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Protocol for the Evaluation of Epidemiological Surveillance Systems

World Health Organization

Emerging and other Communicable Diseases, Surveillance and Control

Protocol for the Evaluation of Epidemiological Surveillance Systems

Prepared for

Division of Health Situation and Trend Assessment

and

Division of Emerging and other Communicable Diseases Surveillance and Control

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Foreword

The present document is not a "cookbook" on how to undertake surveillance. In the course of preparation and evaluation, the typical reader was perceived as the medical or health officer in a Ministry of Health or in a district who is asked to check how well the surveillance in his or her area is working (exactly such a description was made by a participant from Zimbabwe when the protocol was being tested in that country). The text is thus intended as a tool for the assessing an existing surveillance system and identifying areas which can be improved; it provides general advice on how to undertake these improvements.

The protocol was initially developed within WHO's Division of Health Situation and Trend Assessment (HST) in 1994/1995. Some of the functions of this Division have since been taken over by the newly created Division of Emerging and other Communicable Diseases Surveillance and Control (EMC), and it was a logical step to continue this work within the new Division.

Many people contributed to the document; it is appropriate to acknowledge here the early work of Ms Sarah Macfarlane and colleagues, of the Liverpool School of Tropical Medicine, and of Dr Shiva Murugasamphillay and colleagues, of the Ministry of Health and Child Welfare, Government of Zimbabwe, who prepared the first draft of the document and later assisted WHO in revision and in formal field tests in Zimbabwe and in Benin. The assistance of the WHO Regional Office for Africa and that of the health authorities in these countries (and in other countries in Africa where the protocol was assessed informally) is gratefully acknowledged.

The protocol is part of a series of documents aimed at allowing countries to assess their needs in surveillance, to identify existing methods and documentation, and to apply standardized approaches to surveillance. Documents dealing with different aspects of surveillance have recently been issued by WHO or are nearing completion – they are listed at the end of the protocol, and it is intended to present all these documents as one package at a later date. Readers wishing to obtain information on this, or to comment on the present protocol, are asked to contact:

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Part 1

1.1 Epidemiological surveillance systems

What is an epidemiological surveillance system?

Epidemiological surveillance is a process of watchfulness over health events which may occur in a population. It has been defined as "the ongoing and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event" with the objective of supporting the planning, implementation and evaluation of public health interventions and programmes.

An epidemiological surveillance system is the set of interconnected elements and activities which contribute to the achievement of surveillance objectives. A surveillance system is usually established as an integral part of a health care system in order to monitor priority health events. This protocol should be used as a first step towards strengthening and improving surveillance of diseases and other health events within a public health programme.

Initially, it is important to identify what actually exists in terms of surveillance activities. This can be followed by the development or improvement of existing resources, infrastructure and design. Qualitative modifications to the system may be envisaged in order to enhance performance; such qualitative modifications are usually addressed at a later stage in the evaluation.

It is convenient to analyse a surveillance system in terms of its *structure, process* and *output*. *Structure* consists of objectives, resources and organizational procedures i.e. the input to the system. The epidemiological *surveillance process* may be divided into a) observation, communication and confirmation of the event/s and b) interpretation, presentation and communication of the findings to decision-makers. The final *output* of the surveillance system often takes the shape of a communication or report to the decision-makers. The use to which that report will be put (its impact) is the ultimate test of whether the surveillance system works.

Why evaluate epidemiological surveillance systems?

The purpose of evaluation is to improve the information provided and thereby help improve service provision and delivery. It is necessary to evaluate the relevance of the events selected, how the system can detect and report these events, and how the system can respond to them.

Ongoing evaluation of surveillance systems is recommended in order to:

- appraise and prioritize the events to be kept under surveillance
- assess the quality of the epidemiological information produced
- assess how surveillance results affect control and policy
- identify the elements of the system which can be enhanced in order to improve the quality of information.

What can evaluation achieve?

A well focused evaluation can result in:

- documentation of the surveillance system
- identification of the weak points of the system
- recommendations for improvement of the performance of the surveillance system
- These recommendations should help to define staff training requirements and include a justification for allocation of resources to surveillance.

The process of evaluation itself will thus help in further improving surveillance.

When to evaluate a surveillance system

An evaluation can be done at any time. The evaluation must take into consideration the level of development of the surveillance system.

