers, relatives, sexual contacts, friends who regularly visit the home,students), HCWs exposed to respiratory droplets/secretions/wounds)

- Monitor for 10 days if develop symptoms and meet cases definition treat as case
- Obtain nasal and pharyngeal specimerns for testing If with chronic non-healing wound obtain wound swab too
- Antibiotics for 7 days can be stopped if negative testing
- Assess diphtheria vaccination status
  - ➢ If unvaccinated or unknown vaccination history, provide a full course of diphtheria vaccine
  - ➢ If undervaccinated, complete vaccination series

Outbreak measures:

- Outbreaks of diphtheria require immunizing the susceptible patient at risk of infection with emphasis on the need for protection of infants and preschool children. Repeat immunizations may be recommended after one month.
- Active case finding with laboratory confirmation for all suspected cases, along with the identification and appropriate management of close contacts and asymptomatic carriers.

Whooping cough

Acute disease involving the respiratory tract. The catarrhal stage has an insidious onset with irritating cough that gradually becomes paroxysmal usually within 1-2 weeks, and lasts for 1-2 months or longer.

Paroxysms are characterized by repeated violent coughs and can be followed by a characteristic crowing or high pitched inspiratory whoop. It ends with expulsion of clear mucus, often followed by vomiting. Infants less than 6 months old, vaccinated children, adolescents and adults often do not have the typical whoop.

Cases in previously immunized adolescents and adults in countries with long-standing and successful immunization programs occur because of waning immunity and are a source of infection for non-immunized young children. Pertussis is a major cause of childhood morbidity and mortality. One attack usually confers prolonged immunity.

Infectious agent:

Bortedella pertussis, the pertussis bacillus.

Mode of transmission:

Direct contact with discharge from respiratory mucous membranes of infected persons by the airborne route, probably by droplets.

Incubation period:

Average 9- 10 days (range 6-20 days).

Period of communicability:

Highly communicable in the early catarrhal stage before the paroxysmal cough.

Communicability decreases in about 3 weeks in patients not treated with antibiotics. When treated with erythromycin, the period of infectiousness usually is 5 days or less after the start of therapy.

Case definition:

Suspected case:

A suspected case is a person of any age with a cough lasting ≥ 2 weeks, or

of any duration in an infant or any person in an outbreak setting, without a morelikely diagnosis and with at least one of the following symptoms, based on observation or parental report:

- paroxysms (fits) of coughing inspiratory whooping
- post-tussive vomiting, or vomiting without other apparent cause
- apnea (only in < 1 year of age)

OR

- clinician suspicion of pertussis

Confirmed case:

A suspected case epidemiologically linked to laboratory confirmed case or that is laboratory confirmed by:

- A nasopharyngeal (NP) swab or aspirate from suspected cases for PCR. Specimens should be taken from NP at 0 to 3 weeks following cough onset, but may provide accurate results for up to 4 weeks.
- Serologic tests which is more useful for diagnosis in later phases of the disease. For the serology test, the optimal timing for specimen collection is 2 to 8 weeks following cough onset ; however, serology may be performed on specimens collected up to 12 weeks following cough onset
- Culture for isolation of B. pertussis.

Notification:

Group A disease, notification should be done within 24 hours.

Cases:

- Collection of specimens: a nasopharyngeal aspirate or swab should be collected.
- Isolation: respiratory isolation.
- Specific treatment: appropriate antibiotic treatment shortens the period of communicability.

Contacts:

- Contacts should be tested only if they have symptoms consistent with pertussis infection. Asymptomatic contacts of confirmed cases should not be tested and testing of contacts should not be used for post-exposure prophylaxis decisions.
- They should be excluded from schools until the cases and contacts have received 5 days of a minimum 7 days course of appropriate antibiotics.
- Early treatment with macrolide antibiotics (such as erythromycin) should be administered to close contacts who are infants < 6 months of age who develop symptoms of a respiratory infection.
- A 7 days course of erythromycin is recommended for high risk contacts regardless of symptoms or immunization status.
- Pertussis-containing vaccine should be given to any person who is not fully immunized according to the recommended immunization schedule. Vaccination might not prevent illness in a person who has already been infected with B. pertussis.

Outbreak measures:

- Management of contacts.
- Active case finding.

Tetanus

Acute disease induced by exotoxin of tetanus bacillus which grows anaerobically at the site of an injury.

The disease is characterized by painful muscular contractions of the masseter and neck muscles followed by contractions of trunk muscles. A common first sign is abdominal rigidity. Generalized spasms occur. Typical features of the titanic spasm are the position of opisthotonus, and the facial expression known as “risus sardonicus”.

The organism is rarely recovered from the site of infection and there is no detectable antibody response.

Neonatal tetanus is targeted by WHO for elimination.

Infectious agent:

Clostridium tetani, the tetanus bacillus.

Incubation period:

3-21 days; ranges from 1 day to several months.

Shorter incubation period are associated with more heavily contaminated wounds, more sever disease and a worse prognosis.

Mode of transmission:

Tetanus spores introduced into the body usually through a puncture wound contaminated with soil, animal or human feces, through lacerations, burns, or unnoticed wounds.

Period of communicability:

Not directly transmitted from person to person.

Susceptibility and resistance:

Any person out of the following categories is considered susceptible:

- Active immunity induced by Tetanus Toxoid which persists for at least 10 years after full immunization.
- Transient passive immunity following injection of tetanus immunoglobulin or Tetanus antitoxin

. Case definition:

Suspected case of Non-neonatal Tetanus:

- A suspected case is any person > 28 days of age with acute onset of at least one of the following: trismus (lockjaw), risus sardonicus (sustained spasm of the facial muscles) or generalized muscle spasms (contractions).

Confirmed:

A case meeting the suspect definition and clinically confirmed as tetanus by a physician/ trained clinician.

Probable:

A case meeting the suspect case definition without clinical confirmation by a physician/trained clinician.

Discarded:

A case that has been investigated and does not satisfy the clinical criteria for confirmation or has an alternate diagnosis.

Management:

Notification:

Group A disease, notification should be done within 24 hours.

Cases:

- Investigation of the case
- specific treatment:

- Human Tetanus Immunoglobulin and if not available Tetanus antitoxin following appropriate testing for hypersensitivity.
- Appropriate antibiotic treatment.
- The wound should be debrided widely and excised if possible.
- Ensure an adequate airway and employ sedation as indicated.
- Muscle relaxant with tracheostomy may be lifesaving.
- Active immunization should be initiated.

Table (1): Tetanus wound management:

	Clean, minor wounds		All other wounds	
Vaccination History	Td	TIG	Td	TIG
Unknown or less than 3 doses	Yes	No	Yes	Yes
or more doses 3	*No	No	**No	No

*Yes, if more than 10 years since last dose.

**Yes, if more than 5 years since last dose.

Contacts:

Tetanus is not contagious disease so contact tracing not required.

Preventive measures:

- Tetanus vaccination contained in the Diphtheria, tetanus, and pertussis (DPT) or TD vaccine in child hood immunization Vaccination or Td for adult.
- Physician should ensure that all pregnant women completed their vaccination.

Neonatal tetanus

It is a serious health problem in many developing countries where maternity care services are limited and immunization against tetanus is inadequate. Most newborn infants with tetanus have been born to non-immunized mothers delivered by an untrained birth attendant outside a hospital. The disease usually occurs through introduction via the umbilical cord of tetanus spores

during delivery through the use of an unknown instrument to cut the cord. Symptoms usually appear from 4 to 14 days after birth and the inability to nurse is the most common presenting sign.

Incubation period:

Average incubation period is 6 days.

Case definition

Suspected case:

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

Confirmed case:

Any neonate with a normal ability to suck and during the first two 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 NT cases are considered confirmed).

The diagnosis is entirely clinical and does not depend upon bacteriological confirmation.

Prevention of tetanus neonatorum achieved by two approaches:

1. Improving maternity care with emphasis on increasing the tetanus toxoid immunization coverage of women of child bearing age (especially pregnant women).
2. Maintain high proportion of deliveries conducted by trained attendants.

HIV /AIDS

Viral infection that attacks the immune system. Symptoms vary according to the stage of the illness. Many people will develop a self-limited mononucleosis-like illness lasting for a week or two within several weeks after infection with HIV, Infected persons may then be free of clinical signs and symptoms for months or years, before developing specific opportunistic infections and cancers and a range of other AIDS defining condition.

AIDS is a severe, life-threatening disease that represents the late clinical stage of infection with HIV. As the infection progressively weakens the person's immune system, the individual can develop severe illnesses such as tuberculosis, cryptococcal meningitis, and cancers such as lymphomas and Kaposi's sarcoma particularly if the patient did not receive treatment.

Risk factors for the HIV infection.

- having unprotected anal or vaginal sex;
- having another sexually transmitted infection such as syphilis, herpes, chlamydia, gonorrhoea, and bacterial vaginosis;
- sharing contaminated needles, syringes and other injecting equipment and drug solutions when injecting drugs;
- receiving unsafe injections, blood transfusions, medical procedures that involve unsterile cutting or piercing; and
- Experiencing accidental needle stick injuries, including among health workers.

Infectious agent

Human Immunodeficiency virus (HIV), types 1 and 2 (retrovirus).

Transmission

- HIV can be transmitted via the exchange of a variety of body fluids from infected individuals, such as blood, breast milk, semen and vaginal secretions.
- Individuals cannot become infected through ordinary day-to-day contact such as kissing, hugging, shaking hands, or sharing personal objects, food or water.

Incubation period

- Variable (usually 1 to 3 months) and ranges from less than one year to 15 years or longer.
- The time from HIV infection to the diagnosis of AIDS ranges from about two months to 20 years or longer, with a median of 10 years.
- Treatment lengthens the incubation period.

Period of communicability:

As long as HIV infection persists

Case definition

Any case with positive HIV serology test.

Exclusion

Non

Notification

Group A disease, notification should be within 24 hours.

Control of the Case

- Confidential interview to investigate the HIV case and contacts.
- Advice about methods of reducing the risk of transmission of the disease to others.eg. Patients and their sexual partners should not donate blood, plasma, organs for transplantation or tissues.
- Encourage the case to inform their contacts about the availability of testing.
- Refer Bahraini cases to infectious consultant in secondary care for further evaluation and treatment.
- For Non Bahraini cases, follow Ministry of Health policy.

Control of the contacts

- Ensure that sexual and needle-sharing contacts are counseled and followed up.
- Pre- and post-test counseling should be provided for all contacts who seek HIV testing.

Outbreak measures

Not applicable.

Cholera

An acute bacterial enteric disease characterized in its severe form with sudden onset of profuse painless watery stools and occasional vomiting. In untreated cases dehydration, acidosis, circulatory collapse, renal failure and death may occur.

Infectious Agent:

- Vibrio cholera serogroups O1, O139.
- The term non-Vibrio cholera (NVC) refers to cases of cholera like illness caused by organisms other than the O1 or O139 Vibrio species. These infections are not notifiable. Most non-O1/O139 strains do not secrete enterotoxin but can cause sporadic disease.

Mode of transmission:

- Through ingestion of food or water contaminated with feces or vomitus of infected persons.
- Large outbreaks are usually caused by a contaminated water supply.
- Direct person to person transmission is rare.

Incubation period:

From few hours to 5 days, usually 2-3 days.

Period of Communicability:

For the duration of the stool-positive stage (acute stage) and for a few days after recovery. By the end of the first week 70% of patients are non-infectious and by the end of the third week 98% are non-infectious. However intermittent shedding of organisms may occasionally last for several months to years in the carrier state as a result of chronic biliary infection.

Case definition

Suspected case

Any patient presenting with watery diarrhea and/or vomiting and coming from country reporting cholera outbreak.

Laboratory criteria for diagnosis

Isolation of Vibrio cholera O1 or O139 from stools in any patient with diarrhea.

Confirmed case

A suspected case that is laboratory-confirmed

Exclusion:

Until certified free from infection by collecting 3 consecutive stool specimens on alternate days starting 48 hours after completion of antibiotic treatment.

Notification:

- Group A disease, notification should be done within 24 hours. cholera should be reported immediately by telephone
- Communicable disease group should notify National International Health Regulation Focal Point (NFP) about the case.

Preventive measures

Travelers to endemic areas should be advised about careful food and water selection and personal hygiene. Also they should be advised to carry oral rehydration powder which must be reconstituted with boiled or sterilized water if needed.

Control of Case(s)

- Investigate to identify the possible sources of infection especially if there is no history of travel to an endemic area.
- Adequate fluid and electrolyte therapy with oral rehydration therapy (ORS) for mild to moderate illness.
- Intravenous fluid for patients with severe dehydration. Such patients also require appropriate antibiotics to shorten the duration of diarrhea, reduce the volume of rehydration fluids needed, and shorten the duration of bacterial excretion. Mass administration of antibiotics is not recommended, as it has no effect on the spread of cholera and contributes to increasing antimicrobial resistance.

Control of the contacts

- All contacts should be observed for five days from the date of last exposure. Stool culture of all household contacts, even if they are asymptomatic as well as Stool culture of any other contacts with symptoms of diarrhea.
- Contact tracing is also done to identify the possible implicated source of infection.

Control Measures during the post-epidemic phase

- Continuous surveillance of diarrhea cases.

Plague

It is a specific zoonosis involving rodents and their fleas, which transfer bacterial infection to animals and people. Symptoms and signs in human may be nonspecific, commonly a lymphadenitis develops in lymph nodes receiving drainage from the site of the bite. Bubonic plague occurs more often in lymph nodes in inguinal area (90%) and less commonly in axillary and cervical areas. The involved nodes become swollen, tender and may suppurate. Fever is usually present. Plague may progress to septicemia, endotoxic shock and disseminated intra-vascular coagulation may occur. Involvement of the lung results in pneumonia, mediastinitis or pleural effusion. Secondary pneumonia may serve as source of person to person transfer resulting in primary pneumonic plague; this can cause epidemics.

Case fatality rate is about 50% - 60% in untreated bubonic plague. Untreated septicemic and pneumonic plague are invariably fatal.

Infectious Agent:

Yersinia pestis, the plague bacillus.

Reservoir:

Wild rodents are the natural reservoir of plague. Rabbits and domestic cats may also be a source of infection.

Mode of Transmission:

- The most frequent source of exposure has been the bite of infected fleas. Fleas may remain infective for months.
- Other sources include the handling of tissues of infected animals and rarely airborne droplets from human patients or domestic pets with plague pharyngitis or pneumonia.
- Bubonic plague is not usually transmitted directly from person to person unless there is contact with pus from suppurating buboes.
- Pneumonic plague may be highly communicable under appropriate climatic conditions.

Incubation Period:

- 1 - 7 days
- For primary plague pneumonia 1 - 4 days.

Period of Communicability:

Patients are usually not infectious after receiving 48–72 hours of suitable antibiotic treatment.

Case definition

Suspected case

Any case presenting with rapid onset of fever, chills, headache, severe malaise, prostration with

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

Confirmed case:

Any suspected case with positive laboratory tests for plague which include:

- Cultural isolation of Yersinia pestis from buboes, blood, CSF or sputum or
- Passive hemagglutination test (PHA test) demonstrating four fold change in antibody titre, specific for F1 antigen of Y.pestis (HI test) in paired sera

Exclusion:

Until medical clearance from the treating physician.

Notification:

- **Group A disease**, notification should be done immediately by telephone followed by written notification within 24 hours.
- Communicable disease group should notify National International Health Regulation Focal Point (NFP) about the case.

Preventive measures

- Education about the mode of transmission.
- Periodically survey of rodent population. Rat suppression by poisoning may be necessary.
- Control rats on ships by rat proofing
- No vaccine exists of proven efficacy against primary pneumonic plague.

Control of Case(s):

- Strict isolation for patients with pneumonic plague with precautions against airborne spread is required until 48 hours of antibiotic therapy.
- For patients with bubonic plague, secretion precautions are indicated for 48 hours after start of effective therapy.
- Concurrent disinfection: of sputum and purulent discharge and articles. Bodies of people that died of plague should be handled with strict aseptic precautions.

