



When is an Epidemic an Epidemic?*

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Key words: epidemic, outbreak, risk, infectious diseases, West Nile fever

Abstract

Background: The large number of cases of West Nile fever diagnosed in Israel in 2000 once again brought into focus the confusion that frequently accompanies the use of the term “epidemic.”

Objectives: To examine the different definitions of the term “epidemic” and to propose ways in which it can be used to both improve communication among professionals and provide the public with a better sense of the associated risks.

Methods: The literature was reviewed for the various definitions of the terms “epidemic” and “outbreak.” Sources included popular and medical dictionaries, ancient documents, epidemiology texts, legal texts, and the medical literature.

Results: The term epidemic is variously defined. The broad definition given by epidemiologists – namely, more disease than is anticipated by previous experience – is less meaningful to the general public. In some ways it conflicts with the definitions found in the popular literature, which generally imply danger to the public and a very large number of victims.

Conclusions: The interpretation of the term epidemic may vary according to the context in which it is used. For risk communication, we suggest that every effort be made to add descriptive terms that characterize the epidemic.

IMAJ 2002;4:3-6

occurrence in a community or region of cases of an illness, specified health behavior, or other health-related events clearly in excess of normal expectancy; the community or region, and the time period in which cases occur, are specified precisely” [1]. The definition does not specify a minimum number of cases. The area covered by an epidemic may be limited to a small area such as a school classroom, or it may extend to include many countries. Epidemics may also last from a few hours to many years.

The term “outbreak” is considered by epidemiologists to be a synonym for “epidemic.” In the professional literature these terms are used interchangeably, and sometimes even together. There are scientific articles in which the title refers to an epidemic, while in the body of the paper the episode is called an outbreak. Occasionally, the term “epidemic outbreak” is used, such as in “an epidemic outbreak of hepatitis A among homosexual men” [2]. Associated terms include “endemic,” which describes a situation where cases of the disease are constantly occurring in the population; “hyperendemic,” where there is a constantly high incidence of disease in the population; and “pandemic,” where the increased incidence of the disease is of global proportions. It should be stressed that in addition to infectious diseases, contemporary use of the term “epidemic” can be used to describe a relative excess of cases under a wide variety of conditions. These include non-communicable diseases such as breast cancer, physical conditions such as obesity, and behavioral conditions such as smoking and alcohol consumption. The term “epidemic curve” refers to a graph showing the cases of a disease by time of occurrence and demonstrates the trends in the incidence of disease with time. It is a basic tool for identifying the emergence of epidemics of both infectious and non-infectious diseases.

For infectious disease epidemics, sub-categories have been defined according to the mode of transmission of the disease. In a common-source epidemic, such as that originating from contaminated food, there is a sharp increase in the number of cases, and there may be a secondary wave caused by

The occurrence of more than 400 laboratory-confirmed cases of West Nile fever in Israel in 2000 once again raised the question as to whether and when an increase in the incidence of a disease should be described officially as an epidemic. Interpretation of the term “epidemic” could depend on the context in which it is used. Epidemiologists use it in its most general form and define an epidemic as follows: “An epidemic is the

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subsequent person-to-person spread. A purely person-to-person spread epidemic is typified classically by influenza, where droplet spread results in an initial slow accumulation of cases followed by a more rapid increase in incidence. Epidemics can also result from contact with infected vectors. West Nile fever falls into this category, where the virus is transmitted by infected mosquitoes to reservoir hosts such as crows or geese that in turn infect other mosquitoes, which may transmit the disease to “incidental” hosts such as humans and horses.