1.2 Protocol for an evaluation

Objectives of the protocol

The protocol has been written in order to

- provide the basis for developing a process of evaluation of epidemiological surveillance systems
- provide practical assistance in the improvement of epidemiological surveillance systems.

Who can use the protocol?

The protocol can be used by the Ministry of Health at the national, provincial and district levels. A policy group with broad interests, including responsibility for planning, management, disease control and surveillance at all levels in the system, should oversee the evaluation.

How should the protocol be used?

The protocol is intended to provide a *framework* for evaluation and may need some adaptation to meet the specific requirements of each situation. It is recommended that those involved in the evaluation start by discussing the best way to use the protocol. The questions given in each section are only examples. It is important to consider any additional questions or headings which would add to the quality of the evaluation.

A valuable product of the evaluation will be improved documentation of the surveillance system itself. Most of the information required for the basic documentation can be collected and collated during the evaluation.

Outline

- **Part 2** describes the preparatory stages in the evaluation i.e. setting up the policy group and defining the terms of reference. This phase may take some months.

- **Part 3** outlines the method of analysing the components of the system. There is emphasis on both documentation and evaluation. The order in which these sections are used will depend on the level at which the evaluation is taking place.

- **Part 4** focuses on the evaluation of the capacity of the system. It provides an opportunity to review the conclusions arrived at in part 3, first in terms of capacity to monitor specific events and then from an overall perspective.

- **Part 5** describes the final stages in the evaluation which include making and implementing the recommendations and preparing for the next evaluation.

- The text is followed by a **glossary** of the terms used to describe the attributes of epidemiological surveillance systems, and references to recent or forthcoming WHO documents on related topics.

Part 2

Preparation for the evaluation

Summary

The preparation for the evaluation includes:

1 Initiation of the evaluation

2 Defining the surveillance system

3 Setting the terms of reference for the evaluation

4 Preliminary organization of the evaluation

5 Preparation of materials and schedules

2.1 Initiation of the evaluation

The evaluation may be initiated in a number of ways, perhaps on a recommendation from within the ministry or from a donor organization or at the initiative of the department/s responsible for the surveillance system.

A group (usually called a policy group) should oversee the evaluation process. This group should include senior representatives from several sections within the Ministry of Health, plus representatives from other bodies, if appropriate, i.e. NGOs, Ministry of Interior, Rural Development etc). The group will be responsible for:

Preparing	**refer to**
terms of reference	section 2.3
preliminary organization	section 2.4
materials and schedules	section 2.5

Most importantly, this group must ensure a policy commitment from the higher authorities at national level (Ministry or Council of Ministers as appropriate) to implement the recommendations of the evaluation.

2.2 Defining the surveillance system

It can be difficult to delineate surveillance activities in terms of an overall system. Whilst responsibility for disease surveillance may be easily identified, responsibilities for surveillance of other events may be spread between several departments of the Ministry of Health – this can lead to several "vertical" surveillance systems which may overlap. It is important for the policy group to agree on the scope of activities which are to be included within the system to be evaluated.

Consider	**for example**
responsibility for surveillance	Which department is responsible for surveillance? How far do its surveillance activities extend? How does it interact with other departments with respect to flow of information and to other surveillance activities?
disease surveillance	How is disease surveillance practised? There may be several disease reporting systems, e.g. daily, weekly, monthly etc.
vertical programmes	Identify all vertical programmes such as nutrition, MCH or specific disease control programmes e.g. malaria, AIDS, tuberculosis, and document the linkages between them.
donor-run programmes	Which surveillance activities are donor-led, for example immunization programmes or specific donor-funded health programmes. What is the mechanism for integrating reporting activities?
health information system	Is it possible to differentiate surveillance activities from other health information activities? How are they integrated?
programmes of eradication	Has "zero reporting" (the notification that no cases have occurred) been introduced?
other	Are there any other organizations involved in surveillance, e.g. Ministry of Agriculture, the police?

2.3 Setting the terms of reference for the evaluation

The terms of reference will take into consideration the reasons for which the evaluation is being conducted and will govern the scale and outcome of the evaluation. They should be drawn up and agreed upon by all members of the policy group and explained carefully to the technical team conducting the evaluation. The final report will relate closely to these terms of reference.