Control of Contacts:

Contacts – Anyone who has been within 2 meters of a coughing patient in the previous 7 days.

- All contacts with fever or cough to be referred for medical evaluation.
- Asymptomatic contacts will be given antibiotics for 7 days and should be monitored for the development of symptoms.
- Fever watch is required for those who have contraindications to the antibiotics.
- Antibiotic prophylaxis should be considered for the following groups (CDC):
    - Persons exposed to aerosol or other potentially infective Y. pestis release.
    - Household members of cases with respiratory plague.
    - Healthcare workers at facilities that screen or care for suspected

plague patients, and who have direct patient contact.

- Emergency workers or others who respond to calls for assistance.
- Persons who transport sick persons to healthcare facilities.
- Coworkers, friends, and other associates who have had close contact with symptomatic respiratory plague cases.
- Household pets (mammals only) of persons symptomatic with pneumonic plague.

- Doxycycline is the first-choice antibiotic for post exposure prophylaxis.
- Tetracycline, sulfonamides, and chloramphenicol are also useful as post exposure.
- Persons refusing prophylaxis should be closely observed for the development of fever or cough for the first 7 days after exposure and should be treated immediately if the symptoms occurs.

Outbreak measures

A single case of plague is considered an outbreak and should be dealt with as a public health emergency. The outbreak control measures should include the following:

- active case finding
- Issuing alert for all healthcare workers that contains the case definition, management and infection control measures.
- Release timely public information.
- initiation of intensive flea control around the focus in expanding circles of control
- destruction of rodents within affected areas
- tracing and control of contacts

Yellow fever

Yellow fever is an acute viral disease of short duration with a wide variation in intensity. The classic triad of jaundice, hemorrhage and severe albuminuria is present only in a small number of severe cases. In mild cases, the only symptoms may be headache and fever or a 'dengue-like' illness with fever, chills and myalgia.

Malignant cases have three characteristic stages of infection, remission and intoxication:

- Stage one: Fever, chills, backache, myalgia, nausea, vomiting and epistaxis with Fagets sign (relative bradycardia: high temperature, slow pulse) that appear on the second day. On the third day, the fever falls by crisis and patient enters remission.
- Stage two: Remission that may last several hours to several days but hemorrhages, anuria and delirium may occur without remission.
- Stage three: Development of the classic symptoms of jaundice and haemorrhagic manifestations (epistaxis, haematemesis, melaena and uterine bleeding) followed by albuminuria, coma and death three days later.

Infectious Agent

Yellow Fever Virus (flavivirus).

Reservoir

Humans in urban areas and other vertebrate (mainly monkeys) in jungles.

Mode of Transmission

- Urban yellow fever is transmitted from person to person by the Aedes aegypti mosquito.
- Jungle yellow fever is a zoonosis transmitted among non-human hosts (mainly monkeys) by various forest mosquitoes that may also bite and infect humans.
- If these humans are subsequently bitten by Aedes aegypti mosquitoes, they become the source of out-breaks of the urban form of the disease.

Incubation Period

Usually two to five days.

Period of communicability

Human blood is infective for mosquitoes shortly before the onset of fever. For three to five days thereafter, mosquitoes require nine to 12 days after a blood meal to become infectious and remain so for life.

Susceptibility and Resistance

- Mild infection is common in endemic areas.
- Previous infection with dengue gives some degree of immunity, and passive immunity in infants born to immune mothers may last for six months.
- Recovery from yellow fever gives lifelong immunity

Case Definition

Suspected case:

Any case that is compatible with the clinical description mentioned above.

Confirmed case:

Any suspected case with positive laboratory tests including:

- presence of IgM in early sera or four-fold or greater rise in serum IgG levels in paired sera
- Virus isolation by mice inoculation or cell culture.

Exclusion:

Until medical clearance from the treating physician.

Notification:

- Group A disease, notification should be done immediately by telephone followed by written notification within 24 hours.
- Communicable disease group should notify National International Health Regulation Focal Point (NFP) about the case.

Preventive Measures

- All travelers to endemic areas in Africa and South America should be immunized.
- Ae.aegypti should be controlled in airplanes and ships arriving from endemic areas.
- A yellow fever vaccination certificate is valid for life and begins validity 10 days after vaccination.

Control of Case(s)

- Isolation of the case, under blood and body fluid precautions.
- Access of mosquitoes should be prevented (with mosquito nets and residual sprays) for at least five days after onset of disease.

Control of Contacts and the Environment

- Investigate contacts and source of infection.
- Investigate places visited three to six days before onset.
- Immunize household contacts and other contacts not previously immunized.
- Determine presence and source of vector mosquitoes.
- The home of the patient and all houses in the vicinity should be sprayed.

Outbreak measures

A single case of yellow fever is considered an outbreak and should be dealt with as a public health emergency. The outbreak control measures should include the following:

- Active case finding.
- tracing and control of contacts
- Issuing alert for all healthcare workers that contains the case definition, management and infection control measures.
- Vaccination.
- Release timely public information.
- Spraying all houses with insecticide.
- Controlling Ae.aegypti in airplanes and ships.

Leprosy

It is a chronic bacterial infection involving the cooler body tissues, the skin, superficial nerves, nose, pharynx, larynx, eyes and testicles. Skin lesions may occur as pale macular lesions with loss of sensation or erythematous infiltrated nodules. Nerve infiltration and thickening with anaesthesia, neuritis, paraesthesia and trophic ulcers are manifestations of neurologic disturbances.

The two forms of the disease are lepromatous and tuberculoid. The lepromatous type is progressive with numerous acid-fast bacilli in the skin lesions, it manifest by nodular skin lesions and slow symmetric nerve involvement. The tuberculoid type is benign and non-progressive with few bacilli present in the lesions, it manifest by localized skin lesions and asymmetric nerve involvement.

Infectious Agent

Mycobacterium leprae.

Incubation Period

- It is difficult to determine the incubation period.
- It may range from nine months to 20 years. (Average 4 years for tuberculoid leprosy and 8 years for lepromatous leprosy).

Mode of Transmission

The exact mechanism of transmission of leprosy is not known. The disease is probably transmitted by contact between cases of leprosy and healthy persons. More recently the possibility of transmission by the respiratory route is gaining ground. The possibility of transmission through insects cannot be completely ruled out.

Period of Communicability

Leprosy is not usually infectious after three months of continuous treatment with dapsone or clofazimine, or after two to three weeks of treatment with rifampicin.

Case Definition

Suspected case:

A case compatible with the clinical description mentioned above.

Confirmed case:

A suspected case that is laboratory confirmed by positive skin smear (skin biopsy)

Susceptibility and Resistance

Infection among close contacts of leprosy patients is frequent, but clinical disease occurs only in a small proportion.

Exclusion:

Until medical clearance from the treating physician.

Notification

Group A disease, notification should be done within 24 hours.

Control of Case(s)

- Isolation of lepromatous (multibacillary) cases until treatment is initiated particularly if nasal smears are positive.
- Isolation of tuberculoid (paucibacillary) cases is not required.
- Nasal discharges of infectious patients should be disinfected or disposed of as infectious waste.
- Treatment of case according to WHO guideline.
- Follow repatriation policy for non-Bahraini.

Control of Contacts

- Investigation of contacts and source of infection.
- Early detection and treatment of new cases.

Tuberculosis

TB is a bacterial disease that usually affects the lungs, but it can also occur in other parts of the body, such as the brain, the kidneys, or the spine. Pulmonary TB may cause symptoms such as chronic cough that lasts 3 weeks or longer, pain in the chest and or hemoptysis. Symptoms and signs of extrapulmonary TB depend on the body site affected for example:

– Hematuria in TB of the kidney.
– Headache/confusion in TB meningitis.
– Back pain in TB of the spine.
– Hoarseness in TB of the larynx.

Other symptoms of active TB disease may include weight loss, fever, chills, loss of appetite, night sweating and or fatigue.

Infectious Agent

- Mycobacterium tuberculosis
- Rarely by M. bovis or M. africanum.

Mode of transmission:

- Mainly by inhalation of infectious droplets generated during coughing, laughing, shouting or sneezing by patient with active pulmonary or laryngeal tuberculosis.
- Extra pulmonary tuberculosis is generally not communicable except laryngeal infection and renal tuberculosis (in which the urine is infectious).
- Ingestion of unpasteurized milk and dairy products is the main cause of bovine tuberculosis.
- Aerosol transmission has been reported among abattoir workers

Incubation period

About 2-12 weeks

Period of Communicability

- The patient is infectious as long as viable bacilli are being discharged from the sputum.

- The greatest risk of transmitting infection is in the period prior to diagnosis of an open case; a sputum smear positive case is more infectious than a case only positive on culture.
- The risk of transmitting the infection is significantly reduced within 2-4 weeks after commencing appropriate chemotherapy.

Case definition

Suspected case:

Pulmonary TB:

Any patient with cough and expectoration more than three weeks associated with fever, loss of weight and night sweating.

Extra pulmonary TB:

Any person who presents with symptoms or signs suggestive of extra pulmonary TB depending on the site affected as mentioned above.

Confirmed case:

Suspected cases with samples that are smear and/or culture positive for Acid Fast Bacilli (AFB) \ WHO-approved rapid diagnostics such as Xpert MTB/RIF.

Exclusion:

Until medical clearance from the treating physician.

Notification

Pulmonary TB is a group A disease, notification should be done within 24 hours.

Extra pulmonary TB is a group B disease, notification should be done within one week.

Control of cases:

- Isolate the infectious case for the period of communicability. (exclude from work/School for the same period)
- Follow the infection control measures for airborne diseases in pulmonary TB cases.
- Ensure that the patient take adequate anti-TB chemotherapy for an appropriate period of time.

Control of Contacts

- Trace and investigate contacts to identify secondary cases in pulmonary TB and to trace source of infection in extra pulmonary TB cases according to the Ministry of Health policy (annex).
- Manage the contacts and provide preventive measures according the Ministry of Health policy (annex).

Outbreak measures

- Active case finding.
- Tracing and control of contacts.
- Search for the sources of infection.

Meningococcal Infection

An acute bacterial disease, characterized by sudden onset of fever, headache, nausea and often vomiting, stiff neck and, frequently, a petechial rash, it has the potential of causing outbreaks, and the case fatality rate is between 5-15%. Sudden prostration; shock associated with the characteristic rash are manifestation of fulminating infection and this condition has a high fatality rate.

Infectious Agent:

- Neisseria meningitidis is a gram negative diplococci.
- Several serotypes have been identified A,B,C,X,Y,Z,W- 135.
- Group A and C and to lesser extent group B are capable of causing major epidemics.

Mode of Transmission:

By direct contact, including respiratory droplets from nose and throat of infected persons. Humans are the only natural hosts for meningococci and the organism dies quickly outside the human host. It cannot be isolated from environmental surfaces or samples.

Incubation Period:

Range from 2-10 days, usually 3-4 days.

Period of Communicability:

- Until meningococci are no longer present in discharge from nose and mouth.
- Meningococci usually disappear from nasopharynx within 24 hours after starting the treatment.

Case definition:

Suspected case:

Any patient with sudden onset of fever and one of the following:

- neck stiffness
- altered consciousness
- other meningeal sign
- or petechial or purpural rash
- In patients <1 year of age meningitis is suspected when fever is accompanied by a bulging fontanelle.

Confirmed case:

Any suspected case with positive microscopic examinations (gram negative diplococci) and positive culture of CSF.

Exclusion:

Until 24 hours after starting the treatment

Notification:

Group A disease, Meningococcal meningitis should be reported immediately by telephone and written notification should be sent within 24 hours.

Control of Cases

- Admission to a hospital.
- Appropriate antibiotic treatment must be started as soon as possible, ideally after the lumbar puncture has been carried out
- Respiratory isolation for 24 hours after starting of treatment and disinfection of discharge from the nose, throat and articles.

Control of Contacts:

- Contacts include:
- Household contacts: people living in the same house and visitors who stayed overnight in the seven days preceding the onset of the patient's illness.
- Contacts in schools, military camps, hostels and other work place in

the seven days preceding the onset of the patient's illness.

- Sexual contacts.
- Health care workers who performed mouth-to mouth resuscitation or intubation or suction or similar intimate treatment with a case of meningococcal disease before starting therapeutic antibiotics.
- Clearance antibiotics should only be given to the contacts mentioned above who have been with the case seven days prior to the onset of the patient's illness. They should be initiated as soon as possible after diagnosis.
- Chemoprophylaxis aims to eradicate carriage of meningococcal bacteria in the close contacts and ultimately reduce the risk of invasive disease.

Table (2): Prophylaxis for contacts of meningococcal meningitis cases

Drug for prophylaxis	Dose
Rifampicin	All to be given twice daily for 2 days: Dosage -Adults and children over 12 y 600 mg -Children aged 1–12 years 10 mg/kg -Infants (under 12 months) 5 mg/kg Inform the patient about the side effect of the medicine which include staining of urine and contact lenses.
Ciprofloxacin	Dosage Adults 500 mg orally, single dose (minimum age 12 years and weight >40 kg)
Azithromycin	A single dose Azithromycin can be advised for pregnant women. Dosage Azithromycin 500 mg stat
Ceftriaxone:	Dosage -Adults 250 mg IM (recommended for pregnant contacts). -Children (<12yrs) is 125 mg IM. -Not for infants under 1 month.

Preventive measures:

- Vaccination of high risk groups (age more than two years) with meningococcal A,C,W,Y polysaccharide vaccines is as follows :
- Immunization of persons proceeding haj pilgrimage and other holy places where large gathering take place prior to departure
- Immunization of persons travelling to countries known to have had outbreaks of meningococcal meningitis.
- Immunization should be given to asplenic patients over 2 years of age, who are especially susceptible to serious meningococcal infections.
- Health education about personal hygiene and the necessity of avoiding direct contact and exposure to droplet infection.

Outbreak measures

- Prompt and appropriate case management with proper antibiotic.
- Active case finding.
- Vaccination of susceptible populations not already protected through vaccination.

Food Poisoning

Food poisoning is a general term for health problems arising from eating contaminated food. Symptoms vary with the causative agent and range from slight abdominal pain and nausea to vomiting, abdominal cramps and diarrhea. Fever, chills, headache, malaise and muscular pains may accompany gastrointestinal symptoms.

Causative agents:

- toxins elaborated by bacterial growth (e.g. Staphylococcus aureus)
- bacterial , viral or parasitic infection (e.g. salmonellosis , viral gastroenteritis and trichinosis)
- Fish toxins (in some shellfish) & plant toxins which occur naturally in some foods.
- chemical contaminants (heavy metals poisoning)

Mode of transmission:

Transmission is predominantly via the faecal-oral route or ingestion of contaminated food and water sources caused by a contaminated water supply.

Incubation period:

Variable according to the causative agent. Usually short for toxin-producing bacteria and longer for others.

Period of communicability:

Depends on the causative agents. Viruses are generally communicable during the acute phase and up to two days after recovery while bacteria are generally communicable during the acute diarrheal stage.

Case definition:

Suspected cases: may be defined as an incident in which 2 or more persons experience a similar illness after ingesting a common food.

Confirmed cases:

Any suspected case with isolation of the causative organism from stool.

Exclusion:

Exclusion until at least the diarrhoea has ceased is required for the following categories:

- Children from school or childcare.
- Cases from food handling, schools and children's services centres.
- Health care workers if employed in an area with high risk patients, such as special care nurseries or nursing homes.

Notification:

- Group A disease, should be reported immediately by telephone and written notification should be sent within 24 hours.
- CDS staff should notify Food Hygiene Section.

Control of Cases

- The treating physician should request stool culture for suspected cases.
- The case should be managed according to the severity and causative organism (e.g. IV hydration and antibiotics if indicated)
- Investigation of the case by public health specialists.
- Educate patients and their families on the following:
  - The need for strict hygiene practices.
  - Infected persons should not prepare meals for others while infectious nor share utensils, toothbrushes, and towels.

Control of Contacts:

- Surveillance of contacts in the patient's household, or in a common source outbreak.