Risk communication

Other than for the simple monitoring of disease activity, the term “epidemic” is used to communicate risk [3,4]. The origin of the word “epidemic” comes from the Greek *epi* meaning “upon” and *demos* meaning “people,” which together implies “that which falls upon populations” [1]. The general population may perceive the term “epidemic” somewhat differently from that intended by epidemiologists. The Internet site dictionary.com defines an epidemic as something that spreads rapidly and extensively by infection and affects many individuals in an area or population at the same time. The Oxford Dictionary [5] gives a non-technical definition of an epidemic as a widespread occurrence of a disease in a community at a particular time. In the Encyclopedia Britannica [6], an epidemic is described as an occurrence of disease that is temporarily of high prevalence, and the Encarta Dictionary [7] describes it as an outbreak of a disease that spreads more quickly and more extensively among a group of people than would normally be expected.

The Hebrew translation of epidemic is *magefa*. The earliest biblical reference to this term appears in the book of Numbers (*B'midbar*), which recounts that during the wandering of the Jews in the Sinai desert, 14,700 people died from a “magefa” [8]. The English translation of “magefa” describes a “plague” or “pestilence,” connoting a dangerous and contagious disease [8]. The Mishna (the commentary on Jewish law), completed 3,000 years ago, provides a definition surprisingly similar to that of the epidemiologists: “What is considered to be a pestilence? [A situation where] in a city that can provide 500 foot-soldiers, three persons die over a three day period” [9]. One of the modern translations of “magefa” is “a severe infectious disease” [10], quite inconsistent with the contemporary professional epidemiologist’s definition of an epidemic.

The variety of definitions of “epidemic” highlights the problems associated with risk communication and the need for consistency in terminology. This is particularly important, since epidemics tend to be emotionally charged events. An analogy can be drawn with clinical medicine, where there is need to describe the condition of a patient to his or her family and sometimes the media. Usually terms such as mild, moderate, severe or critical are used. Such a classification has limited medical value but is a simplified way of conveying to the lay public the level of risk of an adverse outcome for that patient. Thus, when an increased incidence of disease is described as an “outbreak,” the general public may view this

as being less serious than if the term “epidemic” is used, even though the epidemiologists may contend that the words are synonymous. In fact, Chambers Concise Dictionary [11] defines an epidemic as a “a widespread outbreak,” and even Stedman’s Medical Dictionary [12] defines an “outbreak” as a “localized epidemic.”

Administrative aspects

In contrast to the epidemiologists’ very general definition of an “epidemic,” the term has been defined quantitatively for certain diseases. This is of importance to legislators and administrators. For example, in January 2000, influenza activity in Britain was discussed in the House of Lords. The opposition asked for the officially accepted definition of an epidemic. Lord Hunt of Kings Heath replied that [while] the epidemiologic definition of an epidemic is an increase in the occurrence of a disease above its baseline level, administrative definitions can be set for different diseases in which an arbitrary threshold is selected above which the term “epidemic” is applied” [13].

In fact, in 1996, the UK Department of Health introduced an administrative definition of an epidemic of influenza. An epidemic is declared if the rate of consultations for flu-like symptoms in a sample of reporting by general practitioners exceeds 400 per 100,000 population in one week [14]. In the United States, an epidemic of influenza is confirmed when death rates from pneumonia and influenza exceed a threshold determined by the Centers for Disease Control and Prevention. This threshold is based on data from the vital statistics offices of 121 cities for death certificates in which pneumonia was stated as the underlying cause of death, or influenza was listed anywhere on the certificate. The proportion of deaths due to influenza or pneumonia was computed and a regression model was used to produce a seasonal baseline. An increase in deaths of 1.645 standard deviations above the seasonal baseline (5% of all) is defined as the epidemic threshold [15].

In some countries where meningococcal meningitis is hyperendemic, it is necessary to rapidly institute special preventive measures (such as mass vaccination) in the event of an epidemic. Moore et al. [16] used meningitis rates from active surveillance data in Burkina Faso for detecting meningitis epidemics. They estimated that a threshold of 15 cases per 100,000 per week in a specified study region averaged over two weeks was sufficiently sensitive and specific in detecting epidemics exceeding 100 cases per 100,000 per year. This was suggested as the “epidemic threshold.”