When drawing up the terms of reference:

Indicate	**for example**
the reason for which the evaluation is taking place	Observed deficiencies in information currently collected; introduction of a new control programme; development of a training programme, introduction of a computer system.
the level/s at which the evaluation will take place	The evaluation may be conducted at national level or it may be restricted to a particular region/province; the evaluation could also be conducted in a district.
the range of events to be evaluated	A group of events such as all notifiable diseases, or a vertical programme such as immunizations.
specific aspects of the system to be evaluated	Case definitions; forms used for recording and reporting; system of communication; the ability of staff to handle the surveillance system etc.
the resource constraints to be considered	Availability of computers; shortages of stationery; limited numbers of trained staff; space; transport.
the surveillance problems already identified	A previous epidemic had not been detected in time; there have been complaints about errors and delays in the completion of reports or lack of available information.

Indicate	**for example**
the anticipated outputs from the evaluation	Depending on the findings, possible outputs may include a comprehensive documentation of the system; a set of improved reporting forms; a staff training package, a definition of health workers' responsibilities for surveillance at every level of the health care system.
the constraints on the evaluation itself	Time schedule; limited availability of staff.
constraints on possible follow-up actions	If major changes to the system of surveillance for a particular event cannot be considered, there is little point in evaluating the system. This does not prevent some general recommendations being made for future consideration.

2.4 Preliminary organization of the evaluation

Some preliminary organization will be necessary in order to ensure the smooth running and success of the evaluation. This will be undertaken jointly by the policy group and the technical team.

Identify	**for example**
team members	The technical team will consist of a small group of people drawn from all levels at which the surveillance system operates. The team should have expertise in policy making, epidemiology and health information.
principal investigator	One member of the technical team will be selected to be the principal investigator to chair all meetings, take an active part in every aspect of the evaluation, liaise with the policy group and prepare all reports. This will require full commitment of enough time to prepare, conduct and complete the evaluation.
other roles and responsibilities	If the team is well balanced, their professional roles will be clear. It will be necessary to identify all tasks (professional and administrative) and to ensure that they are allocated rationally and fairly to team members
budget	A budget must be prepared and consideration will have to be given to the appropriateness of the funds allocated. It may not be possible to achieve the full evaluation within its constraints. In this case priorities must be set.
time schedule	An estimate will be made of the time needed to complete the evaluation, and a deadline will be set.

2.5 Preparation of materials and schedules

Prepare	**for example**
documents required	Collect all relevant documents: C country and health profile C maps of the area under surveillance C census figures if available C lists of health facilities C health policy and plans C policy documents relating to the development of the surveillance system C examples of policy documents based on the information provided by the surveillance system C staff lists and job descriptions C the recording and reporting forms used at all levels of the system including examples of completed forms C documentation of computer software, if in use C copies of reports prepared over the previous year; for example, annual and quarterly reports

Prepare	**for example**
reference material	The evaluation team will need to read some preparatory material covering the methods of evaluating surveillance systems. Copies of relevant material should be made available to the review team. It is worth exploring whether any similar exercises have ever been conducted in neighbouring countries and to obtain the reports produced.
training required	Some members of the team may require training in the principles of surveillance and the methods of evaluation. It is useful to prepare them for the evaluation by providing them with a short introductory workshop in which the methods suggested in this protocol are discussed and explained carefully. It must be emphasised that the methods are not rigid and that all members of the team will be expected to develop the ideas presented here for the benefit of this and future evaluations.
field visits	The team will make a number of field visits during the course of the evaluation. The locations cannot be specified in advance of the first team meeting. There may be constraints on the choice of suitable venues, for example weather, accessibility and staff availability. These constraints to field visits may be exactly the same constraints which limit the effective functioning of the surveillance system, and they are thus worth documenting.

Prepare	**for example**
field visits (ctd)	When the team decides on the itinerary for its field visits, it will also decide on the activities to be conducted at each venue. These may include discussions with health and other staff, interviews with administrative officers, focus group discussions with community members, data and activity analysis and even rapid sample surveys.
equipment required	Preparations should be made in advance for these activities to take place efficiently. The central office should be equipped with paper, a computer, printer, typewriter, photocopier and telephone (and fax if available). A portable computer and printer would be extremely useful for the field visits, if they can be made available. Workshops will require chairs, tables, blackboards, whiteboards, flipcharts, slide projector and overhead projector with a sufficient supply of pens, chalk, transparencies and paper. A list of evaluation indicators prepared by the team, together with simple standardized forms and checklists (see 3.8) should be made available for each team.
detailed time scheduling	Adequate time should be allocated to the stages in the evaluation: comprehensive preparation, conduct of the field visits, and the preparation, discussion and presentation of the final report. The schedule and extent of the evaluation will depend on the time and resources allocated by the policy group; this must be discussed with the technical team.