Outbreak measures

Food-borne disease outbreak is defined as an incident in which two or more persons experience a similar illness after ingesting a common food and epidemiological analysis implicates this food as the source of the illness. Exceptions are botulism and chemical poisoning in which a single case is defined as an outbreak.

- Active case finding.
- Inspection and control of the source of food poisoning.

Hepatitis A

Hepatitis A is a liver infection caused by the hepatitis A virus (HAV). Contrasting hepatitis B and C, hepatitis A infection does not cause chronic liver disease and is rarely fatal.

The symptoms of hepatitis A are variable ranging from asymptomatic or mild to severe. It includes fever, malaise, anorexia, nausea and abdominal discomfort, followed within a few days by jaundice and dark-colored urine. Adults have signs and symptoms of illness more frequently than children. Also the severity of disease and mortality increases in older age groups. Most have smooth recovery without complications in several weeks or months.

Infectious agent:

Hepatitis A virus, a picornavirus.

Mode of transmission:

- Person to person by faeco-oral transmission i.e. The HAV-virus is spread when an uninfected (or unvaccinated) person eats or drinks something contaminated by the stool of an infected person.
- Blood borne transmission of HAV occurs, but is much less common.
- The HAV infection is closely associated with inadequate sanitation and poor personal hygiene. Despite the fact that waterborne outbreaks are infrequent, but when occurs usually it's associated with sewage-contaminated or inadequately treated water.
- Casual contact between people does not spread the virus.

Incubation period:

15-50 days (average 28-30 days).

Period of communicability:

2 weeks before to one week after onset of jaundice. Most cases are noninfectious after the first week of jaundice. However, prolonged virus excretions up to six months have been reported.

Exclusion:

Until at least 1 week after onset of jaundice or as directed by the treating physician.

Notification:

Group A disease, notification should be done within 24 hours.

Case definition:

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

Any suspected case with positive hepatitis (A) IgM antibodies.

Control of Cases:

- The case should be managed according to the severity (e.g. IV hydration, referral or hospitalization if indicated)
- Investigation of the case by public health specialists.
- Educate patients and their families on the following:
  - The need for strict hygiene practices.
  - Infected persons should not prepare meals for others while infectious nor share utensils, toothbrushes, and towels.

Control of Contacts:

- Maintain surveillance of contacts in the patient's household, or in a common source outbreak.
- If the case working as a food handler, child care worker or health care worker active case finding should be conducted in their work place.
- For person with recent exposure (within 2 weeks) to HAV who have not previously received hepatitis A vaccine, the vaccine should be given as

soon as possible after exposure. A Second dose to be given 6-12 months after first dose.

- Hepatitis A vaccine may be administered simultaneously with HAV immunoglobulin but should be given at separate injection sites.
- HAV immunoglobulin is recommended in addition to vaccine for contacts who are less able to respond to vaccine (those aged over 50 years or with immunosuppression) and those at risk of severe complications (those with chronic liver disease including chronic hepatitis B or C infection).
- HAV immunoglobulin also can be given for those at risk of severe complications (those with chronic liver disease including chronic hepatitis B or C infection) exposed between two and four weeks to modify the disease.
- Education about adhering to personal hygiene practices, such as regular hand-washing and to practice proper food preparation practice.

Preventive measures:

- Routine vaccination of children.
- Vaccination of travelers.
- Health education about personal hygiene.
- Ensure safety of consumed water and food.

Outbreak measures

- Active case finding.
- Epidemiological, environmental and laboratory investigation of common exposures amongst cases is essential.
- Vaccination of unvaccinated contacts.

Hepatitis E

Hepatitis E is a viral liver infection with symptoms similar to that of hepatitis A. It is a self-limiting disease of adults aged 15–40 years. A high case fatality rate (up to 20%) has been observed in pregnant women who got the infection in their third trimester of pregnancy.

Infectious agent:

Hepatitis E virus (HEV).

Mode of transmission:

- Hepatitis E is transmitted through contaminated water
- possibly by person to person transmission via faeco-oral transmission
- In some endemic countries, evidence of infection in rats and other rodents may indicate other mechanisms of transmission.

Incubation period:

Varies from two weeks to two months

Period of communicability:

Unknown but HEV has been found in stools 14 days after the onset of jaundice.

Exclusion:

Food handlers, health care workers and child care workers must be excluded from work for at least seven days after the onset of jaundice and until well. Children also should not attend school or child care for seven days after the onset of symptoms.

Notification:

Group A disease, notification should be done within 24 hours.

Case definition:

Suspected case:

Any case presenting with the symptoms suggestive of acute hepatitis.

Confirmed case:

Any suspected case with positive hepatitis (E) IgM antibodies

Control of Case(s):

- The case should be managed according to the severity (e.g. IV hydration, referral or hospitalization if indicated)
- Investigation of the case by public health specialists.
- Educate patients and their families on the following:

The need for strict hygiene practices.

Infected persons should not prepare meals for others while infectious nor share utensils, toothbrushes, and towels.

Control of Contacts:

- Maintain surveillance of contacts in the patient's household, or in a common source outbreak.
- If the case working as a food handler, child care worker or health care worker active case finding should be conducted in their work place.

Preventive measures:

- There is no vaccine against HEV
- Vaccination of travelers.
- Health education about personal hygiene.
- Ensure safety of consumed water and food.

Outbreak measures

- Active case finding.
- Epidemiological, environmental and laboratory investigation of common exposures, particularly water, amongst cases is essential.

Typhoid & Paratyphoid Fever

Typhoid and paratyphoid are systemic infectious bacterial diseases of the gastro-intestinal tract and lymphoid tissues and are similar in clinical manifestations. Typhoid fever presents with fever, bradycardia, splenomegaly, abdominal symptoms and 'rose spots' which are clusters of pink macules on the skin. Complications may occur in untreated patients or when treatment is delayed such as intestinal hemorrhage or perforation. Paratyphoid fever presents with a similar

Clinical picture but is usually milder and shorter in duration with fewer complications.

Infectious Agents:

- For typhoid fever, salmonella typhi, the typhoid bacillus.
- For paratyphoid fever, three serotypes of S.enteritidis are recognized, paratyphi A, B and C.

Reservoir:

Humans for both typhoid and paratyphoid fever, rarely domestic animals for paratyphoid fever.

Mode of Transmission:

- Contaminated food and water (by feces and urine of patients and carriers) and rarely by direct contact.
- Water and ice (if unboiled water used).
- Raw fruits and vegetables
- Salads and shellfish.
- Contaminated milk and milk products.
- Flying insects feeding on feces may occasionally transfer the bacteria

Incubation Period:

- For typhoid fever : it depends on the size of infecting dose but usually 8 to 14 days (range from 3-30 days)
- For paratyphoid fever: 1-10 days.

Period of Communicability:

- As long as bacilli persists in excreta. Usually from the first week throughout convalescence; commonly one to two weeks for paratyphoid.
- About 10% of untreated typhoid fever patients will discharge bacilli for 3 months after the onset of symptoms and 2-5% becomes permanent carriers.

Exclusion:

Food handlers and workers in high risk professions are generally excluded from high risk work or patient care until they have had three negative faecal specimens that is collected over three consecutive weeks not sooner than at least 48 hours after cessation of antibiotic treatment.

Notification:

Group A disease, notification should be done within 24 hours.

Case definition:

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

Any suspected case with Isolation of causative bacteria from blood, stool, or other clinical specimen.

Control of Case(s):

- Isolation: Enteric precautions while ill, hospital care is desirable during acute illness. Released from supervision should be based on not fewer than 3 consecutive negative cultures of feces taken at least 24 hours apart and at least 48 hours after antibiotic. If any of these cultures are positive then repeat cultures should be done at intervals of one month during the 12 months following onset until at least 3 consecutive negative cultures are obtained.

- Strict implementation of infection control standards.
- The case should be managed according to the severity and causative agent (e.g. IV hydration, referral or hospitalization)
- Investigation of the case by public health specialists.
- Educate patients and their families on the following:
  - The need for strict hygiene practices.
  - Infected persons should not prepare meals for others while infectious nor share utensils, toothbrushes, and towels.

Control of Contacts:

- Maintain surveillance of contacts in the patient's household, or in a common source outbreak.
- If the case working as a food handler, child care worker or health care worker active case finding should be conducted in their work place.
- Immunization of contacts.
- Contacts should be educated about the disease to reduce the risk of transmission and for early identification of new cases among contacts.
- Faecal screening is indicated for the following:
  - Household contacts of a case who are food-handlers or in a high risk profession.
  - Screening is more intensive and includes the entire household if the patient has no history of travel to a typhoid-endemic area. In this case samples from water sources should also be collected.
  - Fellow travelers.

Preventive measures

- Educate the public regarding the importance of hand washing especially after toilet use and before food preparation.
- Dispose human feces in a sanitary manner.
- Protect and chlorinate public water supplies.

- Control flies by screening, spraying with insecticides. Control fly breeding by frequent collection and disposal of garbage.
- Use strict cleanliness in food handling and preparation.
- Pasteurize or boil milk and dairy products.
- Enforce suitable quality control procedures in industries that prepare food and drink for human consumption.
- Instruct patients, and carriers in personal hygiene.
- Encourage breast-feeding throughout infancy, boil all milk and water used for infant feeding.
- Exclude typhoid carriers from handling food and from providing patient care.
- Typhoid fever immunization to travelers to endemic areas, and household members of known carriers.

Salmonellosis

Salmonellosis is a bacterial infection caused by salmonella which live in the intestinal tracts of humans and other animals, including birds. Salmonella is considered a major cause of foodborne illness throughout the world.

Most of the cases infected with Salmonella presents with diarrhea, abdominal cramps and fever. The illness usually recovers without treatment, but in some cases, the diarrhea may be so severe that the patient requires hospitalization. In severe cases, the Salmonella infection may spread to the blood stream, and to other body sites which may lead to death unless the person is treated on timely manner with antibiotics. The groups who are more likely to get a severe illness are infants, elderly, and those with impaired immune systems. Rarely, some cases infected with Salmonella will develop Reiter's syndrome which is manifested by pain in the joints, irritation of the eyes, and painful urination.

Infectious agent:

Salmonella which is Gram-negative rod-shaped bacilli, with approximately 2000 serotypes that cause human disease.

Mode of transmission:

- Faeco-oral transmission from person to person or animal to person.
- Consumption of contaminated food of animal origin (which usually look and smell normal), mainly meat, poultry, eggs and milk, however many other foods, including green vegetables contaminated from manure, have been implicated in its transmission.
- Foods usually contaminated with animal feces or by the hands of an infected food handler who did not wash hands with soap after using the bathroom.
- Salmonella can pass through the food chain from primary production to households or food-service establishments and institutions.

Incubation period:

Range from 12 to 72 hours after infection

Period of communicability:

Variables from several days to several weeks and carrier state might continue for months

Exclusion:

Exclusion until at least the diarrhoea has ceased is required for the following categories:

- Children from school or childcare.
- Cases from food handling, schools and children's services centres.
- Health care workers if employed in an area with high risk patients, such as elderly and immunocompromised.

Notification:

Group A disease, notification should be done within 24 hours.

Case definition

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

Any suspected case with Isolation of salmonella species stool or blood

Control of Cases

- The case should be managed according to the severity (e.g. IV hydration and hospitalization if indicated)
- Antibiotics are not indicated in uncomplicated gastroenteritis as they may prolong the carrier state and promote antibiotic resistance. Antibiotics are indicated for the following categories
    - Patients at high risk of more severe disease including infants under two months of age, the elderly and immunocompromised (particularly those with HIV)
    - Food handlers who are chronic carriers.
    - For systemic disease

- Investigation of the case by public health specialists.
- Use standard enteric precautions when handling faeces, contaminated clothing and bed linen from hospitalised patients.
- Educate patients (including asymptomatic individuals) and their families on the following:

The need for strict hygiene practices.

Infected persons should not prepare meals for others while infectious nor share utensils, toothbrushes, and towels.

Control of Contacts:

- Surveillance of contacts in the patient's household, or in a common source outbreak.
- Sources of contamination such as use of uncooked products and inadequate cooking should be investigated. Attention should be paid to environmental cleaning, particularly in institutions, child care centres and food premises.

Outbreak measures

Outbreak is defined as two or more cases that are epidemiologically linked (e.g. place, time, and food product) and confirmed to have Salmonella infection.

- Active case finding.
- Conduct investigation to rapidly identify the source and prevent further cases.
- Stools should be collected from cases and attempts made to identify a common source by obtaining food histories and potentially relevant environmental exposures.
- National PulseNet perform standardized molecular subtyping (or "fingerprinting") of foodborne disease-causing Salmoenella by pulsed-field gel electrophoresis (PFGE). PFGE can be used to distinguish strains of organisms at the DNA level.
- The roles of PulseNet:
    - Detect foodborne disease case clusters by PFGE, thereby facilitating early identification of common source outbreaks
    - Separate outbreak-associated cases from sporadic cases (case definition)
    - Assist in identifying and confirming the source of the outbreak (culture confirmation)
    - Act as an efficient means of communication between public health laboratories.

Shigellosis

An illness of variable severity characterized by an acute illness of diarrhea, fever, nausea, abdominal cramps, and tenesmus starting a day or two after the exposure to the bacteria. The stool usually contains blood and mucus (dysentery) but some patient will present with watery diarrhea. A severe infection with high fever may be associated with seizures in children less than 2 years old. Asymptomatic infections may occur. Toxic megacolon, reactive arthritis, and haemolytic uraemic syndrome are reported complications related to the disease.

Infectious agent

Shigella is comprised of four species

- Group A, S.dysenteriae
- Group B, S.flexneri
- Group C, S.boydii
- Group D, S.sonnei.

Mode of transmission

Faeco-oral transmission from a patient or carrier, directly by physical contact or indirectly by contaminated food, water, milk or by flies.

Incubation period

Range from 12-96 hours, usually one to three days; however it might be up to one week for S.dysentreriae.

Period of communicability

During acute infection and until the infectious agent is no longer present in feces, usually within 4 weeks after illness. Asymptomatic carriers may transmit infection, rarely the carrier state may persist for months or longer.

Reservoir

Mainly human, but outbreaks had occurred in primate.

Exclusion:

- Exclusion until at least the diarrhoea has ceased and two negative stools (collected 24 hours apart, but not sooner than 48 hours following discontinuance of antimicrobials) have been obtained is required for the following categories:
    - Children from school or childcare.
    - Workers in schools and children's services centres.
    - Health care workers if employed in an area with high risk patients.
- Food handlers should be excluded from work until two negative stools have been obtained, or until at least 48 hours after the diarrhoea has ceased and rigid personal hygiene measures can be assured.

Notification:

Group A disease, notification should be done within 24 hours.

Case definition

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

Any suspected case with Isolation of shigella from stools or rectal swabs.

Preventive measures:

- Good personal hygiene is essential to prevent the disease. Hand washing is important before eating and food handling and after toilet use, particularly in young children.
- Travel advice regarding safe food and water consumption should be given to traveler to endemic countries.

Control of Cases

- The case should be managed according to the severity (e.g. IV hydration and hospitalization if indicated)
- Antibiotics may shorten the duration and severity of illness however their use should be based on the serotype, severity of illness and host characteristics, for example if they are a child in child care, food handler or suffer chronic illness.
- during acute illness, enteric precautions should be implemented
- Investigation of the case by public health specialists.
- Educate patients and their families on the following:

The need for strict hygiene practices.

Infected persons should not prepare meals for others while infectious nor share utensils, toothbrushes, and towels.

Control of Contacts:

- The diagnosis should be considered in symptomatic contacts however stool cultures may be confined to food handlers and those in situations where the spread of infection is particularly likely (child care centres, hospitals, institutions).
- Symptomatic contacts of shigellosis patients should be excluded from food handling and the care of children or patients until investigated.
- Remove contaminated food and/or water sources.
- Strict attention should be paid to environmental hygiene in child care centres, institutions and food premises.

Outbreak measures

Outbreak is defined as two or more cases that are epidemiologically linked (e.g. place, time, and food product) and confirmed to have Shigella infection.

