

Routine and sentinel surveillance methods

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خلاصة إن الترصد سواء أكان فاعلاً أم غير فاعل ، هو عملية ديناميكية ذات أهمية أساسية لأي قرار يتخذ أو عمل ينفذ في مجال الصحة السومية . كما أن اختيار الأمراض التي تخضع للترصد ، وتطوير الطرائق المناسبة لترصدها ، والتقييم المنهجي المستمر لها ، وبث المعلومات المتعلقة بها بصفة مستمرة بين من يحتاجون لمعرفةا ، كلها عناصر تتطلب عناية خبيرة وواعية . وسوف يؤدي عصر الاتصالات إلى إعادة تعريف أساليب الترصد بدرجة كبيرة ، سواء من أجل الحصول على البيانات أو نشرها . ولقد بات لزاماً على العاملين بالصحة العمومية أن يعززوا قدراتهم ، ولا سيما في مجال بث المعلومات .

ABSTRACT Surveillance, whether active or passive, is a dynamic process. It is fundamental to public health decision-making and subsequent action. Choice of diseases for surveillance, development of methods, ongoing systematic evaluation and dissemination to those who need to know, are each components which require expert, knowledgeable attention. The communication age will greatly redefine approaches to surveillance, both for data acquisition and dissemination. Especially in the dissemination area, the public health community needs to strengthen its capacity.

Méthodes de surveillance systématique et sentinelle

RESUME La surveillance, qu'elle soit active ou passive, est un processus dynamique. Elle est essentielle pour la prise de décisions concernant la santé publique et les interventions qui s'ensuivent. Le choix des maladies qui doivent faire l'objet d'une surveillance, la mise au point des méthodes, l'évaluation systématique suivie et la diffusion des résultats à ceux qui ont besoin de savoir sont autant de composantes qui nécessitent l'attention de personnes expertes et bien informées. L'ère de la communication va considérablement redéfinir la surveillance, les approches retenues, tant pour la saisie des données que pour leur diffusion. Dans le domaine de la diffusion singulièrement, la communauté de la santé publique doit renforcer ses capacités.

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Introduction

Public health surveillance has undergone considerable development and sophistication over the past few decades. Surveillance is defined as "ongoing" systematic collection, analysis and interpretation of data and the distribution to those who need to know [1]. This means the dissemination of information that results from properly executed surveillance to those who plan public health programmes; to those who develop local, regional, national and even international policies; to those who implement intervention and carry out public health action; to the public, who need to have information in order to evaluate public health practice; and to those who need the information for personal action for their health and well-being.

Surveillance has three basic component activities:

- *Data collection.* This process can be passive in nature, whereby data are reported in such a way that the receiving agency waits for data reports to be sent in. This is seen in standard systems that report notifiable diseases to a public health department. Alternatively, the data collection practice can be active in nature, whereby data are actively sought out.
- *Analysis.* Analysis of data is a dynamic, expert and intellectual process of interpretation and results in the production of important information on which to base action. To carry out analysis adequately requires expertise in the subject area, skill in analytical techniques and a knowledge of the relevant public health literature.
- *Dissemination.* Proper dissemination of information to those who need to know must be timely and also requires communication skills and experience.

These surveillance activities of data collection, analysis and timely dissemination are a dynamic process, are interrelated and rely upon each other.

A US Institute of Medicine report of 1992, entitled *Emerging infections: microbial threats to health*, stated that surveillance is a fundamental component of the strategy against emergence of infection [2]. Surveillance strengthening is included as a major theme in the strategic plans against emerging infections such as those of the World Health Organization [3], the Pan American Health Organization [4], the United States [5], Canada [6] and others.

In many countries the basic infrastructure necessary to carry out some surveillance exists to larger or lesser degrees. This requires health practitioners throughout communities, competent laboratory support and some form of communication system. Surveillance often relies on the astute observations of inquisitive individuals as it does on a system. This is especially true in the case of emergence of infection. The problems of establishing surveillance systems lie in the connection, coordination and linkage of practitioners and institutions for the purpose of surveillance. Other concerns in the process include standardization of methods, quality assurance of laboratory support, timeliness and methods of dissemination, to name just a few.

Surveillance, when solidly designed and implemented, has many uses [7]:

- quantitative estimates of the magnitude of a health problem
- portraying the natural history of disease
- detecting epidemics
- documenting the distribution and spread of a health event
- facilitating epidemiological and laboratory research

- testing a hypothesis
- evaluating control and prevention measures
- monitoring changes in infectious agents
- monitoring isolation activities
- detecting changes in health practice
- planning.

Setting up a surveillance activity is not a casual process. There should be a priority need that must be addressed. The surveillance system must have well developed objectives. There is a requirement for method design and for field-testing of methods and instruments. After implementation the system should be evaluated. Good, meticulous surveillance systems can yield quality data and information. Poor systems can be a costly waste of resources and can be misleading.