Part 3

Documentation and evaluation of the system:

Summary

Document and evaluate:

1 Objectives of the system

2 Population under surveillance

3 Events under surveillance

4 Flow diagram of the surveillance system

5 Detection of events

6 Reporting procedures

7 Decision-making and action taken

8 Feedback

9 Resources available to the surveillance system

Include a critical review of the documents listed under 2.5.

3.1 Objectives of the system

Identify the objectives of the overall surveillance system. These may already be documented but if not they should be drawn up at this stage. Even if it is made up of several vertical systems, it is still possible to identify the objectives of the whole (the sum of these separate mechanisms). Consider whether the following issues have been addressed.

Include	**for example**
extent of the surveillance intended	What is the range of events which are under surveillance? How much of the population is it intended to cover? Are there groups of events which require one hundred percent detection and others where intended coverage may be less comprehensive?
use to be made of the information collected	Indicate the uses which are intended to be made of the information at every level in the system. Give examples of the decisions which are intended to be made on the basis of the information collected, such as initiating an intervention, controlling an epidemic, allocating resources, establishing priorities.
relationship to health policy objectives	To what extent is the surveillance system expected to assist in the overall goals of the health system?

3.2 Population under surveillance

Describe the characteristics of the population in which the events are expected to occur. Population size and composition determine the denominator for the events under surveillance. Its demographic, socioeconomic, geographic structure and the availability of health care influence the practicalities and accuracy of the surveillance system.

Analyse	**for example**
topography	The topography of the country will be illustrated on any maps available. Ascertain the way in which topography relates to the distribution of the health events and the functioning of the surveillance system. What is the approximate geographical distribution of the population by the smallest administrative areas within the regions under consideration?
demography	The structure of the population (age-sex composition, birth and death rates) can be obtained from recent census figures or household surveys. If there is no other choice, these can be taken from another country or area of similar development characteristics. This breakdown will provide the basis for the calculation of incidence rates and also of the number of events within the surveillance system.
major health problems	What are the major health problems experienced by the population? Pay particular attention to geographic variations. List any important events which are not already under surveillance.

Analyse	**for example**
risk factors	Look for factors which identify groups of people who are more vulnerable to experiencing certain events e.g. climate, rural/urban distribution, ethnicity, religion, socioeconomic status, occupational hazards, availability of transport and communication. Locate under-privileged groups/ areas. Does a health profile of the population exist?
mobility	Not all denominators are stable. Are any of the populations groups nomadic or displaced by war or famine (resettlement, refugee camps, squatters)? Is there a progressive migration away from the rural areas to the cities? If so, who is migrating and who is left behind? The system should be flexible enough to alert to mass movements of populations in or out of the areas under surveillance. Analyse the potential for population movements.
provision of health care	Make a list of the health facilities available to the population. Include private sector facilities. Obtain detailed organigrams illustrating the administrative structure at each level of the health care system. What are the constraints which could affect the surveillance system? Is health care delivery decentralized? How might this affect the operation of the surveillance system?
accessibility and coverage	Describe the geographical distribution of the health facilities, using available maps. How accessible are the services to population groups and what is the extent of coverage in relation to national standards? Which specific groups are not covered?

3.3 Events under surveillance

Make a list of all the events which are currently under surveillance and those which it would be advisable to include as a result of this evaluation. These may be diseases or other health-related items such as nutrition, immunization, disability. In order to insure the relevance of events under surveillance, it is crucial to **assess their priority** in terms of:

public health importance: is the event a serious health concern? Should it be given priority in the surveillance system (incidence, severity, mortality, international requirements, communicability, potential for outbreak, socioeconomic impact, public perception)?

vulnerability: the degree to which the event can be prevented or treated. This will affect its priority in the list of events to be kept under surveillance (need for immediate response, availability and efficacy of control measures).

capacity for control: the capacity of the health system to implement the appropriate control measures (speed of response, availability of resources, requirements of surveillance itself).