- Active case finding.
- Conduct investigation to rapidly identify the source and prevent further cases.
- Stools should be collected from cases and attempts made to identify a common source by obtaining food histories and potentially relevant environmental exposures.

Rabies

It is an acute viral disease of the central nervous system. The illness start with nonspecific symptoms such as fever, headache, malaise, anorexia, nausea and vomiting for one to four days followed by neurological symptoms in the form of periods of excitation and agitation leading to delirium, confusion, hallucinations and convulsions, these symptoms are manifestation of encephalitis. The patient then develops signs of brain stem dysfunction manifested by excessive salivation and difficulty in swallowing. This produces the traditional picture of 'foaming at the mouth'. The disease is usually fatal. Death from respiratory paralysis generally occurs within two to six days of onset.

Note that no rabid animal was detected in Bahrain for more than 50 years in Bahrain

Infectious Agent:

Rabies virus (rhabdovirus).

Reservoir

Rabies is primarily a disease of animals, particularly wild and domestic canine species, cats, skunks, raccoons, mongooses, monkeys, bats and other biting mammals.

Mode of Transmission:

- It is transmitted by the virus-laden saliva of a rabid animal introduced via bite or scratch.
- Dogs and cats are the main urban vectors. Dogs and cats may transmit virus for three to 7 days (rarely over four days) prior to onset of clinical signs and throughout the course of the disease.
- Person-to-person transmission via saliva is theoretically possible but has never been documented.
- Organ transplant (cornea) from patient who died from unknown C.N.S. disease.
- The virus is comparatively fragile and does not survive for long periods outside the host. It is readily inactivated by heat and direct sunlight.

Incubation Period:

Ranges from nine days to 7 years (commonly between three to eight weeks), depending on factors such as severity, site of wound and infective dose.

Period of Communicability:

No documented direct person to person transmission but rabies can be acquired from transplantation of organs of persons who died of the disease. Despite human saliva is not thought to be very infectious, precaution to exposures to saliva of the case should be implemented due to the deadly nature of this disease.

Exclusion:

Until medical clearance from the treating physician.

Notification:

Group A disease, notification should be done within 24 hours.

Case definition

Suspected: A case that is compatible with the clinical description mentioned above.

Confirmed: A suspected case that is laboratory-confirmed. By one or more of the following tests:

- Detection of rabies viral antigens by direct florescent 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 sucking mice.
- Detectable rabies-neutralizing antibody titre ≥ 1:5 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 specimen and confirmation of rabies viral antigens by direct fluorescent antibody testing.

Control of Cases

- There is no specific treatment available. Intensive supportive treatment is required.
- The patient should be placed in a private room with standard isolation precautions implemented for respiratory secretions for the duration of the illness.
- Disinfection of all saliva-contaminated articles should be done.
- Healthcare workers should wear gowns, gloves and masks while attending patients.
- Blood and urine are not considered infectious.
- Follow the guidelines for post-exposure prophylaxis

Control of Contacts:

- Other individuals exposed to the source animal are identified and offered postexposure prophylaxis.
- Contacts that have open wound or mucous membrane exposure to a patient's saliva should be offered full post-exposure prophylaxis.

Preventive Measures

- Domestic cats and dogs in urban areas of endemic countries should be vaccinated. Reduction of street dogs is most important.
- Travelers should be counseled not to ignore animal bites. Wounds should be immediately washed and cleaned with soap or detergent and water. The wound should not be sutured if possible. Expert medical advice should be sought. Tetanus vaccination should be considered for unvaccinated individuals.
- Post-exposure prophylaxis should be provided via rabies vaccine and rabies immunoglobulin for those bitten or scratched by animals that may be carrying the disease.
- The same prophylaxis should also be given to those people with open wounds or mucous membranes that have been contaminated with saliva or other potentially infectious material (brain tissue) from a rabid animal.

Unusual Event

- The event is caused by an un known agent or the source, vehicle, route of transmission is Unusual or

- Evolution of cases more severe than expected (including morbidity or case fatality) or with un usuaf symptoms.

- Occurance of the event itself unusual for the area, season or population.

Examples of Unusual Event

- Anthrax .

- Avian Influenza.

- Middle East Respiratory Syndrome Corona Virus (MERS CoV).

- Zika.

- Ebola Virus Disease.

- Covid 19.

- Monkeypox.

Part III- Communicable Diseases Under surveillance: Group B Diseases

This section provides specific guidelines for surveillance of the diseases included in the notification list. Each notifiable disease has been discussed in terms of its epidemiological features, and case definition. It also describes the role and responsibility of staff involved in disease control.

Viral Hepatitis B

Hepatitis B is a liver infection caused by hepatitis B virus (HBV) and can cause both acute and chronic disease. The acute illness may present with symptoms that last several weeks, including jaundice, dark urine, extreme fatigue, nausea, anorexia, vomiting, vague abdominal pain and sometimes arthralgia and rash. People can take several months to a year to recover from the symptoms. HBV can also be subclinical or might cause a chronic liver infection that can later develop into cirrhosis of the liver or liver cancer

Infectious agent:

Hepatitis B virus (HBV), is a DNA virus belonging to the Hepadnaviridae family.

Mode of transmission:

Hepatitis B virus is transmitted by contact with blood and/or body fluids of an infected person.

a. perinatal (Vertical transmission from infected mothers to the newborn or at birth)

b. early childhood infections (inapparent infection through close interpersonal contact with infected household contacts)

c. Parenteral route and Percutaneous route such as unsafe injections practices and blood transfusion

d. sexual contact

The highest concentration of the virus are in blood and serous fluid, lower titer are found in saliva and semen.

HBV can survive outside the body for at least 7 days and might cause infection if it enters the body of a person who is susceptible

Incubation period:

30-180 days (average 90 days). HBV might be detected 30 to 60 days after infection and persist for variable time periods

Period of communicability:

All persons who HBs Ag positive are potentially infectious. The patient is infectious during the incubation period and remains infective through the acute course of the disease. The infectivity of chronically infected persons

varies from highly infectious (HBe Ag positive) to sparingly infectious (anti-HBe positive).

Exclusion:

Not applicable

Notification:

Group B disease, notification should be done within one week

Case definition

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

Any suspected case with detection of hepatitis B surface antigen (HBs Ag) in the serum.

Hepatitis profile interpretation

HBsAg **anti-HBc** **anti-HBs**	negative negative negative	Susceptible
HBsAg **anti-HBc** **anti-HBs**	negative positive positive	Immune due to natural infection
HBsAg **anti-HBc** **anti-HBs**	negative negative positive	Immune due to hepatitis B vaccination
HBsAg **anti-HBc** **IgM anti-HBc** **anti-HBs**	positive positive positive negative	Acutely infected
HBsAg **anti-HBc** **IgM anti-HBc** **anti-HBs**	positive positive negative negative	Chronically infected
HBsAg **anti-HBc** **anti-HBs**	negative positive negative	Interpretation unclear; four possibilities: 1. Resolved infection (most common) 2. False-positive anti-HBc, thus susceptible 3. "Low level" chronic infection 4. Resolving acute infection

Control of Cases

- Investigation of the cases and the carriers by public health specialists.
- All diagnosed patients with HBV infection to be followed by physician with liver function test and abdominal ultrasound accordingly. Those with abnormality of either test should be referred to gastroenterologist.
- Hepatitis A vaccine is recommended to patients with hepatitis B infection, to prevent co-infection.

Control of Contacts:

- Possible contacts:
  - Infants born to Hepatitis B mother.
  - Sexual partners of infected person.
  - Needle sharing with infected person.
  - Any person exposed to needle stick or non-intact skin exposure to blood, body fluids or mucus membrane of infected person.
- For infants born to Hepatitis B mother or of unknown HBs Ag status, Hepatitis B immunoglobulin and Hepatitis B vaccine should be administered at the same time in a separate site then followed by routine vaccination schedule
- For person exposed to needle stick or non-intact skin exposure to blood, body fluids or mucus membrane of infected person , Hepatitis B immunoglobulin and Hepatitis B vaccine should be administered at the same time in a separate site
- For other contacts Hepatitis B vaccine should be offered.

Preventive Measures

- Receive three doses of Hepatitis B vaccine and ensure achieving protective titer after vaccination.
- All health care providers with high risk contact with blood or body fluids should use standard precautions.
- Use single-use equipment for all skin penetration procedures or use appropriate sterilization methods when reusable instruments are used for any procedure.
- The risk of infection can be reduced by avoiding:
  - Unnecessary and unsafe injections.
  - Unsafe blood products.
  - Unsafe sharps waste collection and disposal.
  - Use of illicit drugs and sharing of injection equipment.
  - Unprotected sex with HBV-infected persons.
  - Sharing of sharp personal items that may be contaminated with infected blood.
  - Tattoos, piercings and acupuncture performed with contaminated equipment.

Viral Hepatitis C

Hepatitis C is a liver disease caused by hepatitis C virus. After the initial infection, approximately 80% of patients are asymptomatic. Those who are acutely symptomatic may exhibit fever, fatigue, anorexia, nausea, vomiting, abdominal pain and jaundice. When a chronically-infected person develops symptoms, it may indicate advanced liver disease. 60–70% of chronically-infected persons develop chronic liver disease, 5-20% develop cirrhosis, and 1–5% die from cirrhosis or liver cancer.

Infectious agent:

Hepatitis C virus is an enveloped RNA virus (hepacivirus) from the flaviviridae family.

Mode of transmission:

Transmitted mainly parenterally through exposure to infectious blood such as:

- Receiving contaminated blood transfusions, blood products, and organ transplants.
- Injections with contaminated syringes.
- Needle-stick injuries.
- Being born to an HCV-infected mother (risk is 5-6%)

It is less commonly transmitted through sex with an infected person and sharing of personal items contaminated with infectious blood.

Hepatitis C is not spread through breast milk, food or water or by casual contact such as hugging, kissing and sharing food or drinks with an infected person.

Incubation period:

From 2 weeks to 6 months; commonly 6-9 weeks. Chronic infection can persists up to 20 years prior to cirrhosis and hepatocellular carcinoma.

Period of communicability:

One or more weeks before onset of the first symptom. May persist in most persons indefinitely.

Exclusion:

Not applicable

Notification:

Group B disease, notification should be done within one week

Case definition

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

A suspected case that is laboratory-confirmed. By the following tests:

- Detection of anti-hepatitis C antibodies.
- PCR test.

Control of Cases

- Investigation of the case by public health specialists.
- All diagnosed patients with HCV infection should be referred to gastroenterologist for assessment and treatment.
- All patients with hepatitis c infection should receive hepatitis A and B vaccine, to prevent co-infection.

Control of Contacts:

Contact tracing. Possible contacts include:

  - Needle sharing with infected person.
  - Sexual partners of infected person.
  - Any person exposed to needle stick or non-intact skin exposure to blood, body fluids or mucus membrane of infected person.

- No vaccine exists to prevent HCV infection.

Preventive Measures

- All health care providers with high risk contact with blood or body fluids should use standard precautions.
- Use single-use equipment for all skin penetration procedures or use appropriate sterilization methods when reusable instruments are used for any procedure.
- The risk of infection can be reduced by avoiding:
    - Unnecessary and unsafe injections.
    - Unsafe blood products.
    - Unsafe sharps waste collection and disposal.
    - Use of illicit drugs and sharing of injection equipment.
    - Unprotected sex with HCV-infected persons.
    - Sharing of sharp personal items that may be contaminated with infected blood.
    - Tattoos, piercings and acupuncture performed with contaminated equipment.

Gonococcal infection

A sexually transmitted bacterial disease (STI), which differs in males and females in course, severity and ease of recognition. In males, anterior urethritis is a common presentation, causing dysuria and purulent discharge, but symptoms may be mild or absent. In females, the lower cervical canal is commonly infected but the urethra and rectum might also be involved. Symptoms are vaginal discharge and dysuria, but 50% of women may have no symptoms.

Infectious Agent

Neisseria gonorrhoeae, a gram negative diplococci.

Mode of Transmission

Contact with exudates of infected mucous membranes, commonly through sexual intercourse.

Incubation Period

2-7 days (might be longer).

Period of Communicability

- It might be months in untreated cases.
- Communicability ends within hours after onset of effective therapy.

Exclusion:

Not applicable

Notification:

Group B disease, notification should be done within one week

Case definition

Suspected case:

Any case presenting with the symptoms mentioned above.

Confirmed case:

A suspected case that is laboratory-confirmed. By the following tests:

- Gram-negative diplococci may be seen in a stained secretion.
- Culture of exudate on a selective media.

Control of Case

- Interview the patients and identify all sexual contacts.
- Specific treatment and proper counseling. Cases should refrain from any sexual contact till the completion of therapy.
- HIV and other STI testing and counseling.

Control of Contacts

- Identify and investigate sexual contacts.
- Sexual contacts should be examined, tested and treated.
- All infants born to infected mothers should be given prophylactic treatment.

Syphilis

Syphilis is a sexually transmitted infection. The clinical picture of syphilis can be divided into stages:

- Early syphilis manifested by painless superficial ulceration (chancre) at site of exposure.
- Secondary (generalized rash or condylomata lata).
- Latent syphilis (asymptomatic) of less than two years duration evident by serology results only.
- Late latent syphilis: longstanding latent without other symptoms and signs of disease or neurosyphilis syphilis. It last for two or more years or of indeterminate duration,
- Tertiary syphilis where the case develop cardiovascular complication and neurosyphilis.

Infection during pregnancy may cause abortion, stillbirth, premature delivery and perinatal death. In congenital syphilis, the live infant develops generalized systemic disease.

Infectious agent:

The spirochete, Treponema palladium.

Mode of transmission:

- Direct contact with infectious exudates of lesions on skin or mucous membranes
- Sexual intercourse
- During pregnancy of an infected woman when transplacental infection occur.

Incubation period:

Range from 10 days to 3 months with an average of 3 weeks.

Period of communicability:

Syphilis is considered sexually infectious during the early stage (primary and secondary), and up to early latent period which is around two years after infection. However, syphilitic lesions may appear at any time during the latency, so all cases must be treated.

Exclusion:

Not applicable

Notification:

Group B disease, notification should be done within one week

Case definition

- Suspected: patients with clinical features of the disease.
- Confirmed:

A suspected case that is laboratory-confirmed by VDRL and TPHA tests Or

Patient with VDRL and TPHA positive tests.

Control of Case

- Specific treatment and proper counseling.
- HIV and other STI testing and counseling.
- Benzathine penicillin (2.4 million units in a single IM dose) weekly for 3 weeks. Those sensitive to penicillin who are non-pregnant are given either doxycycline (PO, 100 mg twice per day for 14 days) or tetracycline (PO, 500 mg 4 times per day for 14 days).
- Follow up can be done by serological testing (VDRL) at 3, 6, 9, 12 months.
- A four-fold titer rise indicate the need for re-treatment.

Control of Contacts:

- Sexual contacts should be traced.
- For primary syphilis, contacts with the index case during the 3 months before onset of illness should be evaluated and treated as the case even if serological test is negative.
- For secondary and latent syphilis, contacts should be traced for 6 and 12 months, respectively.
- For late latent syphilis, contacts and children of infected mothers should be evaluated.
- For congenital syphilis, all family members should be evaluated.

Preventive measures:

- Health education of the community about safe sex practices.
- Education and counseling of STIs, patients.

Malaria

Malaria is a parasitic disease, the clinical features include:

- Indefinite malaise and slowly rising fever of several days duration. This is followed by chills and rapidly rising temperature that ends with profuse sweating.
- The fever is usually accompanied by headache and nausea.
- While, classically, fever due to malaria may occur every second or third day, in practice, the fever may have no specific pattern.
- Falciparum malaria (malignant tertian) may present a varied clinical picture with an atypical onset including diarrhea. If diagnosis or treatment was delayed, it might progress to jaundice, coagulation defects, shock, renal and hepatic failure, acute encephalopathy, pulmonary and cerebral edema, coma and death.
- Therefore any person returning from an endemic area who develops a fever should be promptly investigated.
- Individuals who are partially immune or have been taking anti-malarial chemoprophylaxis may show an atypical clinical picture with wide variations in incubation period. Most antibiotics can modify the course of malaria.

