

Five data sources that could be used for infectious disease surveillance at a National or regional level

Niazi A. Rahman

School of Biomedical Science, Curtin University of Technology, Perth WA

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Introduction

Surveillance is the close observation of a person or group, especially ones under suspicion. In the field of infectious disease, it is close observation of a suspicious area and reporting disease cases. The objective of disease surveillance is to provide early and accurate information on important aspects of diseases activity, such as time, location, disease severity and the infection type. Analysis of this information provides the necessary data to understand the burden of the disease and to predict the disease transmission and conduct the implementation of control measures. It is an obvious need that infectious diseases which were the main cause of death in previous century should be closely monitored and new cases reported as soon as it is detected to implement some control measures to control the spread of the disease and prevent establishment of epidemic. Long ago, as Giesecke (2002, 148) points out, the detection of an outbreak was based on clinical observation, where new cases were reported by doctors or the public. Although this method provided information about outbreaks and epidemics, the lack of an established system for collecting this data was undermining its strength and optimality and it was for this purpose that

the new modern system of surveillance has been founded. According to ASTDR (2003) surveillance is a constant, systematic and methodical process of collection, analysis, interpretation, and distribution of descriptive information for monitoring health problems. Surveillance data systems store up information on diseases and public health issues over a specified period of time that can be used by public health authorities for planning, evaluation, or implementation of public health interventions. Giesecke (2002, 148) emphasizes that it is compulsory for all members to report the findings of a surveillance to World Health Organization. The purpose of this system is to detect the new cases of a disease or evaluate the result of a public health intervention in an area quickly.

Important Data Sources for Regional and National Surveillance of infectious Diseases

1. Physician's Record

From the information given above, it is clearly understandable and predictable the most important and the first data source for the surveillance system is the physician's records and their reports to regional or national bodies. Johnatan (2000, 5) states that always physicians play a central role in outbreak investigations and disease surveillance. The observation of medical practitioners on the disease occurrence alerts the community to an unusual epidemic and provides important data for the authorities to evaluate, guide and implement control measures against the disease. In physician's reporting type of data source, the surveillance mainly relies on reports from physicians who see the patients. The advantage of this method lies in the fact that it is rapid, since when the physicians see an illness or a patient they report; another strong advantage of this method is that it provides very useful information about the patients, for example, Giesecke (2002, 149) states that in this method physicians provide information about the date of onset, age, gender, and where the patients live, sometimes it may have some information about the symptoms, treatment, precautionary measures and the type of exposure as well. However, there are some disadvantages in this method. According to GAO (2004, 31) there is a slight probability of underreporting by physicians. Many physicians and health care providers do not completely understand the importance of their role in infectious diseases surveillance as well as the importance of immediate reporting of clinical information to the public health officials. The other disadvantage of this method is the fact that sometimes it is not accurate and furthermore, it is limited to the patients and people who go to see the physicians when feel ill. And finally as

Johnathan (2000, 5) points out many physicians are not often sure to where and when report the doubtful cases of infection and moreover, they might not be trained about the criteria that should be considered while launching a public health concern assessment and investigation. But considering all disadvantages mentioned above still physicians' case reporting method has its strength and is very important.

2. Microbiology Laboratory

The second data source for surveillance of infectious diseases is the data coming from microbiology laboratories. According to Giesecke (2002, 149) and Novick (2005, 630) laboratories provide useful and accurate information on infectious disease surveillance because most of infectious disease diagnosis needs confirmation by microbiological laboratories. If a standardized system for reporting the new cases is established, it results in reporting most of infectious disease cases from these laboratories. This system relies on both public and private sector laboratories. Novick (2005, 630) reveals that despite the fact that private sector laboratories mainly focus on the care of individual patients, they are on the leading position of discovering community illnesses and provide important case reports and microbial isolates for disease monitoring and surveillance. The advantage of this method is that it provides the accurate information on the cases because the diagnosis is on the basis of sample examination and confirmation is gained from the sophisticated laboratory tests and techniques. This method can also provide information on the organism responsible for the disease and outbreak and can suggest the optimal treatment medication and measures. Moreover, microbiological laboratories can alert the public health officials and epidemiologists when they see something out of ordinary, such as new pathogens or disease clusters. The disadvantage of this is that similar to the first method, only the cases will be diagnosed that refer to the doctor and in turn the doctor sent them to have the laboratory examination. Another disadvantage of this method is that sometimes there is not a close coordination between the public and private sector laboratories and some of the cases will be missed. Another disadvantage of this method lies in the fact that it is not as quick as physicians-based system and it may take hours or sometimes days to detect the organism responsible for the disease, while the outbreak of some infectious diseases occur very rapidly. But considering all these, the issue of its strong accuracy is a very important characteristic of this system and should not be neglected.