Assess	**for example**
incidence	The incidence rate at which the event occurs provides an indication of the size of the problem. This may vary between risk groups and it is important therefore to obtain some idea of the range of incidence rates experienced by this population.
severity	Measurement of severity depends on the event under consideration. Factors to consider are duration, complications, discomfort. For disability and malnutrition, for example, there are recognised grades of severity.
mortality caused by the condition	This may be measured in terms of the case fatality ratio where relevant.

Assess	**for example**
international requirements	Some diseases are subject to notification according to international health regulations. This reflects national and international relevance. Other indicators are often required for global reporting e.g. maternal mortality.
communicability	The extent to which the condition can be transmitted between persons.
potential for an outbreak	This is usually interpreted in terms of disease and relates to communicability. However, there can be outbreaks of other events such as disability during war, malnutrition during famine etc.
socioeconomic impact	Consider the socioeconomic consequences of morbidity and mortality caused by the event, e.g.loss of earning power, inability to perform usual duties, cost of hospitalization. Some conditions lead to social isolation.
public perception	The public rating of conditions needs to be taken into account in assessing priority. This relates to traditional beliefs, health education and media attention. Perceptions may change with time and will vary between communities.

Assess	**for example**
control measures	What is the availability and efficacy of control measures? Is a vaccine available and what is its efficacy?
speed of response	Is an immediate response required in order to prevent further transmission? Is it possible to respond in sufficient time to be effective? This will relate to cost and availability of resources.
economics	Consider the relative cost of implementing the appropriate control measure.
availability of resources	Are the resources required to implement control measures available in the country?
what does surveillance of this event require?	Is it feasible to put this event under surveillance?

3.4 Flow diagram of the surveillance system

Prepare a flow diagram indicating the way in which different types of information are intended to be transmitted through the system. This will form the basis for the evaluation described in sections 3.5 to 3.8.

Identify	**for example**
detection of events (3.5)	Where were the events observed? It is common for some or all of the following to be involved: the community, village workers, schools, health centres, hospitals, laboratories (private, missionary, NGO), other authorities e.g. army, prison.
reporting of information (3.6)	To whom is the information about an event communicated once it has been observed? Identify the levels of the health care system which are intended to receive and transmit this information.
decision-making (3.7)	Who makes decisions at each level based on the information observed? This could be at any level in the system, including the point of detection. Make sure all decision-makers are included to ensure the comprehensiveness of the information flow.
communication of feedback (3.8)	How is information fed back through the system? How often? Are indicators used to monitor quality and frequency of reporting?

3.5 Detection of events

The team should review the facilities/people responsible for the detection of the events and visit some of them. For each:

Analyse	**for example**
population	Obtain a map of the catchment area. What is the size of the population served? How is this information used to calculate expected rates of occurrences of the important events?
the events	List all the events to be detected here.
case definitions	How is the occurrence of the events defined? Obtain the case definitions used, if any, at the point of detection. Are they correct and appropriate? Are they available? Are the definitions adapted to the objectives of surveillance? What proportion of events are correctly detected? Is it necessary and feasible to introduce revised definitions? How much training and additional resources would this require?
recording forms	Obtain copies of the forms used for recording the occurrence of events (register books, family records, patient cards and record forms, tally sheets). Ascertain how well the forms are understood and if they are used correctly. Ask for any problems experienced in their completion. Identify if there is any duplication of items recorded. How much revision do the forms require. Is this feasible?

Analyse	for example
workload	Who completes the forms? How much time does this take? Are the forms completed correctly? In what ways are the recording activities seen as useful? How could the workload be reduced?
control measures	Enquire about a recent outbreak and how it was detected and controlled. What information is recorded about the control measures implemented at this level?

3.6 Reporting procedures

Follow the paths through which the data are reported once they have been observed and recorded.