In Kingdom of Bahrain no cases with indigenous transmission have been reported since 1979.

Infectious Agent

- The malarial parasite, Plasmodium spp. Four species can infect humans: P.vivax, P. falciparum, P. malariae and P.ovale.
- Infection is most commonly caused by P.vivax and/or P. falciparum.
- Mixed infections may occur in endemic areas.

Reservoir

Humans are the only important reservoir of human malaria.

Mode of transmission:

- Malaria is transmitted by the bite of an infective female anopheles mosquito, most species of which feed at dusk or in the early night hours. In the human host, the period between the infective bite and the appearance of parasites in the blood varies from six to nine days for P. falciparum, P. vivax and P. ovale, and 12 to 16 days for P. malariae.
- Malaria can also be transmitted by transfusion of blood of infected persons, or by using contaminated needles or syringes.
- Congenital transmission occurs rarely.

Incubation period:

The time between the infective bite and the appearance of symptoms is approximately 9-12 days for P. falciparum, 12-18 days for P. vivax and P. ovale and 18-40 days for P. malariae.

Period of communicability:

For infection of mosquitoes, it is communicable for as long as infective gametocytes remain in the blood.

- Gametocytes usually appear within three days of parasitaemia with P. vivax and after 12 to 14 days with P. {alciparum.
- Untreated or inadequately treated patients may be a source of mosquito infection for 1-2 years.
- Infected mosquitoes remain infective for life.
- Transmission by transfusion may occur as long as asexual forms remain in the circulating blood. Stored blood can remain infective for 16 days.

Exclusion:

Not applicable

Notification:

Group B disease, notification should be done within one week

Case Definition

- Suspected: A case compatible with the clinical description.
- Confirmed: A suspected case that is laboratory confirmed by demonstration of malaria parasites in blood films (mainly asexual forms).

Control of Case

- Prompt and adequate treatment is required for the prevention of complications and relapses.
- Isolation of the patient and concurrent or terminal disinfection is not required.
- Patients should be kept in mosquito proof places from dusk to dawn.

Control of Contacts

- Enlist close contacts from all possible sources.
- Investigate the contacts for a possible exposure to infection (examination of blood films).
- The diagnosis of malaria in travelling companions should be considered.
- In transfusion-induced malaria, all donors must be located and their blood tested for malaria parasites.
- If a history of needle sharing is obtained from a malaria patient, all persons who shared the equipment should be investigated and treated.

Preventive Measures

- Advice to travelers intending to visit malarial areas should include self-protection measures against mosquito bites and chemoprophylaxis.
- Drug resistance by the malaria parasite continues to change and travelers must take the right drug/s as directed.
- There is no drug that is completely safe and effective for prophylaxis against malaria. The decision to recommend chemoprophylaxis and the choice of drug/s must involve the following considerations:
    - Prevalence and type of resistance to the available drugs.
    - Level of malaria transmission.
    - Duration and place of stay, particularly in rural areas.
    - Age.
    - Travelers' current health and medical history.
- For Chemoprophylaxis[7] details visit

http://www.who.int/ith/en/

Leginellosis

Legionellosis is an acute bacterial infection with two recognized presentations:

Legionnaires' disease:

- This is the pneumonic form of the illness where the patient typically presents with severe pneumonia.
- Early symptoms are anorexia, malaise, myalgia and fever (flu-like).
- There is usually multi-system involvement with diarrhoea, vomiting, mental confusion, delirium and renal failure.
- In epidemics, it has an attack rate of up to 5 percent and a case fatality rate of around 15 percent.

Pontiac fever:

- The non-pneumonic form, presents mainly as a flu-like illness with spontaneous recovery and no reported deaths.
- It has a high attack rate (95 percent) and outbreaks have been reported overseas.

Susceptibility:

- Legionnaires' disease has a low attack rate and males are more frequently affected than females.
- Though the disease can affect any age group, it is rarely reported in children.
- Other groups at risk include the immunosuppressed, diabetics and those with chronic respiratory disease.

Infectious Agent

- The infectious agent is Gram negative bacilli belonging to the genus Legionella.
- There are currently more than 30 species, but L. pneumophila (with 14 recognised serogroups) is responsible for at least 75 percent of cases.

Reservoir

- The bacterium is water-associated.
- It is often isolated from natural habitats (rivers, creeks, hot springs) and from artificial equipment such as cooling towers associated with air-conditioning and industrial processes, and in warm water systems where the temperature is maintained around 43°C favoring proliferation of the bacteria.

Mode of transmission:

Legionellosis is transmitted through inhalation of contaminated aerosols

Incubation period:

- Legionnaires' disease: usually 5-6 days (range from 2-10 days).
- Pontiac fever: 4-66 hours (mostly 1-2 days).

Period of communicability:

There have been no reports of person-to-person transmission

Exclusion:

Not required

Notification:

Group B disease, notification should be done within one week

Case Definition

- Suspected: A case compatible with the clinical description
- Probable: A case compatible with the clinical description, with presumptive laboratory results.
- Confirmed: A case compatible with the clinical description, with confirmative laboratory results.
- Laboratory criteria for diagnosis

A. Presumptive: one or more of the following:

- Detection of specific legionella antigen in respiratory secretions or urine.
- Direct fluorescent antibody (DFA) staining of the organism in respiratory secretions or lung tissue, using evaluated monoclonal reagents.
- A fourfold or greater rise in specific serum antibody titre to legionella species other than Legionella pneumophila serogroup 1, using a locally validated serological test.

B. Confirmative: one or more of the following:

- Isolation of Legione/la from respiratory secretions, lung tissue, pleural fluid, or blood
- A fourfold or greater rise in specific serum antibody titre to Lpneumophila serogroup 1 by indirect ummunofluorescence antibody test or microagglutination.

Control of Case(s)

- Specific antibiotic treatment.
- Supportive treatment is needed if there is respiratory failure.
- Dialysis may be required if there is a renal failure.
- After estimating the onset of illness, the patient's movements during the incubation period should be established.

Control of Contacts

- There is no risk of person to person transmission.
- Tracing the contacts is to help identify a common source of exposure.

Control of Environment

- Inspection should be undertaken of places where the following aerosol generating equipment may be present:
  - Cooling towers.

- Fountains or sprinklers.
- Spas.
- Humidifiers.
- Showers, especially associated with warm water systems.

- Places inspected may include workplaces, hospitals, homes and others.
- Potential sources should be sampled.

Prevention

- Preventing or controlling Legionellosis is based on appropriately maintaining aerosol-generating equipment.

Epidemic Measures

- When an epidemic occurs, allow for investigation for a common source of infection and resultant action as indicated:
- Investigation of contacts and source of infection.

Search for additional cases from a common environmental source.

Brucellosis

Brucellosis is a systemic bacterial disease with acute or insidious onset. Localized infections may also occur, but subclinical and unrecognized infections are the most frequent form of the disease.

Fever is the most common presentation and may be associated with a range of other complaints.

Complications include osteoarticular complications (common) and less common complications such as orchitis, epididymitis, osteomyelitis and endocarditis.

The case-fatality rate in untreated brucellosis is approximately 2%, predominantly due to endocarditis.

Infectious agent

- Brucella. abortus,
- Brucella melitensis,
- Brucella suis and
- Brucella canis.

Transmission:

- Contact with infected tissues, blood, urine, vaginal discharges, aborted animal fetuses and especially placentae;
- ingestion of unpasteurized milk and dairy products from infected animals
- Aerosols inhalation in laboratories, animal pens stables and abattoirs.

Incubation period:

- Variable and difficult to ascertain.
- Usually 5 to 60 days; can be several months.

Period of Communicability:

There is no evidence of communicability from person to person.

Exclusion:

Not required

Notification:

Group B disease, notification should be done within one week

Case definition

- Suspected: A case that is compatible with the clinical description and is epidemiologically linked to suspected or confirmed animal cases or contaminated animal products.
- Probable: A suspected case that has a positive Rose Bengal test.
- Confirmed: A suspected or probable case that is laboratory-confirmed by serological tests for antibodies detection.(Brucella agglutination tite)

Preventive Measures

- Educate the public about avoiding drinking of unpasteurized milk or eating dairy products from such milk. Boiling milk is effective when pasteurization is not available.
- Educate farmers and handlers of potentially infected animals to reduce exposure and to follow best practices for handling placentae, discharges and fetuses.
- Trace livestock at risk of infection.

Control of Case(s)

- Give specific treatment
- Inform the animal welfare directorate.

Control of the contacts

Contact tracing is done to identify those people who have been exposed to the same implicated source of Brucella infection as the case.

These people are informed about the early signs and symptoms of brucellosis to ensure early diagnosis and treatment.

Control of environment

- Control of the source infected
- Recall implicated products if any and draw it from the market.

Outbreak measures

Trace source of infection, which is usually a common vehicle of infection as row milk or milk products specially cheese from an infected herd and apply the control measures.

Rota Virus Infection

Rotaviruses are a leading cause of severe diarrheal disease and dehydration in infants and young children throughout the world. Most symptomatic episodes occur in young children between the ages of 3 months and 2 years.

Symptoms include projectile vomiting and watery diarrhea, often with fever and abdominal pain. The first infection is usually the worst one.

The highest rates of illness occur among infants and young children, and most children infected by 5 years of age. Adults can also be infected, though disease tends to be milder

Rotavirus spreads easily among infants and young children

Infectious agent

Rotaviruses are non-enveloped RNA viruses belonging to the Reoviridae family Rotavirus, predominantly Group A.

Rotavirus is highly communicable, with a small infectious dose of <100 virus particles

Transmission:

The virus spreads by the fecal-oral route. Because the virus is stable in the environment, transmission can occur through ingestion of contaminated water or food and contact with contaminated surfaces or objects

Incubation period:

Usually two to three days

Period of Communicability:

Virus mostly shed when patient is sick and during the first 3 days after they recover from rotavirus disease.

Exclusion

- Exclude from school or child care center until at least 48 hours after symptoms have ceased.
- Health care workers and food handlers should be excluded from work until at least 48 hours after diarrhea has ceased

Notification:

Group B disease, notification should be done within one week

Case definition

Suspected: A case that is compatible with the clinical description

Confirmed: A suspected case that is laboratory-confirmed by detection of rotavirus antigen in stool specimens

Preventive Measures

- Good hygiene (hand washing) and cleanliness are important but are not enough to control the spread of the disease.
- Rotavirus vaccines are very effective in preventing rotavirus gastroenteritis and the accompanying diarrhea and other symptoms.

Control of Case(s)

- Treatment is nonspecific and consists primarily of oral rehydration therapy to prevent dehydration.
- About 1 out of 70 children with rotavirus disease will require hospitalization for intravenous fluids.
- Advice regarding personal hygiene.

Control of the contacts

- Identify whether any contacts are ill.
- Provide advice about strict personal, food and home hygiene.

Control of environment

Attention to clean-up procedures and personal and home hygiene is essential to prevent further transmission.

Outbreak measures

An outbreak is defined as two or more related cases of gastroenteritis. The primary aim is to prevent further disease by identifying the source, cleaning contaminated environments and isolating cases.

Invasive Pneumococcal Disease

The most common presentation of invasive pneumococcal are septicemia, meningitis and pneumonia. Septicemia and meningitis are more common in children, and pneumonia is more common in adults. Other clinical presentations include septic arthritis, peritonitis, pleurisy and pericardial abscess.

Infectious agent

Streptococcus pneumonia is a gram positive Streptococcus. 90 serotypes are known to cause disease.

Transmission:

Infection can spread through:

- Respiratory droplets
- direct oral contact
- Indirect contact through articles freshly soiled with respiratory discharges.

Incubation period:

The incubation period is one to three days.

Period of Communicability:

The patient can infect others until discharge from the mouth and nose no longer contain virulent pneumococci in significant numbers. Proper treatment makes patients non-infectious within 24–48 hours.

Exclusion

Until the patient is non-infectious

Notification:

Group B disease, notification should be done within one week

Case definition

Suspected: A case that is compatible with the clinical description

Confirmed: A suspected case that is laboratory-confirmed by isolation of the organism by Culturing.

Preventive Measures

- Pneumococcal conjugate and/or polysaccharide pneumococcal vaccine according to Ministry of Health policy.
- Enforce proper hand washing and disposal of used tissues.

Control of Case(s)

- Proper antibiotic treatment.
- Implement proper infection control measures for admitted patients.

Control of the contacts

- Investigation of contacts is of not needed.

Control of environment

Articles contaminated with discharges from the nose and throat or from other infected sites should be disinfected.

Outbreak measures:

Consider immunization if an outbreaks occurred in institutions or in other closed population groups.

Respiratory Syncytial Virus (RSV)

In children, RSV infection most commonly symptomatic presented with a cold-like illness. But it can also cause bronchitis, croup, and lower respiratory infections like bronchiolitis and pneumonia. Premature infants, very young infants, and those with chronic lung or heart disease or with suppressed immune systems at higher risk of developing more severe infection such as a lower respiratory tract infection.

Infants with a lower respiratory tract infection typically have a runny nose and a decrease in appetite before any other symptoms appear. Cough usually develops 1 to 3 days later. Soon after the cough develops, sneezing, fever, and wheezing may occur. In very young infants, irritability, decreased activity, and apnea may be the only symptoms of infection.

Most otherwise healthy infants who are infected with RSV do not need hospitalization. Those who are hospitalized may require oxygen, intubation, and/or mechanical ventilation. Most improve with supportive care and are discharged in a few days.

In Adults symptomatic RSV infections may occur, mainly in healthcare workers or caretakers of small children. Disease usually lasts less than 5 days, and symptoms are usually consistent with an upper respiratory tract infection and can include a runny nose (rhinorrhea), sore throat (pharyngitis), cough, headache, fatigue, and fever, but some high-risk adults, such as those with certain chronic illnesses or immunosuppression, may have more severe symptoms consistent with a lower respiratory tract infection, such as pneumonia.[5]

Infectious agent

Respiratory syncytial virus (RSV)

Transmission:

RSV is transmitted through oral contact, droplet spread or by contact with hands or fomites soiled by respiratory discharges from an infected person.

Incubation period:

Varies from one to ten days.

Period of Communicability:

RSV is communicable just before the appearance of the symptoms and for the duration of active disease. Prolonged shedding of RSV has been reported.

Exclusion

Children with the infection should not attend school or child care centers while unwell.

Notification:

Group B disease, notification should be done within one week

Case definition

Suspected: A case that is compatible with the clinical description

Confirmed: A suspected case that is laboratory-confirmed by isolation of the organism by

Culturing or multiplex PCR.

Preventive Measures

- There is no vaccine available
- Hygiene can help in limiting the spread of the virus.

Control of Case(s)

- Treatment is supportive
- Advice regarding personal hygiene.

Control of the contacts

Investigation of contacts is not required but the diagnosis in other family or close contacts should be considered if they are symptomatic.

Control of environment

Articles contaminated with discharges from the nose and throat or from other infected sites should be disinfected

Outbreak measures:

The risk for hospital acquired infection of RSV rises during community outbreaks which can be controlled by following contact and respiratory precautions.

Part IV- Communicable Diseases Under Surveillance: Group C Diseases

This section provides specific guidelines for surveillance of the diseases included in the notification list. Cumulative reporting of these cases on weekly bases is required by nationality, age and gender.

List of group C Diseases:

- Human Papilloma Virus Infection
- Genital warts
- Amoebiasis
- Intestinal helminthiasis
- Relapsing fever
- Herpes zoster (shingles)
- Scabies
- Leishmaniasis
- Otitis media
- Influenza
- Chickenpox
- Hand foot and mouth disease

Part V- Conditions Under Surveillance: Syndromic Surveillance

This section provide symptomatic approach to health-related conditions to provide an early warning of human or veterinary public health threats, which require public health action.