Legal aspects

Under what circumstances should the health authorities formally declare an epidemic? Firstly it should be clear that the use of the term “epidemic” by health authorities is primarily intended in the professional sense. It implies that an unusual event has occurred and is usually accompanied by a description of the measures that will be taken to control the epidemic.

These include the defined cooperation between different local and national authorities and allocation of special resources available for disease control. It is important to distinguish between the situation whereby the health authorities simply describe an increased incidence of disease as an epidemic and the much rarer event where a disease is declared to be particularly dangerous to the health of the population. In the latter situation, the purpose of the declaration is to enable the health authorities and others to take extraordinary measures such as house-to-house visits and quarantine.

This is delineated in a note to the British Public Health Act of 1936, on which the Israeli Public Health Ordinance 1940 is based. Here, epidemic diseases are defined as “those which prevail among a large portion of a country, rage for a certain time, and then gradually diminish and disappear, to return again at periods more or less remote.” It is further stated: “It is essential to the medical notion of all epidemic diseases, that it should be dependent on some common and widely extended cause, of a temporary in contradistinction to a persistent nature” [17]. In Palestine under the British mandate, Public Health Ordinance No. 40 of 1940, clause 20, deals with “emergency powers.” It states that “when any part of Palestine appears to be threatened with or is affected by a formidable epidemic, endemic or infectious disease, that is to say, plague, cholera, yellow fever, smallpox, typhus fever, or other disease declared by the High Commissioner by notice in the Gazette to be a formidable infectious disease, the High Commissioner may by notice as aforesaid declare that the health of the public is seriously threatened by the threat or existence of such disease in Palestine or in neighbouring territories.” This ordinance remains in effect in Israel, with the Minister of Health authorized, in place of the High Commissioner, to make the declaration necessary for the implementation of extraordinary measures. The Minister of Health must publish an official declaration regarding the existence of a serious threat to the public health, without necessarily using the term “epidemic.”

Definition of an epidemic when a baseline is lacking

There are situations where the data are inadequate to determine a baseline or reference by which to decide whether or not there has been an exceptional increase in incidence. Clearly, for a truly “new” disease, any number of cases may signify an epidemic. For example, after the first few cases of AIDS were diagnosed, it would have made sense to label that an epidemic. A somewhat different situation exists when new diagnostic methods become available. In this case, there is an apparent increase in the incidence of the disease due to the increased ability to diagnose it. This question was raised regarding West Nile fever in Israel, where only recently was the laboratory test for serology introduced for routine diagnosis. In such a situation, various surrogate indicators are used to identify the occurrence of an epidemic. For example, for West Nile fever, the incidence of encephalitis was compared with that

of previous years. In any event, where a historical baseline is lacking, a clear temporal increase in the incidence of the disease should be sufficient to declare an “epidemic” in order to recruit the resources necessary for controlling the event.

Conclusion

The word “epidemic” is an emotionally charged term. It means different things to different people, and professionals using the term may have an intended meaning quite different from the public’s perception of the word. It may also imply different things when translated into other languages. We believe there is a need to define a more understandable official lexicon for “epidemics,” particularly when attempting to communicate risk to the population. While recognizing that epidemiologists will continue to use the words “outbreak” and “epidemic” interchangeably, for risk communication the term “outbreak” should be used according to its standard general dictionary definition as being a more limited type of epidemic.

Furthermore, descriptive words should be used to better define the epidemic. The nature of the spread, number of cases, case-fatality, and area affected should be included. Thus, the disease should be described as contagious or non-contagious, with mild, moderate or severe clinical manifestations. The size of the epidemic could be described as small, medium or large, depending on the percentage of the population affected. Finally, the distribution of the epidemic should be classified as widespread or localized. As an example, the West Nile fever epidemic in Israel in 2000 could be described as a medium-sized, relatively widespread epidemic of a non-contagious disease with generally mild to moderate clinical manifestations and a significant death rate only in very elderly people. While this approach will require us to expand our terminology in order to be more specific, it should make risk communication much more effective.

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