Analyse	**for example**
reporting to whom	Identify the levels to which the information observed about the detected events is reported, e.g. from health centre to district to region to state level. What are the means of reporting? Include both formal and informal channels of communication.
reporting/return forms	Collect the forms used for reporting/returning information to other levels. Are the forms clear? Is there any duplication? Who is responsible for their completion, collation and transmission? How much of a burden are they to complete? Check with the person to whom the forms are transmitted if they are completed properly and how the information is actually used.
communication	What are the means of communication used for reporting the information to each level, e.g. telephone, fax, radio, mail? How reliable and efficient have they been in the past? What is the degree of compliance?
utilisation of the data	Is there any evidence of interpretation and use of the data collected at this level? Which rates are calculated? Are graphs and maps used to indicate variations in time and space? Ask staff to describe priority problems in the area. Are data compared with targets?
collation and management of data	Give instances of output (graphs, tables). If a computer system is used, describe the capabilities of hardware and software. What problems are experienced in using it?
timing	How frequently are reports communicated between levels? What deadlines are imposed, and are they met? Are these deadlines justified in terms of the interventions to be taken? Do they need to be shortened or lengthened? Have bottlenecks been observed? Give instances, e.g. delays in compilation.

3.7 Decision-making and action taken

This section is concerned with those people who use the information from the surveillance system to take action. Include people at all levels of the system. They may or may not be designated officially as decision-makers.

Describe	**for example**
decision-makers	Who are the decision-makers with respect to surveillance? Find out if the community are involved? Which decisions are made by health workers and which by managers at different levels?
the decisions	List the types of decision which should be made by each decision-maker, e.g. operational decisions about curative or preventative care of individual patients, planning decisions about the allocation of resources for the implementation of control measures, and policy decisions about the direction of priorities.
timing	When and how often are the decisions made? Differentiate between the types of decisions, e.g. to control an epidemic or to change policy. Document instances when the information reaches the decision-makers on time (or not).
adequacy of the information	Identify any information collected systematically but not used. What evidence is there that decisions are actually made on the basis of the information collected? Is the information suitable for analysis? Discuss with the decision-makers the adequacy of the epidemiological information reported to them in terms of presentation, quantity and relevance.

Analyse	for example
presentation of information	How is the information presented to decision-makers? Describe any constraints on presentation, e.g. lack of equipment or skills? Identify people who require information which is not already presented to them.
implementation	How are the decisions communicated and implemented? What are the constraints to their implementation?
monitoring	What type of mechanism is in place for monitoring that the decisions taken are implemented? Give an example of documents such as policy reviews.
impact	Is consideration given to the impact of the action taken? Is this fed back through the process?

3.8 Feedback

Refer to the *flow diagram* already drawn whilst examining the reporting procedures and insert on it the intended directional flow of feedback.

Analyse	**for example**
communication	Analyse the communication of the conclusions drawn and the decisions made from the information among the various levels. Analyse the means of communicating feedback. This may be through informal discussion or through formal periodic reports. How can the feedback mechanisms be improved?
use of feedback	What use is intended to be made of feedback by each level, e.g. for supervision and improvement of performance. Is the feedback received adequate for these purposes? Is there any way to request better feedback?
timing	How long does it take for different types of feedback to be transmitted? How adequate is the schedule for those receiving the feedback? How well does the timing of feedback correspond with the timing of the reporting?
indicators	What are the indicators used to define the quality of reporting required (proportion of centres reporting; proportion of reports submitted within X days of the mandatory reporting date; numbers and proportion submitting "zero reporting", if appropriate)? If such indicators do not exist, the team may wish to develop some and make a checklist of these indicators for use while implementing the survey (see 2.5).

3.9 Resources available to the surveillance system

What resources are available to the surveillance system at each level in the system? Indicate whether the resources are dedicated to surveillance activities, or shared.

Analyse	**for example**
staffing	Obtain staff lists and job descriptions for each type of facility and administrative office involved in surveillance. Explain any vacancies. Who is responsible for management of the system at this level? What proportion of staff time is spent on surveillance activities? Are they qualified for the task in terms of skills and capabilities? Are they adequately trained and supervised? Explain any vacancies. Do the necessary skills exist?
equipment	Obtain some indication of the equipment at this level. What are the shortages? For administrative offices, find out the availability of telephones, fax machines, radios, computers, calculators, duplicators, scanners, photocopiers, printers, stationery, computer software etc. How well is the equipment used and maintained? Are the staff trained and authorized to use it?
budget	Is there a specific budget for the surveillance system? If not, how is the system financed? Discuss any problems which have resulted from requesting resources for these activities. How are decisions made about the allocation of additional resources? Is the budget evenly spread to support comprehensive operation of the surveillance system?