Acute Flaccid Paralysis	
Case definition	Sudden onset of weakness (flaccid paralysis) in any limb in all individual less than 15 years of age
Notification of the case	Notification of PHD-DCS immediately by Tel: 17288888, Ext: 2141 – 2145 - 2143 - 2296, Fax: 17279290 – 17279268.
Action to be taken at health facility	Primary care physician: ◆ Notification of PHD-DCS immediately ◆ Refer the case to pediatrician. Pediatrician: ◆ Refer the case to the pediatric neurologist. ◆ Notification of PHD-DCS immediately ◆ Should take relevant History and conduct clinical examination. ◆ Check Immunization status document. ◆ Admit the case to the hospital. ◆ pediatric neurologist: ◆ Fill the immediate case investigation forms. ◆ Ensure collection of two stool samples at least 24 hours apart and within 24 – 48 hours of notification. The 2 samples should be collected within 14 days from the onset of paralysis each specimen should be split in two containers. ◆ Arrange for nerve conduction study (EMG). ◆ Follow up of the patient after 60 days. ◆ Give final diagnosis. ◆ Fill the sixty days follow up form and send it to DCS.

Action to be taken at public health	AFP focal point Public Health Specialist: • Coordinate surveillance activities. • Ensure proper specimens collection at proper time and contact investigation if applicable. • Ensure transportation of specimen in a special container according to storage and shipment of AFP/polio samples guidelines. • Ensure samples sent to the reference laboratory on time and not to delay the first samples if the 2nd sample delayed more than 2 days. • Collect notification form, child immunization card, immediate case investigation forms and other investigation results, laboratory result, final diagnosis forms and sixty days forms. • Ensure completion of data. • Ensure appropriate investigation including EMG is done for the case if indicated. • Ensure that the case has a follow up appointment with the neurologist. • Ensure follow up of the case at 60 days. • Prepare AFP report for the higher authority and WHO. • Ensure contact sampling is done according to guidelines for contact sampling • Refer the case to expert group for final classification Contact sampling of AFP cases should be done for : 1. Contacts of AFP cases with inadequate stools: 2. 'Hot' or highly suspected AFP cases: 3. Contact samplings may be collected when there is any suspicion by the program regarding the collection process, or handling of the index AFP stool specimen, specialized investigations e.g. nerve conduction study, EMG...etc.

Congenital Rubella Syndrome

Case definition

Suspected case definition for case finding

1- Any infant < 12 months of age that presents with any of the following:
congenital heart disease
suspicion of hearing impairment
one or more of the following eye signs: cataract (white pupil), congenital glaucoma (larger eyeball) or pigmentary retinopathy.

2- Any infant < 12 months of age in whom a health worker suspects CRS, even without apparent signs of CRS, including maternal history of suspected or confirmed rubella during pregnancy.

Complication of CRS

Group A	Group B
Cataract(s), congenital glaucoma, pigmentary retinopathy, congenital heart disease (most commonly peripheral pulmonary artery stenosis, patent ductus arteriosus or ventricular septal defects), hearing impairment	Purpura, splenomegaly, microcephaly, developmental delay, meningoencephalitis, radiolucent bone disease, jaundice that begins within the first 24 hours after birth.

Classification of cases:

1. Clinically -confirmed CRS

A suspected CRS without an adequate specimen in whom a qualified clinician detects at least 2 complication from group A or 1 from group A and 1 from group B

2. Laboratory-confirmed CRS case

A suspected CRS case with at least one sign from group A and meets the laboratory criteria for confirmation of CRS:

- An infant with a positive blood test for rubella IgM who has clinically-confirmed CRS.
- IgM antibody persists for at least 6 – 12 months in the cord blood or serum.
- Rubella IgG titer persists in infant serum more than the expected time for passive transfer of maternal IgG and the titer is not declining at expected rate of a twofold dilution per month.

3. Congenital rubella infection (CRI):

- An infant who has none of the clinical signs of CRS from group A, but who meets the laboratory criteria for CRS.

Notification of the case	Notification of the case to public health within 24 hours.	
Action to be taken at health facility	◆ Collect blood requesting rubella IgM test and send to public health lab. ◆ Report any suspected or confirmed case. ◆ To fill the CRS case investigation form and forward it to DCS at Public Health Directorate, P.O. Box 42, and Fax No.17279268.	
Action to be taken at public health	◆ Case investigation. ◆ Single case of congenital rubella syndrome is considered as an outbreak. ◆ Control measures and vaccination campaign to be conducted in residency block, contacts in workplace or school/ nursery and other governmental and private sector in order to ensure vaccination with two doses MMR.	

Maculopapular Rash with Fever	
Case definition	Any case with maculopapular rash and fever
Notification of the case	Notification of the case to public health within 24 hours.
Action to be taken at health facility	◆ Collect 5 ml of blood in plain bottle and 30 ml of urine requesting measles & rubella IgM. ◆ Ensure exclusion from work/school for appropriate period (following measles/ rubella guideline)
Action to be taken at public health	◆ Case investigation. ◆ Follow the results. ◆ Contact management according to the final diagnosis.

Viral Hemorrhagic Fevers (VHFs)	
Case definition	a severe multisystem syndrome caused by several distinct families of viruses. The clinical pictures range from mild infections to severe acute febrile illnesses in which shock is a prominent feature. Fever, headache, myalgia, conjunctival hemorrhage, and abdominal pain are common early symptoms followed in severe cases by hemorrhage and shock. They are characterized by extensive ecchymosis; mucosal, gastrointestinal and genitourinary bleeding; and hepatic dysfunction. The recovery is slow and the overall case fatality rate ranges from 20%-88% in hospitalized patients. VHFs can be caused by several distinct families of viruses : • Arenaviridae (Lassa fever, Junin and Machupo) • Bunyaviridae (Crimean-Congo haemorrhagic fever, Rift Valley Fever, Hantaan haemorrhagic fevers) • Filoviridae (Ebola and Marburg) • Flaviviridae (yellow fever, dengue, Omsk haemorrhagic fever, Kyasanur forest disease)
Notification of the case	Notification of the case to public health immediately by telephone and send the notification form within 24 hours.
Action to be taken at health facility	• To follow strictly the guideline in the diagnosis and management of all cases. • Immediate notification of public health. • Implement strict infection control measures.
Action to be taken at public health	• Issuing alert and guideline for all healthcare workers that contains the case definition, management and infection control measures. • Follow strict implementation of the guideline in all private and governmental health facilities. • Case investigation. • Contact tracing and management. • Notification of IHR focal point.

Sever Acute Respiratory Infection (SARI)	
Case definition	An acute respiratory infection with onset within the last 10 days with: • history of fever or measured fever of ≥ 38 C° • AND • cough • AND • requires hospitalization
Notification of the case	Notification of the case to public health according to the most probable diagnosis • If the physician suspects Influenza (H1N1, Flu A or Flu B): notification of the case to public health within 24 hours. • If the physician suspects Middle East respiratory syndrome coronavirus: notification of the case to public health immediately by telephone and send the notification form within 24 hours.
Action to be taken at health facility	• To follow strictly the guideline in the diagnosis and management of all cases. • Notification of public health as mentioned above. • Implement strict infection control measures. • Collect the recommended sample and send it to public health laboratory.
Action to be taken at public health	• Issuing alert and guideline for all healthcare workers that contains the case definition, management and infection control measures. • Follow strict implementation of the guideline in all private and governmental health facilities. • Case investigation. • Contact tracing and management if applicable. • Notification of IHR focal point if applicable.

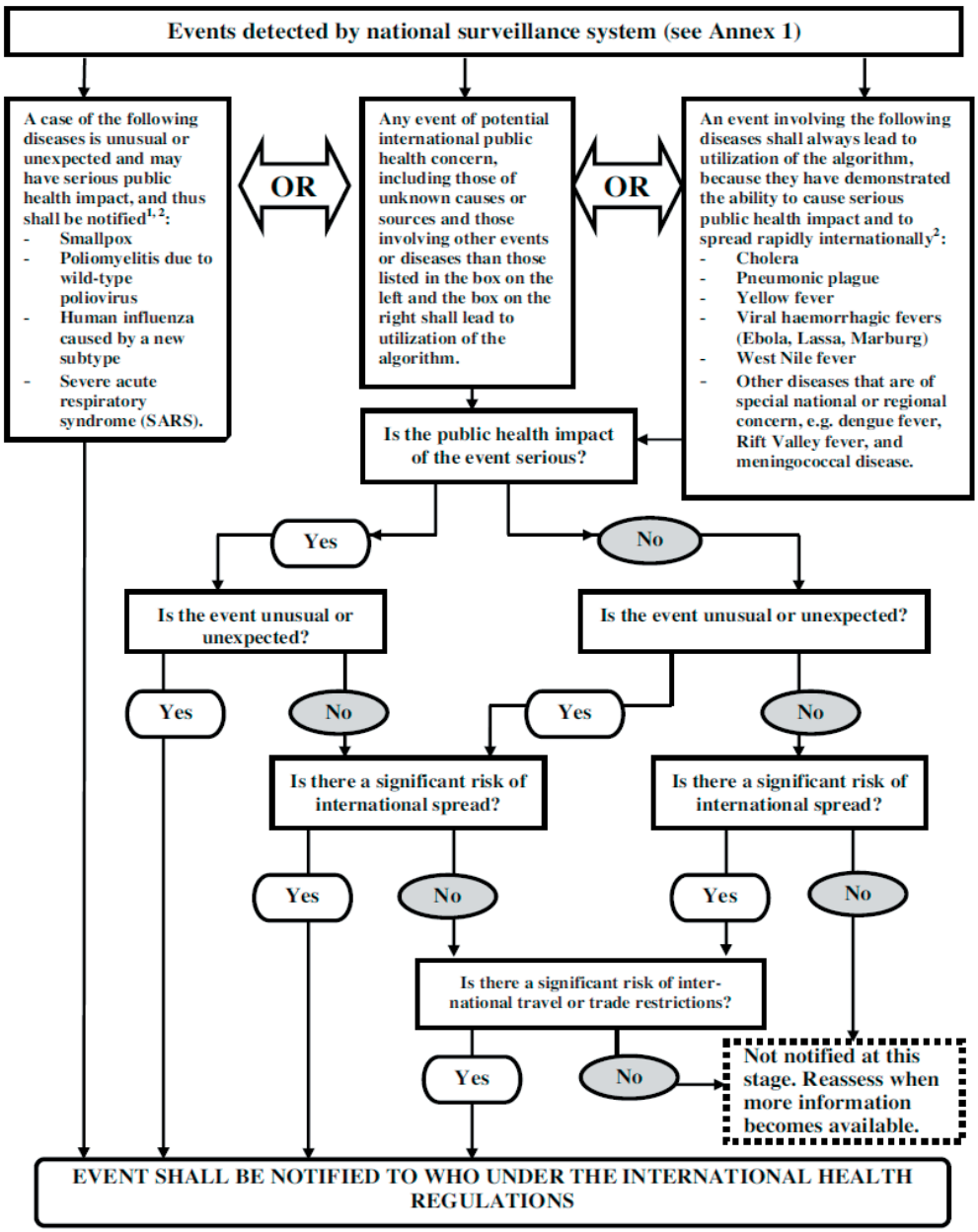
Part VI - Communicable Diseases and International Health Regulations (IHR)

This section provide the assessment tool for events that require notification to world health organization (WHO)

Decision Instrument for the Assessment and Notification of Events That May Constitute a Public Health Emergency of International Concern

ANNEX 2

DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN



[1] As per WHO case definitions.
[2] The disease list shall be used only for the purposes of these Regulations.

EXAMPLES FOR THE APPLICATION OF THE DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

The examples appearing in this Annex are not binding and are for indicative guidance purposes to assist in the interpretation of the decision instrument criteria.

DOES THE EVENT MEET AT LEAST TWO OF THE FOLLOWING CRITERIA?

Is the public health impact of the event serious?

I. Is the public health impact of the event serious?

1. *Is the number of cases and/or number of deaths for this type of event large for the given place, time or population?*

2. *Has the event the potential to have a high public health impact?*

THE FOLLOWING ARE EXAMPLES OF CIRCUMSTANCES THAT CONTRIBUTE TO HIGH PUBLIC HEALTH IMPACT:

- ✓ Event caused by a pathogen with high potential to cause epidemic (infectiousness of the agent, high case fatality, multiple transmission routes or healthy carrier).
- ✓ Indication of treatment failure (new or emerging antibiotic resistance, vaccine failure, antidote resistance or failure).
- ✓ Event represents a significant public health risk even if no or very few human cases have yet been identified.
- ✓ Cases reported among health staff.
- ✓ The population at risk is especially vulnerable (refugees, low level of immunization, children, elderly, low immunity, undernourished, etc.).
- ✓ Concomitant factors that may hinder or delay the public health response (natural catastrophes, armed conflicts, unfavourable weather conditions, multiple foci in the State Party).
- ✓ Event in an area with high population density.
- ✓ Spread of toxic, infectious or otherwise hazardous materials that may be occurring naturally or otherwise that has contaminated or has the potential to contaminate a population and/or a large geographical area.

3. *Is external assistance needed to detect, investigate, respond and control the current event, or prevent new cases?*

THE FOLLOWING ARE EXAMPLES OF WHEN ASSISTANCE MAY BE REQUIRED:

- ✓ Inadequate human, financial, material or technical resources – in particular:
  - insufficient laboratory or epidemiological capacity to investigate the event (equipment, personnel, financial resources);
  - insufficient antidotes, drugs and/or vaccine and/or protective equipment, decontamination equipment, or supportive equipment to cover estimated needs;
  - existing surveillance system is inadequate to detect new cases in a timely manner.

IS THE PUBLIC HEALTH IMPACT OF THE EVENT SERIOUS?

Answer "yes" if you have answered "yes" to questions 1, 2 or 3 above.

Is the event unusual or unexpected?

II. Is the event unusual or unexpected?
4. *Is the event unusual?* THE FOLLOWING ARE EXAMPLES OF UNUSUAL EVENTS: ✓ The event is caused by an unknown agent or the source, vehicle, route of transmission is unusual or unknown. ✓ Evolution of cases more severe than expected (including morbidity or case-fatality) or with unusual symptoms. ✓ Occurrence of the event itself unusual for the area, season or population.
5. *Is the event unexpected from a public health perspective?* THE FOLLOWING ARE EXAMPLES OF UNEXPECTED EVENTS: ✓ Event caused by a disease/agent that had already been eliminated or eradicated from the State Party or not previously reported.
IS THE EVENT UNUSUAL OR UNEXPECTED? **Answer "yes" if you have answered "yes" to questions 4 or 5 above.**

Is there a significant risk of international spread?

III. Is there a significant risk of international spread?
6. *Is there evidence of an epidemiological link to similar events in other States?*
7. *Is there any factor that should alert us to the potential for cross border movement of the agent, vehicle or host?* THE FOLLOWING ARE EXAMPLES OF CIRCUMSTANCES THAT MAY PREDISPOSE TO INTERNATIONAL SPREAD: ✓ Where there is evidence of local spread, an index case (or other linked cases) with a history within the previous month of: – international travel (or time equivalent to the incubation period if the pathogen is known); – participation in an international gathering (pilgrimage, sports event, conference, etc.); – close contact with an international traveller or a highly mobile population. ✓ Event caused by an environmental contamination that has the potential to spread across international borders. ✓ Event in an area of intense international traffic with limited capacity for sanitary control or environmental detection or decontamination.
IS THERE A SIGNIFICANT RISK OF INTERNATIONAL SPREAD? **Answer "yes" if you have answered "yes" to questions 6 or 7 above.**

Risk of international restrictions?	IV. Is there a significant risk of international travel or trade restrictions?
	8. *Have similar events in the past resulted in international restriction on trade and/or travel?*
	9. *Is the source suspected or known to be a food product, water or any other goods that might be contaminated that has been exported/imported to/from other States?*
	10. *Has the event occurred in association with an international gathering or in an area of intense international tourism?*
	11. *Has the event caused requests for more information by foreign officials or international media?*
	IS THERE A SIGNIFICANT RISK OF INTERNATIONAL TRADE OR TRAVEL RESTRICTIONS? **Answer "yes" if you have answered "yes" to questions 8, 9, 10 or 11 above.**

States Parties that answer "yes" to the question whether the event meets any two of the four criteria (I-IV) above, shall notify WHO under Article 6 of the International Health Regulations.

