

## Chapter 2

# Epidemics of infectious origin

### Purpose of assessment

Infectious diseases of many kinds are present in all human populations. Each population has an expected level of occurrence of each type of disease, and increases in these levels can result in an outbreak, epidemic or epidemic emergency.

Epidemics may occur as the result of an emergency or as an emergency in their own right. The potential risk of an epidemic may be influenced by a number of conditions, including:

- pre-existing disease levels, degree of immunity, and nutritional status;
- environmental change;
- changes in population density and movement of populations;
- disruption of water and sewage services; and
- disruption of basic health services.

An early response to an outbreak or threatened epidemic will often significantly reduce mortality and morbidity in the affected population and limit the spread of the disease to other populations. Rapid health assessment is a key part of such an early response.

The purpose of this rapid assessment is to.

- confirm the threat or existence of an actual epidemic;
- assess its health and socioeconomic impact and likely evolution; and
- assess local response capacity and identify the most effective control measures to minimize the epidemic's effects.

Table 2 gives examples of epidemic disease emergencies.

### Preparedness

In dealing with epidemics, the steps below must be carried out, along with the seven preparedness measures listed in Chapter 1, so that the assessment can be rapid.

- Make preliminary preparations for rapid collection and shipment of specimens to reference laboratories.
- Assemble standard data collection forms, specimen containers, slides, and other laboratory supplies for the epidemic diseases that are likely to occur.

- Stock the necessary protective clothing and equipment against potential communicable diseases associated with high mortality.
- Clarify procedures for national and international disease reporting.

Team members should be technically competent to assess the suspected disease both clinically and epidemiologically, and knowledgeable about other diseases possibly involved. Optimally, they should have received training in rapid epidemic assessment, or have prior experience in outbreak investigation.

## **Conducting the assessment**

The decision to mount an epidemic emergency response and the extent of this effort are determined by:

- the seriousness of its actual or potential health impact on the population; and
- the ability of the local health services to respond.

These two factors should be given priority during the assessment.

The five most important questions to take into account are:

- What is the geographical distribution of cases and how many people are at risk?
- How serious is the clinical course of the disease?
- Is the epidemic spreading?
- What could be possible mode(s) of transmission?
- Can local health services cope?

The rapid assessment consists of confirming the existence of an epidemic, assessing its impact on health, and assessing the existing response capacity and additional immediate needs.

## **Confirming the existence of an epidemic**

The first alert or rumour that an epidemic emergency is occurring may come from a wide range of sources, such as local government personnel, citizens, the press, and health care workers. Some sources are not always reliable. A rapid site visit is necessary to verify or refute these initial reports.

To confirm the existence of an epidemic, the diagnosis must be confirmed, an initial case definition established, and the increase in cases verified.

### ***Confirm the diagnosis***

This should be carried out by:

- clinical examination of a sample of patients by an expert,
- confirmation of the validity of any supporting laboratory test; and
- collection and testing of additional specimens in a reference laboratory.

Table 2. Examples of emergencies related to epidemics or potential epidemics

Disease	In non-endemic areas	In endemic areas
Cholera	One confirmed indigenous case.	Significant increase in incidence over and above what is normal for the season, particularly if multifocal and accompanied by deaths in children less than 10 years old.
Giardiasis	A cluster of cases in a group of tourists returning from an endemic area.	A discrete increase in incidence linked to a specific place.
Malaria	A cluster of cases, with an increase in incidence in a defined geographical area.	Rarely an emergency, increased incidence requires programme strengthening.
Meningococcal meningitis	A 3- to 4-fold increase in cases compared with a similar time period in previous years may indicate an epidemic, as may a doubling of meningitis cases from one week to the next for a period of three weeks.	For countries with high rates of endemic meningitis, such as those within the traditional meningitis belt, a rate of 15 cases per 100 000 per week in a given area, averaged over two consecutive weeks, appears to be a sensitive and specific predictor of epidemic disease in this area.
Plague	One confirmed case.	(a) A cluster of cases apparently linked by domestic rodent or respiratory transmission, or (b) a rodent epizootic.
Rabies	One confirmed case of animal rabies in a previously rabies-free country.	Significant increase in animal and human cases.
Salmonellosis	Not applicable.	A large cluster of cases in a limited area, with a single or predominant serotype, or a significant number of cases occurring in multiple foci apparently related by a common source (not forgetting that several countries may be involved).

Smallpox	Any strongly suspected case. The WHO smallpox eradication campaign succeeded in eliminating the disease in 1980; vigilant surveillance of pox-like diseases (e.g. varicella, monkeypox) is maintained during the post-eradication era.	Not applicable.
Typhus fever due to <i>Rickettsia prowazekii</i>	One confirmed case in a louse-infested, non-immune population.	Significant increase in the number of cases in a limited period of time.
Viral encephalitis, mosquito-borne	Cluster of time- and space-related cases in a non-immune population (a single case should be regarded as a warning).	Significant increase in the number of cases with a single identified etiological agent, in a limited period of time.
Viral haemorrhagic fever	One confirmed indigenous or imported case with an etiological agent with which person-to-person transmission may occur.	Significant increase in the number of cases with a single identified etiological agent, in a limited period of time.
Yellow fever	One confirmed case in a community with a non-immune human population and an adequate vector population.	Significant increase in the number of cases in a limited period of time.