Part 4

Evaluation of the capacity of the surveillance system

Summary

Now evaluate the following:

1 Capacity of the system to monitor each event

2 Overall capacity of the system

4.1 Capacity of the system to monitor each event

Consider the capacity of the surveillance system to monitor *each priority event* efficiently. Start by reviewing the objectives of keeping this event under surveillance (refer to section 3.3). In the light of the results of part 3, decide whether there is sufficient capacity to fulfil the objectives of keeping each event under surveillance. It may also be necessary to conduct specific surveys in the community or health facilities.

Assess	**for example**
sensitivity	Is it necessary for every occurrence of this event to be observed and reported? What is the intended level of sensitivity for this event? How much can this vary between points of observation e.g. between health centres and hospitals? Estimate the proportion of events/epidemics occurring in the population which actually present to the system. Is the intended coverage appropriate? Estimate the proportion of presenting events/epidemics which are actually detected. Assess the case definitions in use at each point of detection and how they are implemented (section 3.5). Assess the adequacy of these procedures in achieving the required overall sensitivity.
specificity	What level of false positivity is acceptable for this event and how does this vary between facilities? Assess the use of the case definitions (section 3.5) at each point of detection to ensure that the false positivity rate is as low as desirable.

representativeness	How representative should the reporting of this event be? What is the likely impact of unrepresentative reporting? Do the reported occurrences of the event represent the correct distribution of all occurrences in the population particularly with respect to time, place and person? Are there any characteristics of the population (section 3.2) which might affect the representativeness of the reporting of this event?
timeliness	How important is speed in the control of this event? Pay particular attention to the potential for an epidemic. What are the targets for detection, reporting and implementation of control measures? Is it possible to detect important changes in occurrences of the event in time (section 3.6 -3.8)?
simplicity	Is it possible to reduce the amount of information collected in order to establish the occurrence of the event (section 3.5)? How many reporting sources are there? Is the communication of the observation as efficient as possible? How many organizations are involved? Is the reporting/ feedback procedure as smooth as possible (section 3.6-3.8)?
flexibility	Is the system able to respond quickly to new information requirements for this event?
acceptability	Are there any problems or prejudices which might affect efficient surveillance of this event?

4.2 Overall capacity of the system

Consider the overall capacity of the surveillance system. Is the system as it stands capable of achieving its own objectives? Does it have any spare capacity? Is there flexibility to add events to the system? Should the number of events be reduced?

Analyse	**for example**
completeness	Is the list of events under surveillance complete? Should some be added or subtracted?
simplicity	This refers to both its structure and ease of operation, for example: amount and type of information collected, number of reporting sources, methods of communication, number of organizations involved, staff training requirements, type and extent of data analysis, number and type of users, methods of distribution, feedback, time spent on different activities.
flexibility	Can the system respond to changes and new challenges? Is it possible to add or subtract events? How has the system handled any recent outbreak of an event?
representativeness	Does the overall coverage of the surveillance system correctly represent the population groups in the population?

Analyse	**for example**
acceptability	The willingness of individuals to participate in the surveillance system i.e. the catchment population, the suppliers and users of the information. This will relate to whether or not the population report to the observation points, the acceptability of the recording and reporting forms, the acceptability of the reports and feedback. Do the decision-makers actually use the information collected?
timeliness	Does the system have any target dates for completion of regular activities? Are these met? If not, how important are the delays? What are the reasons for the delays?
usefulness	Does the system meet its own objectives? Is it possible to identify the impact of the system on policies, interventions or the occurrence of the health events under surveillance?

Part 5

Outcome of the evaluation

Summary

The outcome of the evaluation includes:

1 Making recommendations

2 Presenting the findings and recommendations

3 Implementing the recommendations

4 Preparing the next evaluation

5.1 Making recommendations

The recommendations should be made only after careful consideration of the terms of reference. Problems with implementation should be anticipated where possible and sufficient justification and explanation provided.

Identify	**for example**
changes required	The improvements proposed may range from fine tuning of a part of the system to a radical overhaul of the entire system. The scale will be determined by the initial terms of reference.
can they be implemented	The recommendations should be implementable if the terms of reference have been adhered to. However, some may be unpopular and will need thorough explanation and justification for implementation.
resources required	The team should give some indication of the resources required to implement the alternative strategies recommended.
training required	Most major changes will require the provision of in-service training for successful implementation. Suitable programmes should be specified.