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Annexes

Annex (1A): Daily Communicable Disease Notification Form

KINGDOM OF BAHRAIN
MINISTRY OF HEALTH
PUBLIC HEALTH DIRECTORATE
COMMUNICABLE DISEASES UNIT

DCS\CDU\ Program 14 G - 1 of 3

Notifiable Diseases Return – Form I
Case Report
(To be filled for each case)

From:…… **Date of reporting:** ……..
To: The Communicable Diseases Unit, P.O.Box: 42 PHD, Fax: 17279268 Tel: 17279214
Stick the patient label here if available

Patient's Name : ……..
Nationality :……..
CPR :…….. *Sex: M /F*
Age : …….. *Home Tel:* ……..
Mobil:…….. *Other Tel:*……

Med. Rec. No……
Area : ……
Address : Flat No:…….. *House No:* ……
Road/st.No:…….. *Block No:*……

Diagnosis:……. **Date of onset:** ……..
Dr. Name: ……

Group 'A' Diseases *To be reported within 24 hours*	Cases
Acute Flaccid Paralysis ✆	
Poliomyelitis (Suspected) ✆	
Measles	
Mumps	
Rubella	
Congenital rubella syndrome	
Maculopapular rash & Fever	
Diphtheria	
Whooping cough	
Tetanus	
AIDS/HIV	
Cholera ✆	
Plague ✆	
Yellow Fever ✆	
Acute Haemorrhagic Fever ✆	
Leprosy	
Pulmonary TB	
Meningococcal meningitis ✆	
Meningitis (Specify)	
Food Poisoning ✆	
Viral hepatitis A	
Viral hepatitis E	
Typhoid Fever	
Paratyphoid Fever	
Salmonellosis	
Shigellosis	
SARI – (Sever acute respiratory infection)	
Rabies (Suspected)	
Any unusual event Specify:	

Group 'B' Diseases To be reported within one week	Cases
Extra pulmonary TB	
Viral hepatitis B	
Viral hepatitis C	
Viral hepatitis (Specify)	
Gonorrhea	
Syphilis	
Other STD's (Specify)	
Malaria (Specify)	
Legionellosis	
Brucellosis	
Pneumococcal infection (Specify)	
Rota virus GE	
Respiratory Syncytial Virus (RSV)	

Group 'C' Diseases To be reported within one week	Cases
Human Papilloma Virus Infection	
Genital Warts	
Amoebiasis	
Intestinal Helminthiasis	
Relapsing Fever	
Herpes zoster (Shingles)	
Scabies	
Leishmaniasis	
Otitis Media	
Influenza	
Chickenpox	
Hand & foot & mouth diseases	

*Explain the unusual event (i.e clustering of cases)
✆ These diseases should be reported immediately
All notifiable diseases to be reported to Disease Control Section by Tel: 17279214-fax 17279268
Email :PHD-DCS@health.gov.bh P.O.Box:42

مملكة البحرين – وزارة الصحة – إدارة الصحة العامة –قسم مكافحة الأمراض- هاتف : 172792214 فاكس : 17279268 - ص . ب : 42
KINGDOM OF BAHRAIN – MINISTRY OF HEALTH – DIRECTORATE OF PUBLIC HEALTH –
DISEASES CONTROL SECTION – TEL : 17279214 – FAX :17279268 P.O.BOX : 42, Email: PHD-DCS@health.gov.bh.

Annex (1B): Weekly Communicable Disease Notification Form

KINGDOM OF BAHRAIN
MINISTRY OF HEALTH
PUBLIC HEALTH DIRECTORATE
COMMUNICALBE DISEASES GROUP

NOTIFIABLE DISEASES - FORM II
WEEKLY RETURN
(Zero repoorting is required)

To: The Communicable Diseases Unit, P.O.Box: 42 PHD, Fax: 17279268 Tel: 17279214

Return for the week ending Sunday: .....

Health Facilities Name:.....

Name of reporter:

To: The Communicable Diseases Group , P.O.BOX : 42 PHD

To be repoerted within 24 hours	Cases
Acute Flaccid Paralysis	
Poliomyelitis (Suspected)	
Measles	
Mumps	
Rubella	
Congenital rubella syndrome	
Febrile rash	
Diphtheria	
Whooping cough	
Tetanus	
AIDS/HIV	
Cholera	
Plague	
Yellow Fever	
Acute Haemorrhagic Fever	
Leprosy	
Pulmonary TB	
Meningococcal meningitis	
Meningitis (Specify)	
Food Poisoning	
Viral hepatitis A	
Viral hepatitis E	
Typhoid Fever	
Paratyphoid Fever	
Salmonellosis	
Shigellosis	
SARI – (Sever acute respiratory infection)	
Rabies (Suspected)	
Any unusual event* specify:	

To be reported within one week	Cases
Extra pulmonary TB	
Viral hepatitis B	
Viral hepatitis C	
Viral hepatitis (Specify)	
Gonorrhea	
Syphilis	
Other STD's (Specify)	
Malaria (Specify)	
Legionellosis	
Brucellosis	
Pneumococcal infection (Specify)	
Rota virus GE	
Respiratory Syncytial Virus (RSV)	
Campylobacter	

To be reported within one week	Cases
Human Papilloma Virus Infection	
Genital Warts	
Amoebiasis	
Intestinal Helminthiasis	
Relapsing Fever	
Herpes zoster (Shingles)	
Scabies	
Leishmaniasis	
Otitis Media	
Influenza	
Chickenpox	
Hand & foot & mouth diseases	

*Explain the unusual event (Le clustering of cases ,The event is caused by an unknown agent or the source, vehicle; route of transmission is unusual or unknown ,Evolution of cases more severe than expected)

These diseases should be reported immediately on communiable diseases hotline 66399868
All notifiable diseases to be reported to Disease Control Section by Tel: 17279214-fax 17279268
Email :PHD-DCS@health.gov.bh P.O.Box:42

مملكة البحرين – وزارة الصحة – إدارة الصحة العامة –قسم مكافحة الأمراض، هاتف : 17279214 فاكس : 17279268 - ص.ب : 42
– KINGDOM OF BAHRAIN – MINISTRY OF HEALTH – DIRECTORATE OF PUBLIC HEALTH
DISEASES CONTROL SECTION – TEL : 17279214 – FAX :17279268 P.O.BOX : 42, Email: PHD-DCS@health.gov.bh

Annex (1C): Attached Form to Weekly Return Form

KINGDOM OF BAHRAIN
MINISTRY OF HEALTH
PUBLIC HEALTH DIRECTORATE
COMMUNICABLE DISEASES GROUP

ATTACHED TABLE TO NOTIFIABLE DISEASES – Format

Health Facility---------- Week: start Date---------- End Date----------

Age group	Influenza				Chickenpox				Otitis Media			
	Bahraini		Non-Bah		Bahraini		Non-Bah		Bahraini		Non-Bah	
	M	F	M	F	M	F	M	F	M	F	M	F
0-4												
5-9												
10-14												
15-19												
20-24												
25-29												
30-34												
35-39												
40-44												
45-49												
50-54												
55-59												
60-64												
65-69												
70-74												
75+												

KINGDOM OF BAHRAIN – MINISTRY OF HEALTH – DIRECTORATE OF PUBLIC HEALTH –
DISEASES CONTROL SECTION – TEL: 17279214 – FAX:17279268 P.O BOX: 42, Email: PHD-DCS@health.gov.bh

Annex (2): Infectious Disease–Summary Chart

DISEASE/ AGENT	INCUBATION PERIOD	TRANSMISSION	CONTAGIOUS PERIOD	REPORT TO PUBLIC HEALTH	EXCLUSION
Animal Bites/Rabies Rabies virus	Rabies: 8 days-6 years (usually 3-8 weeks)	Saliva of an infected animal	As long as symptoms are present	YES (Within 24 hours)	None for animal bites
Campylobaeter Campylabacter bacteria	1-10 days (usually 2-5 days)	Fecal-oral spread, contaminated food/water animals	While diarrhea is present; can spread for a few days after symptoms are gone	No	Yes-until 24 hours after diarrhea
Chickenpox (Varicella)	10-21 days (usually 14-16 days)	Droplet/infectious discharges, skin contact	1-2 days before the rash appears until all the blisters have crusted over 7 days after onset)	YES (7 days)	Yes-until all blisters have crusted over
Common Cold A variety of viruses	1-3 days (usually 48 hours)	Droplet/infectious discharges	1 day before symptom onset until 5 days after	NO	None-unless symptoms are severe
E. coli 0157:H7 and other Shiga Toxin Producing E. coli (STEC)	1-10 days (usually 3-4 days)	Fecal-oral spread, contaminated food/water, animal	While diarrhea is present; can spread for 1-3 weeks after symptoms are gone	Yes (7 days)	Yes-until diarrhea resolves (diapered children need 2 negative stool tests)
Fifth Disease Human parvovirus B19	4-21 days	Droplet/infectious discharges	1 week before rash appears	NO	None
Genital Herpes Herpes simplex virus	2-12 days	Sexual transmission	Potentially lifelong	NO	None

DISEASE/ AGENT	INCUBATION PERIOD	TRANSMISSION	CONTAGIOUS PERIOD	REPORT TO PUBLIC HEALTH	EXCLUSION
Genital Warts Human papillomavirus	Variable	Sexual transmission	Potentially lifelong	None	None
Giardia Giardia lamblia parasite	1-3 weeks (usually 7-10 days)	Fecal-oral spread, contaminated food/water	While diarrhea is present; can spread for months after symptoms are gone	NO (7 days)	Yes-until 24 hours after diarrhea resolves
Gonorrhea Neisseria ganorrhea bacteria	1-14 days	Sexual transmission	Until treated	Yes (7 days)	None
Hand, Food, and Mouth Disease Strains of enteroviruses	3-6 days	Droplet/infectious discharges, fecal-oral spread	During the first week of illness for respiratory droplets; virus can be present in stool 4-6 weeks	Yes (7 days)	None-unless the child is drooling uncontrollably
Head Lice (Pediculosis) Pediculus humanus, the head louse	Nits hatch in 10-14 days, adults live 3-4 weeks	Direct contact with an infested person/object	As long as live lice are present	None	Yes-from end of school day until after first treatment
Hepatitis A Hepatitis A virus	2-6 weeks (usually 4 weeks)	Fecal-oral spread, contaminated food/water	Most contagious 2 weeks before symptom onset and slightly contagious week after jaundice onset	Yes (24 hours)	Yes-until 1 week after symptom onset or jaundice

DISEASE/ AGENT	INCUBATION PERIOD	TRANSMISSION	CONTAGIOUS PERIOD	REPORT TO PUBLIC HEALTH	EXCLUSION
Hepatitis B	2-6 months	Infective blood or	Several weeks before	Yes	None
Hepatitis B virus	(usually 2-3 months)	body fluids, sexual trans-mission	symptom onset and throughout the illness, virus for life	(7 days)	
Hepatitis C	2 weeks - 6 months	Infective blood	1 or more weeks before symptom onset and as long as the virus is present in the blood	Yes	None
Hepatitis C virus	(usually 6-7 weeks)			(7 days)	
HIV and AIDS	Variable	Infective blood &	Lifelong	Yes	None
Human		some body fluids		(24 hours)	
immunodeficiency					
virus					
Influenza	1-4 days	Droplet/infectious	From slightly before	Yes	None
Influenza virus	(usually 2 days)	discharges	symptom onset to	(7 days)	
			about day 3 of illness		
Measles (Rubeola)	7-21 days	Airborne/droplet/	4 days before rash	Yes	Yes-until 5 days after
Measles virus	(usually 10-12 days)	Infectious discharges	onset to 5 days after	(24 hours)	rash onset
Meningitis (Bacterial)	Depends on the agent	Droplet/infectious	Until completing 24	Yes	Yes- until 24 hours
Bacteria such as	(usually 1-10 days)	discharges	hours of antibiotic	(24 hours)	after treatment
Neisseria meningitides			treatment		
(meningococcal)					
Haemophilus influenza					
(H.flu), Streptococcus					
pneumonia					
(pneumococcal)					
Meningitis (Viral)	Depends on agents	Droplet/infectious	Depends on agent	Yes	None
Several different		discharges, fecal-oral		(24 hours)	
viruses		spread			

DISEASE/ AGENT	INCUBATION PERIOD	TRANSMISSION	CONTAGIOUS PERIOD	REPORT TO PUBLIC HEALTH	EXCLUSION
Salmonella Salmonella bacteria	6-72 hours, but up to 7 days (usually 12-36 hours)	Fecal-oral spread, contaminated food/water, animals	While diarrhea is present; can spread for a variable period of time after symptoms are gone	Yes (24 hours)	Yes-until diarrhea has resolved
Scabies Sarcoptes scabei, a mite	2-6 weeks if never infected, 1-4 days if infected before	Skin contact/direct contact	Until the mites and eggs are destroyed, usually after 1st or 2nd treatment	Yes (7 days)	Yes-from end of school day until after first treatment
Shigella Shigella bacteria	1-7 days (usually 1-3 days)	Fecal-oral spread, contaminated food/water	While diarrhea is present; can spread for weeks after symptoms are gone	Yes (24 hours)	Yes-until diarrhea resolves (diapered children require 2 negative stool tests)
Shingles (Herpes Zoster) Varicella –zoster virus	10-21 days (usually 14-16 days)	Skin contact	Until all the blisters have crusted over	Yes (7 days)	No- as long as the blisters are covered
Syphilis Treponema pallidum Bacteria	10 days-3 months (usually 3 weeks)	Sexual transmission	Until treated	Yes (7 days)	None
Tetanus Clostridium tetani bacteria	2 days-several months (usually 8-14 days)	Through breaks in the skin	Not contagious	Yes (24 hours)	None
Mycobacterium tuberculosis mycobacterium	2-12 weeks	Airborne	As long as symptoms are present or until on treatment	Yes (24 hours)	Yes- (active cases) until on treatment and cleared by a chest consultant
Whooping Cough (Pertussis) Bordetella pertussis bacteria	5-21 days (usually 7-10 days)	Droplet/infectious discharges	Until after the third week of coughing, or until after 5 days of treatment	Yes (24 hours)	Yes-until 5 days after treatment or until 3 weeks after cough onset.