Sources:

1. *Public health action in emergencies. caused by epidemics.* Geneva, World Health Organization, 1986.
2. *Control of epidemic meningococcal disease: WHO practical guidelines.* Lyon, Fondation Marcel Merieux, 1995.

***Establish an initial case definition***

Establish a working case definition after examining patients, meeting with local health workers, and reviewing hospital records. This is essential for guiding early field investigations and identifying cases.

For example, an initial case definition in an outbreak of food-borne disease identified as a “dysentery-like” syndrome was: “a person having bloody diarrhoea and one or more of the following signs and symptoms: fever, nausea, vomiting, abdominal cramps, and tenesmus.”

***Confirm the increase in the number of cases***

Look at local records and compare the current incidence of disease to historical levels in the same population. Make sure that the increase in cases is not spurious, owing to an increased detection of a constant number of cases. Concern about rumours of an epidemic can lead to improved recognition and reporting in health facilities, which result in a dramatic rise in reported cases, when there is no real increase in disease.

For certain diseases (e.g. cholera, yellow fever, viral haemorrhagic fever and plague in a non-endemic area) one confirmed case should be considered an epidemic and should prompt emergency action (see Table 2).

**Assessing the impact on health*****Estimating the population at risk***

Review census figures or population estimates provided at provincial or district level. Determine the size and characteristics (e.g. sex and age distribution) of the population in the affected area.

***Case-finding and estimating geographical distribution***

The purpose of case-finding is to:

- monitor changes in the number of cases over time; and
- identify the geographical distribution of the epidemic and its possible spread to other areas.

Case-finding should include:

- interviewing health workers to detect past cases and stimulate reporting of future cases;
- reviewing outpatient, inpatient, laboratory and death records;
- investigating contacts of confirmed and suspected cases; and
- enhancing or establishing routine surveillance for this disease.

Case-finding should be based on the working case definition. It should not be limited to hospitals and urban areas only as these may provide a non-representative picture of the outbreak. This approach may lead to an underestimate of the true distribution of cases, particularly in areas where the population has poor access to health facilities. Rapid household surveys in the affected area(s) may lead to a more accurate appreciation of the epidemic.

**Collecting information on all or a representative sample of cases**

Careful interviewing and physical examination of identified cases is extremely important. These early clinical findings provide clues to the type of infection, source of infection, and mode of transmission.

As a minimum, gather information on:

- name, age, sex, place of residence, date of onset and date of reporting;
- signs and symptoms, severity of illness, outcome, treatment given and response to treatment; and
- presence of risk factors in order to draw conclusions about possible mode(s) of transmission.

**Analysing the information**

The information should be analysed in terms of time, place, and person.

*Time:* When did cases occur? Is the number increasing?

- Draw a simple graph showing the number of cases reported per unit of time for the course of the epidemic so far (epidemic curve).
- If the epidemic has affected a wide area, draw graphs for the different communities affected, showing the number of cases reported per unit of time.

*Place:* Where have cases occurred? Is the outbreak spreading? Are there accessible health facilities in affected areas?

- Map the cases geographically, if possible, by date of onset.
- Calculate the area-specific attack rate to identify areas at highest risk.
- Use maps that have settlements and health facilities indicated. If these are not available, sketch a rough map, including this information.

*Person:* Which groups are at greatest risk?

- Calculate specific attack rates to identify highest risk groups.
- Calculate attack rates for risk factors to identify modes of transmission.
- Estimate the numbers of hospital admissions and outpatient attendances by affected areas and by specific facilities.

These initial conclusions are necessary to guide immediate control measures and further field investigations. For instance, if the cause of the outbreak and mode(s) of transmission can be identified at this early stage, immediate action can be taken to contain the spread of the disease.

**Assessing the local response capacity and immediate needs****Local response capacity**

- Can local epidemic surveillance be guaranteed with existing personnel, transport, and communications?
- Are diagnostic capabilities of local laboratory and clinical services adequate?
- Are local resources sufficient for carrying out more extensive field investigations?

- Do local health facilities have sufficient staff? Are they equipped to manage adequately existing or anticipated patient load? Are they equipped to isolate patients and protect health workers?
- What steps have local health officials taken to organize epidemic response? Is there a plan of action, standardized reporting procedures, and trained staff? What steps have been taken to interrupt transmission?
- What links have been established with key community members (e.g. for education, improved case detection, and protection of uncontaminated water sources)?
- What are the existing stocks and supplies of key drugs, vaccines, and laboratory reagents?

### ***Immediate needs***

Look for needs in the following areas:

- epidemiological expertise to maintain adequate surveillance and carry out further investigation;
- laboratory support (e.g. shipment of specimens to national and international reference laboratories or imports of necessary equipment);
- environmental control (e.g. improving water quality);
- qualified clinical personnel and training for case management;
- isolation of patients and protection of health workers;
- essential medicines, vaccines and equipment; and
- transportation, communication and logistics.

### **Presenting results**

In presenting the results of your assessment, indicate the following:

- Estimate geographical magnitude and health impact in numbers of projected cases and deaths.
- Estimate needs for outside assistance based on preliminary findings (e.g. drugs, vaccines, technical personnel, and logistics and communications support).
- Give recommendations on the following:
  - priority activities and priority at-risk groups, if the disease has been diagnosed; refer to existing emergency plans that may have been prepared; and
  - further epidemiological field investigations, if the epidemic is still not well understood.
- Convey the rapid assessment findings to decision-makers at community, subnational, national and international levels.