3. Hospital Records

The third data source for surveillance of infectious disease is the data coming from records of hospitals. Giesecke (2002, 149) point out that for the hospital records to be an effective surveillance system, hospital records should have important information about the disease and patients, for example, diagnosis, type of diagnosis, the date on which the patient was diagnosed to have the disease, symptoms, complications if any, treatment and its successfulness, the prognosis, age, gender, place of residency of the patient and some other important information varying from one disease to another. The advantage of this system is that it provides good information on the surveillance of infectious and other diseases. Hospital records are valuable source of data for health scientists, epidemiologists, health service researchers and more importantly clinical research that analyze the outbreaks and epidemics and quickly react to conduct some preventive issues and control measures to stop or at least control the spread of the disease in the community. Another advantage of hospital-record-based system is that in countries such as Afghanistan where the public hospitals offer free services, most people refer to hospitals to seek treatment instead of going to individual doctors clinics. This issue causes that most of the cases can be detected easily and accurately because often diagnosis is confirmed by the laboratory and the person is under close observation to understand the prognosis of the disease and its possible future burden in the community; moreover, the sophisticated system of recording in the hospital facilitates the storage of the data for analysis. But the disadvantage of this system is that only people who come to the hospital (sometimes only people who are in sever stage refer to hospitals) are diagnosed and the burden of the disease in the population will not be understood. But still this method gives a good conception of an outbreak which if needed leads to close investigation of the area of epidemic and active surveillance.

4. Sentinel System

The fourth data source for surveillance is sentinel system-based surveillance. Sentinel system is a system approximately similar to physician's-based system, but as Giesecke (2002, 158) mentions it is built on a random sample of all doctors in the country in which the outbreak has taken place. According to Bremer et al. (2005, 177) through the sentinel system data is collected from local health departments (LHO) clinics, hospitals and appointed individual doctors. The advantage of this system is that it does not need a lot of expenses and huge data can be collected by spending

very little resources; and because it is based on clinical diagnosis the sensitivity of this method is often good. On the other hand there are some disadvantages inherent in this system. For example, Giesecke (2002, 148) reveals that sentinel system only reports the weekly number of patients suffering from a certain disease, with very little or even no information about each case, therefore, they are only useful in showing changes of overall incidence. The fact that it is based on clinical diagnosis puts the specificity of this method under the question. In evaluation of sentinel system reports, generally for the comparison of data coming from different doctors and over time, one needs to use denominator. In this case Giesecke (2002, 148) suggests that the total number of the patients that a certain doctor is visiting is optimal for this purpose.

5. Active Surveillance

The above mentioned surveillance systems are example of passive surveillance, meaning that the health care providers report cases to health departments as a matter of routine and is used for less severe infectious diseases such as food poisoning (Bannister 2006, 505 & Williams 2006, 124). But according to the authors, active surveillance and reporting is usually necessary for serious conditions or those where a public health program of elimination of a disease, for example poliomyelitis, is planned. In active surveillance health department personnel contact selected health care providers at regular intervals to facilitate case reports. The advantage of this system is that it is particularly useful when an epidemic is suspected or in progress. Active surveillance also can be done by direct traveling of health department personnel in the area and conducting an active investigation of the disease and its burden. It can detect most of cases. According to Giesecke (2002, 159) in active surveillance all available sources should be used to confirm the diagnosis of a case, the confirmation of a case should be done by the laboratory examination. The disadvantage of this method is that it is too costly and sometimes impossible to be conducted because of lack of resources such as personnel and finance.