Annex (3) : Common food- or water-borne pathogens

Causative agent	Incubation period	Duration of illness	Predominant symptoms	Foods commonly implicated
Bacteria				
Campylobacter jejuni	1-10 days(usually 2-5 days)	2-5 days occasionally >1 0 days	Sudden onset of diarrhea abdominal pain, nausea, vomiting,	Raw or undercooked poultry, raw milk raw or undercooked meat, untreated, water
E. coli enterohaemorrhagic (STEC, VTEC)	days 2-10	5-10 days	Severe colic, mild to profuse bloody diarrhea can lead to hemolytic uremic syndrome	Many raw foods (especially minced beef), unpasteurized milk, contaminated water
E. coli enteropathogenic enterotoxigenic enteroinvasive	(12-72hrs (enterotoxigenic	days 3-14	Severe colic, watery to profuse diarrhea, sometimes bloody	Many raw foods, food contaminated by fecal matter, contaminated water
Salmonella serovars (non-ty-(phoid	hrs 6-72	days 3-5	Abdominal pain, diarrhea, chills, fever, malaise	Raw or undercooked meat and chicken, raw or undercooked eggs and egg
Salmonella Typhi/ paratyphi	Typhoid 8-14days Paratyphoid1-10 days	Days-weeks (chronic asymptomatic carriers (can occur	Systemic illness - sustained fever, headache and constipation rather than diarrhoea	Raw shellfish, salads, contaminated water
.Shigella spp	hrs 12-96	days 4-7	Malaise, fever, vomiting, diarrhoea ((blood & mucus	Foods contaminated by infected food handlers and untreated water contaminated by human faeces
Vibrio cholerae	A few hours to 5 days	days 3-4	Asymptomatic to profuse painless watery diarrhoea, dehydration	Raw seafood, contaminated water
Vibrio parahaemolyticus	hours 4-30 (usually 12-24 hrs)	days 1-7	Abdominal pain, diarrhoea, vomiting and sometimes fever. Illness of moderate severity	Raw and lightly cooked fish, shellfish, other seafoods

Causative agent	Incubation period	Duration of illness	Predominant symptoms	Foods commonly implicated
Viruses				
Norovirus (and other viral gastroenteritis)	hrs 24-48	12-60 hrs	Severe vomiting, diarrhea	Oysters, clams, foods contaminated by infected food handlers and untreated water contaminated by human feces
Rotaviruses	hrs 24-72	Up to 7 days	Malaise, headache, fever, vomiting, diarrhea	Foods contaminated by infected food handlers and untreated water contaminated by human feces
Hepatitis A	days 15-50	Usually 1 - 2 weeks	Fever, nausea, abdominal discomfort, possibly jaundice	Shellfish, foods contaminated by infected food handlers and untreated water contaminated by human feces
Parasites				
Giardia lamblia	weeks 1-3	1 - 2 weeks to months	Loose pale greasy stools, abdominal pain	Foods contaminated by infected food handlers and untreated water contaminated by human feces
Entamoeba histolytica	weeks 2-4	Weeks to months	Colic, mucous or bloody diarrhea	Foods contaminated by infected food handlers and untreated water contaminated by human feces
Toxin producing bacteria				
B. cereus (toxin in food)	1-6 hrs (vomiting) or 6-24 hrs (diarrhea)	hrs 24 >	Two known toxins causing nausea and vomiting or diarrhea and cramps	Cereals, rice, meat products, soups, vegetables
Clostridium botulinum	hrs 12-36	Variable	(Neurotoxin) Blurred or double vision, difficulty swallowing, respiratory paralysis, muscle weakness and lethargy	Canned food, often home canned food (low acid)
Staphylococcus aureus (toxin in food) Fish / shellfish toxins	30 min - 8 hrs	hrs 24	Acute vomiting, and cramps, may lead to collapse	Cold foods (much handled during preparation) milk products, salted meats

Annex (4) : Use of antimalarial drugs for prophylaxis in travelers

Generic name	Dosage regimen	Duration of prophylaxis	Use in special groups: Pregnancy	Breastfeeding	Children	Main contraindications[a]	Comments[a]
Atovaquone–proguanil combination tablet	One dose daily. 11–20 kg: 62.5 mg atovaquone plus 25 mg proguanil (1 paediatric tablet) daily 21–30 kg: 2 paediatric tablets daily 31–40 kg: 3 paediatric tablets daily >40 kg: 1 adult tablet (250 mg atovaquone plus 100 mg proguanil) daily	Start 1 day before departure and continue for 7 days after return	No data, not recommended	No data, not recommended	Not recommended <11 kg because of limited data	Hypersensitivity to atovaquone and/or proguanil; severe renal insufficiency (creatinine clearance <30 ml/min)	Take with food or milky drink to increase absorption. Registered in European countries for chemoprophylactic use with a restriction on duration of use (varying from 5 weeks to 1 year). Plasma concentrations of atovaquone are reduced when it is co-administered with rifampicin, rifabutin, metoclopramide or tetracycline. May interfere with live typhoid vaccine. The non-recommended status in pregnancy has been replaced with a warning label in France.
Choroquine	5 mg base/kg weekly in one dose, or 10 mg base/kg weekly divided in 6 daily doses Adult dose: 300 mg chloroquine base weekly in one dose, or 600 mg chloroquine base weekly divided over 6 daily doses of 100 mg base (with one drug-free day per week)	Start 1 week before departure and continue for 4 weeks after return. If daily doses: start 1 day before departure	Safe	Safe	Safe	Hypersensitivity to chloroquine; history of epilepsy; psoriasis	Concurrent use of chloroquine may reduce the antibody response to intradermally administered human diploid-cell rabies vaccine.

Generic name	Dosage regimen	Duration of prophylaxis	Use in special groups: Pregnancy	Breastfeeding	Children	Main contraindications[a]	Comments[a]
Doxycycline	1.5 mg salt/kg daily Adult dose: 1 tablet of 100 mg daily	Start 1 day before departure and continue for 4 weeks after return	Contraindicated	Contraindicated	Contraindicated under 8 years of age	Hypersensitivity to tetracyclines; liver dysfunction	Doxycycline makes the skin more susceptible to sunburn. People with sensitive skin should use a highly protective (UVA) sunscreen and avoid prolonged direct sunlight, or switch to another drug. Doxycycline should be taken with plenty of water to prevent oesophageal irritation. Doxycycline may increase the risk of vaginal Candida infections. Studies indicate that the monohydrate form of the drug is better tolerated than the hyclate.
Mefloquine	5 mg/kg weekly Adult dose: 1 tablet of 250 mg weekly	Start at least 1 week (preferably 2–3 weeks) before departure and continue for 4 weeks after return	Safe	Safe	Not recommended under 5 kg because of lack of data	Hypersensitivity to mefloquine; psychiatric (including depression) or convulsive disorders; history of severe neuropsychiatric disease; concomitant halofantrine treatment; treatment with mefloquine in previous 4 weeks	Do not give mefloquine within 12h of quinine treatment. Mefloquine and other cardioactive drugs may be given concomitantly only under close medical supervision. Ampicillin, tetracycline and metoclopramide may increase mefloquine blood levels. Do not give concomitantly with oral typhoid vaccine. In the United States, mefloquine is recommended as a chemoprophylaxis option for all trimesters of pregnancy

Annex (5): Screening and Treatment Of Latent Tuberculosis

Screening for latent TB infection:

1. Mantoux TB skin test

- Most persons can receive a Tuberculin Skin Test (TST). TST is contraindicated only for persons who have had a severe reaction (e.g., necrosis, blistering, anaphylactic shock, or ulcerations) to a previous TST.
- It is not contraindicated for any other persons, including infants, children, pregnant women, persons who are HIV-infected, or persons who have been vaccinated with BCG.
- The skin test reaction should be read between 48 and 72 hours after administration. If a person does not return within 48-72 hours for a tuberculin skin test reading, a second test can be placed as soon as possible.

2. QuantiFERON®-TB Gold test

a whole-blood test that detects TB infection by measuring the cell mediated immune response to TB-specific antigens.

Treatment of Latent TB

Children:

INH 10-15 mg/kg (Maximum dose: 300 mg) for 9 months

Adult:

INH 5 mg/kg (Maximum dose: 300 mg) for 6 months

Vitamin B6 should be given to adult to prevent peripheral neuropathy.

Patient Education

- Explain the disease process and rationale for medication in the absence of symptoms or radiographic abnormalities.
- Review the importance of completing treatment for LTBI.
- Discuss possible side effects of LTBI medications that may include:

- Fever
- Unexplained anorexia
- Dark urine (color of coffee or cola)
- Icterus
- Rash
- Persistent paresthesia of hands and feet
- Persistent fatigue or weakness lasting 3 or more days
- Abdominal tenderness, especially in right upper quadrant
- Easy bruising or bleeding
- Arthralgia
- Nausea
- Vomiting

◆ Discuss management of common side effects and the need to report to health care provider.

Laboratory Testing

◆ Baseline laboratory testing (measurements of serum AST, ALT, and bilirubin) is not routinely necessary.

◆ Laboratory testing at the start of LTBI therapy is recommended for patients with any of the following factors:

- Liver disorders
- History of liver disease (e.g., hepatitis B or C, alcoholic hepatitis,or cirrhosis)
- Regular use of alcohol
- Risks for chronic liver disease
- HIV infection
- Pregnancy or the immediate postpartum period (i.e., within 3 months of delivery)

- Baseline testing can be considered on an individual basis, especially for patients taking other medications for chronic medical conditions.

- After baseline testing, routine periodic retesting is recommended for persons who had abnormal initial results and other persons at risk for hepatic disease.

- At any time during treatment, whether or not baseline tests were done, laboratory testing is recommended for patients who have symptoms suggestive of hepatitis (e.g., fatigue, weakness, malaise, anorexia, nausea, vomiting, abdominal pain, pale stools, dark urine, chills) or who have jaundice. Patients should be instructed, at the start of treatment and at each monthly visit, to stop taking treatment and to seek medical attention immediately if symptoms of hepatitis develop and not wait until the next clinic visit to stop treatment.

- It is generally recommended that medication be withheld if a patient's transaminase level exceeds 3 times the upper limit of normal if associated with symptoms or 5 times the upper limit of normal if the patient is asymptomatic.

Questions And Answers about TB Screening Test

1. Tuberculin Skin Testing

What is it?

The Mantoux tuberculin skin test (TST) is the standard method of determining whether a person is infected with Mycobacterium tuberculosis. Reliable administration and reading of the TST requires standardization of procedures, training, supervision, and practice.

How is the TST Administered?

The TST is performed by injecting 0.1 ml of tuberculin purified protein derivative (PPD) into the inner surface of the forearm. The injection should be made with a tuberculin syringe, with the needle bevel facing upward. The TST is an intradermal injection. When placed correctly, the injection should produce a pale elevation of the skin (a wheal) 6 to 10 mm in diameter.

How is the TST Read?

The skin test reaction should be read between 48 and 72 hours after administration. A patient who does not return within 72 hours will need to be rescheduled for another skin test.

The reaction should be measured in millimeters of the induration (palpable, raised, hardened area or swelling). The reader should not measure erythema (redness). The diameter of the indurated area should be measured across the forearm (perpendicular to the long axis).

How Are TST Reactions Interpreted?

Classification of the Tuberculin Skin Test Reaction

An induration of 5 or more millimeters is considered positive in

- HIV-infected persons
- A recent contact of a person with TB disease
- Persons with fibrotic changes on chest radiograph consistent with prior TB
- Patients with organ transplants
- Persons who are immunosuppressed for other reasons (e.g., taking the equivalent of >15 mg/ day of prednisone for 1 month or longer, taking TNF-a antagonists)

An induration of 10 or more millimeters is considered positive in

- Recent immigrants (< 5 years) from high-prevalence countries*
- Injection drug users
- Residents and employees of high-risk congregate settings
- Mycobacteriology laboratory personnel
- Persons with clinical conditions that place them at high risk
- Children < 4 years of age
- Infants, children, and adolescents exposed to adults in high-risk categories

An induration of 15 or more millimeters is considered positive in any person, including persons with no known risk factors for TB. However, targeted skin testing programs should only be conducted among high-risk groups.

What Are False-Positive Reactions?

Some persons may react to the TST even though they are not infected with M. tuberculosis. The causes of these false-positive reactions may include, but are not limited to, the following:

- Infection with nontuberculosis mycobacteria
- Previous BCG vaccination
- Incorrect method of TST administration
- Incorrect interpretation of reaction
- Incorrect bottle of antigen used

What Are False-Negative Reactions?

Some persons may not react to the TST even though they are infected with M. tuberculosis. The reasons for these false-negative reactions may include, but are not limited to, the following:

- Cutaneous anergy (anergy is the inability to react to skin tests because of a weakened immune system)
- Recent TB infection (within 8-10 weeks of exposure)
- Very old TB infection (many years)
- Very young age (less than 6 months old)
- Recent live-virus vaccination (e.g., measles and smallpox)
- Overwhelming TB disease
- Some viral illnesses (e.g., measles and chicken pox)
- Incorrect method of TST administration
- Incorrect interpretation of reaction

Who Can Receive a TST?

Most persons can receive a TST. TST is contraindicated only for persons who have had a severe reaction (e.g., necrosis, blistering, anaphylactic shock, or ulcerations) to a previous TST. It is not contraindicated for any other persons, including infants, children, pregnant women, persons who are HIV-infected, or persons who have been vaccinated with BCG.

How Often Can TSTs Be Repeated?

In general, there is no risk associated with repeated tuberculin skin test placements. If a person does not return within 48-72 hours for a tuberculin skin test reading, a second test can be placed as soon as possible. There is no contraindication to repeating the TST, unless a previous TST was associated with a severe reaction.

What is a Boosted Reaction?

In some persons who are infected with M. tuberculosis, the ability to react to tuberculin may wane over time. When given a TST years after infection, these persons may have a false-negative reaction. However, the TST may stimulate the immune system, causing a positive, or boosted reaction to subsequent tests. Giving a second TST after an initial negative TST reaction is called two-step testing.

Why is Two-Step Testing Conducted?

Two-step testing is useful for the initial skin testing of adults who are going to be retested periodically, such as health care workers or nursing home

residents. This two-step approach can reduce the likelihood that a boosted reaction to a subsequent TST will be misinterpreted as a recent infection.

Can TSTs Be Given To Persons Receiving Vaccinations?

Vaccination with live viruses may interfere with TST reactions. For persons scheduled to receive a TST, testing should be done as follows:

- Either on the same day as vaccination with live-virus vaccine or 4-6 weeks after the administration of the live-virus vaccine
- At least one month after smallpox vaccination

http://www.cdc.gov/tb/publications/factsheets/testing/skintesting.htm

2. Interferon-Gamma Release Assays (IGRAs) – Blood Tests for TB Infection

What are they?

Interferon-Gamma Release Assays (IGRAs) are whole-blood tests that can aid in diagnosing Mycobacterium tuberculosis infection. They do not help differentiate latent tuberculosis infection (LTBI) from tuberculosis disease.

How do they work?

IGRAs measure a person's immune reactivity to M. tuberculosis. White blood cells from most persons that have been infected with M. tuberculosis will release interferon-gamma (IFN-g) when mixed with antigens (substances that can produce an immune response) derived from M. tuberculosis.To conduct the tests, fresh blood samples are mixed with antigens and controls.

What are the advantages of IGRAs?

- Requires a single patient visit to conduct the test.
- Results can be available within 24 hours.
- Does not boost responses measured by subsequent tests.
- Prior BCG (bacille Calmette-Guérin) vaccination does not cause a false-positive IGRA test result.

What are the disadvantages and limitations of IGRAs?

- Blood samples must be processed within 8-30 hours after collection while white blood cells are still viable.
- Errors in collecting or transporting blood specimens or in running and interpreting the assay can decrease the accuracy of IGRAs.
- Limited data on the use of IGRAs to predict who will progress to TB disease in the future.
- Limited data on the use of IGRAs for:
    - Children younger than 5 years of age;
    - Persons recently exposed to M. tuberculosis;
    - Immunocompromised persons; and
    - Serial testing.
- Tests may be expensive.

What are the steps in administering an IGRA test?

- Draw a blood sample from the patient according to the test manufacturer's instructions.
- Schedule a follow-up appointment for the patient to receive test results.
- Based on test results, provide follow-up evaluation and treatment as needed.

How do you interpret IGRA test results?

IGRA interpretations are based on the amount of IFN-g that is released or on the number of cells that release IFN-g. Both the standard qualitative test interpretation (positive, negative, or indeterminate) and the quantitative assay measurements (Nil, TB, and Mitogen concentrations) should be reported.

As with the tuberculin skin tests (TSTs), IGRAs should be used as an aid in diagnosing infection with M. tuberculosis. A positive test result suggests that M. tuberculosis infection is likely; a negative result suggests that infection is unlikely. An indeterminate result indicates an uncertain likelihood of M. tuberculosis infection.

A diagnosis of LTBI requires that TB disease be excluded by medical evaluation. This should include checking for signs and symptoms suggestive of TB disease, a chest radiograph, and, when indicated, examination of sputum or other clinical samples for the presence of M. tuberculosis. Decisions about a diagnosis of M. tuberculosis infection should also include epidemiological and historical information.

Can IGRAs Be Given to Persons Receiving Vaccinations?

As with TST, live virus vaccines might affect IGRA test results. However, the effect of live virus vaccination on IGRAs has not been studied. Until additional information is available, IGRA testing in the context of live virus vaccine administration should be done as follows:

- Either on the same day as vaccination with live-virus vaccine or 4-6 weeks after the administration of the live-virus vaccine
- At least one month after smallpox vaccination

https://www.cdc.gov/tb/publications/factsheets/testing/igra.htm