To select diseases and risk factors for surveillance, certain criteria are needed, including frequency, severity, cost, preventability, communicability and public interest [8]. Otherwise choice of surveillance can be purely interest driven and inappropriate. Involving collaborators in consensual priority setting is an important aspect of establishing a surveillance programme. This develops alliances for subsequent implementation.

Surveillance systems can also be aided by the collaboration of special interest groups.

Passive surveillance systems

It is important to emphasize that passive systems need dynamic design and attention. The most commonly used passive systems are disease notification systems, which require disease reports that are sent from physicians to a central institution. Such diseases are notifiable usually by legislation. Laboratory systems produce surveillance data

when specimens are passively received for diagnosis or microbiological reference. Reports of deaths, disease registries, hospital records and physician billing systems within health insurance schemes are examples of passive surveillance. Many countries have passive mechanisms in place for the reporting of outbreaks of infection for the purpose of quick intervention.

The overall purpose of passive surveillance systems is to assess trends in diseases and risk factors for disease prevention and control. Some of the data sources mentioned are collections for purposes other than disease surveillance. With care and methodological attention, however, they can yield useful surveillance information. Problems arise because passive physician reporting can be incomplete, especially if the feedback of information to them is poor. Supporting information, such as laboratory data, may be incomplete and case definitions may be poorly adhered to.

Active surveillance systems

Active systems seek out data from selected, targeted groups or networks put together for specific purposes. Such groups or networks usually cover a subset of the population. Examples of active systems include:

- sentinel systems: sites, events, providers
- serial health surveys
- database linkage.

Active sentinel sites might be medical clinics, hospitals, health centres which cover certain populations at risk. They could be networks of individual practitioners such as primary health care physicians. Such sentinels can often provide an early assessment of occurrence in an outbreak and are most useful for diseases that occur frequently. Physician sentinels are often used for sur-

veillance of influenza. However, in some instances, physician networks can be used to detect rare events such as acute flaccid paralysis. Sentinel events are measured occurrences that can be used to bring attention to problems in practices, procedures or systems. For example, maternal mortality has long been used as one indicator of the efficacy of maternal and child health programmes.

Other active surveillance systems include repeated or serial health surveys and chart reviews within health institutions. These are usually very expensive if practised routinely. As databases become better established and sophisticated (disease registries, health insurance databases, etc.) it is possible to link them for active surveillance purposes.

Both passive and active systems have advantages and disadvantages, which must be weighed when planning (Table 1). Passive systems can suffer from underreporting or compromised accuracy of reporting and show selection bias depending on the source of reports or laboratory specimens. Registries can be rather slow and expensive.

However, passive systems can often be effective in an acceptable timeframe.

Active surveillance can produce early, timely and complete information, but methodology must be carefully developed and data interpreted. Active sentinel systems can also be expensive to maintain.

No single surveillance tool is perfect, and usually combinations of approaches work best.

Communication

The third component of surveillance is dissemination and communication. Just as data collection, analysis and interpretation must be a dynamic process, so must dissemination. Information must be created in a form suitable for the intended audience, that audience must be defined and the means or channel of communication selected. It must be determined how the message is to be sent and afterwards what effect it had [9]. Communication of surveillance information is a professional activity and not merely an af-

Table 1 Evaluation of passive and active surveillance systems

Passive system	Strength	Weakness
Notification	Available Timely	Underreporting Inaccuracy
Laboratory reporting	Precise data Higher level of completeness	Selection bias No denominator
Registries	Complete data Many applications	Slow systems Expensive Quality can vary
Active system	Strength	Weakness
Sentinel physicians units	Timely Completeness	Selection bias
Serial surveys	Completeness Accuracy	Expensive

terthought. Dissemination is an area in need of strengthening in public health systems.

Evaluation of surveillance systems

Ongoing surveillance without evaluation is inappropriate. Many factors can change, and as a dynamic process, surveillance often needs adjustment. The approach to evaluation of surveillance is also systematic; steps are listed in Table 2. Evaluation of surveillance is advisable on a cyclic basis and should be done objectively. Projects which fail to measure up should be redefined and redesigned or terminated.

Table 2 Evaluation of surveillance systems

Tasks include:

- describe public health importance
- describe the system:
 - objectives, health events, case definitions
 - flow chart
 - components and operations
- evaluate usefulness (i.e. resultant action taken)
- assess attributes
- simplicity
- flexibility
- acceptability
- sensitivity
- predictive value positive
- representativeness
- timeliness
- resource analysis
- conclusion/recommendations

Source: *Guidelines for evaluating surveillance systems*. Morbidity and mortality weekly report, supplement, 1988, 37:S5.

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