International Health Organization

As was mentioned earlier, Giesecke (2002, 148) confirms that all new cases of an epidemic disease should be reported to WHO. The World Health Organization (WHO) is the most credible agency of the United Nations (UN) that coordinates affairs of international public health (WHO, 2007). The principle duty of WHO is to provide highest level of health to people of the member

states. It combats against diseases and especially infectious diseases to develop and improve the general health status of people of the world. WHO performs many valuable duties and tasks from preparing vaccines for infectious disease, formulating effective drugs for diseases and many more. One of the most important tasks of WHO is conducting surveillance of infectious diseases in member states. It mainly develops integrated disease surveillance (IDS) strategy for the countries of the region by developing a regional strategy to prevent the disease. IDS or integrated disease surveillance of a disease foresees all surveillance activities conducted in certain countries as public services which performs many functions applying similar structures, procedures and resources. The huge resources available in WHO facilitates the research and surveillance of the diseases. As mentioned in WHO website (2007), surveillance is based on collecting the only information required to gain the objective for the control and prevention of the disease. This data might be different from one disease to another according to the characteristics of the certain disease and the measures that are needed to be considered. Moreover, the skill and experience of WHO staff in conducting survey, surveillance and research is another positive point of this organization that should not be neglected. Mainly, for any disease that WHO actively participated in the surveillance or collected the information from the other data source systems, a quick reaction against the disease has been carried out and the control measure and prevention issues have been investigated, introduced and implemented.

Moreover, CDC, Center for Disease Control and investigation, and agency of United States Department of Health Human Services provide information to enhance health decision. According to CDC (2007), its main focus is on developing the strategies and implementing preventive and control measures against diseases particularly infectious diseases. Its huge available facilities pave the way for its leading position in surveying and surveillance of the diseases. The specific function of CDC in active surveillance of infectious disease provides a lot of useful information about the certain diseases which are under surveillance and leads to conducting control measures and preventive issues to stop their spread and finally reduce or eliminate them.

From the above five mentioned data sources for surveillance of infectious disease, physician's-based system, microbiological laboratory based system, and active surveillance are optimal for

the regional level, while hospital based and sentinel system are good for national level surveillance. Of course physicians based system can also be used in national level, but gathering all data from a huge number of doctors is a challenging work. Hospital record based surveillance can also be optimally used for regional level giving a good understanding of burden of disease in a specific are of that specific state of city.

Considering developing and developed countries, it has to be stated that the difference between the developed and developing countries in many aspects influences the choice of the system for the surveillance. Since the physicians based and microbiological laboratory based systems need many facilities for reporting every case such as email, internet, laboratory sophisticated equipment, and good filing of data, in my opinion, they are good to be implemented in developed countries. In contrast, hospital based system and sentinel system can be considered useful in developing countries. The active surveillance should be considered in both developed and developing countries because of its accuracy and emergency reaction against sudden increase of dangerous or serious infectious diseases.

Surveillance and evaluation of vaccines

Surveillance is also used to evaluate success of vaccines and other intervention program. Jarrett (2004, 2054) points out that surveillance of vaccinated community helps us measure the success of the vaccination program and get comprehensions of immunity inducing level of the vaccine. This is particularly important in public health because it shows the future picture of the disease and the extent that vaccination can be helpful in reduction, elimination and finally eradication of the disease in the community in particular and in the world as a whole.

Davis et al. (2005, 339) mentions that surveillance can also be implemented to detect early signs of adverse events of vaccination. This is true especially when vaccine has recently passed the trial stages in smaller samples and is conducted for the first time in a non-immune population. This can be achieved by either active or passive surveillance, but the authors suggest that active surveillance will be more optimal in this case because by active surveillance detection and diagnosis of adverse events or adverse effects of vaccination can be detected easily and prophylactic steps will be taken to reduce or eliminate those signs and symptoms. For a

vaccination to be successful, no new cases or adverse effects should be detected among the vaccinated population in the surveillance.

Surveillance is also useful to show how much the health providers who directly observed the process of vaccination performed their responsibilities. If during surveillance new cases were found some thoughts will be traced on the fact that health care providers might have not performed the vaccination process carefully and with necessary attention, and if there were any sign of duty ignorance, legal steps will be exercised against the ones responsible.

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