5.2 Presenting the findings and recommendations

It is the responsibility of the technical team to present and discuss their findings with the policy group and with all the staff involved in the evaluation. The findings should be clearly presented and well justified.

Describe	**for example**
terms of reference	The terms of reference that were followed in the conduct of the evaluation. Have these have been modified during the evaluation process? If so how?
methodology	The approach used by the team in conducting the evaluation. Explain any procedures that are not familiar and why they were used. Describe criteria used in the evaluation.
observations	Provide a summary of the major observations made about the system and the events under surveillance. This will include a description of the parts of the system which are functioning well and of those which are not. Phrase all criticism positively.
recommendations	All recommendations should be supported by justification and constructive suggestions as to how they can be implemented.
supporting information	Include all supporting tables and illustrations in an appendix to the final report.
acknowledgements	Acknowledge the people involved in or affected by the evaluation.

5.3 Implementing the recommendations

Support should be given by the policy group for the proper and speedy implementation of the agreed findings. Although other members of the health department will take part in this, none will have as much interest or skills to ensure implementation.

The team should:

Organize	**for example**
documentation	The improvements proposed by the evaluation team should be fully documented. Whilst it may not be possible to detail every step in their implementation, the team should provide enough documentation for a technical expert to follow.
action to be taken	Identify those responsible for the actions to be taken and a means of monitoring their completion.
training	Full details of any necessary training programmes should be provided and discussed with the training department. It should be ascertained when and if staff will be able to attend the training programmes when prepared.
support	The team should identify any technical support needed in order to make the required changes to the system.
evaluation	A date should be set for the next evaluation of the surveillance system.

5.4 Preparing the next evaluation

The first evaluation will, no doubt, prove to be a unique experience, but it should not be a unique event. One of its major outcomes should be recommendations about future assessments of the surveillance system.

The team should:

Recommend	**for example**
terms of reference	Suggest the most appropriate terms of reference for the next evaluation. Why will it be necessary?
frequency	When would it be appropriate to hold the next evaluation? How frequently should the evaluations be conducted?
personnel	Make some recommendations about the formation of the team to conduct the next evaluation. Base it on the experience of the current evaluation. Should any other professional expertise be included?
protocol	How could the protocol have been more useful to the evaluation? Make suggestions for improvement to the content and format of the protocol based on the experience of this evaluation.

Glossary

The following definitions are adapted mainly from Thacker, Parrish, Trowbridge et al, *World Health Statistics Quarterly*, **41**, 1988, 11-18 'A method for evaluating systems of epidemiological surveillance', and from document EPI/GEN/93.22 'Protocol for the Assessment of the Quality of Surveillance and Control of EPI Diseases'

acceptability

epidemiological surveillance

flexibility

health event

indicators

representativeness

sensitivity

simplicity

specificity

timeliness

usefulness

Term	definition
acceptability	Acceptability is measured by the willingness of persons conducting surveillance and those providing data to generate accurate, consistent and timely data.
epidemiological surveillance	The systematic collection, analysis, interpretation and dissemination of health data for the planning, implementation and evaluation of public health programmes. The application of these data to disease prevention and health promotion programmes completes a surveillance cycle in public health.
flexibility	Flexibility is a measure of the ability of the surveillance system to be easily adapted to new reporting needs in response to changes in the nature or the importance of the health event, the population monitored, or the resources available.
health event	(a) instances in which persons have a particular health problem or risk factor, (b) a more narrowly defined subset of (a) e.g. deaths, © an epidemic of a particular event.
indicators	The main indicators of quality of reporting and of effective use of reported data are: Timeliness/completeness: measured as the number of reports received on time compared to the number of health facilities designated to report. What "on time" means needs to be defined by national authorities depending on local conditions for communications. In most countries, for instance, 8 weeks should suffice for reports to be processed from the peripheral to the national level. Thoroughness: the number of cases or outbreaks investigated compared to the number of cases or outbreaks reported. Various time limits can be built in, for example how many cases are investigated within 48 hours after receipt of reports. Other indicators can be monitored on the quality of effectiveness of different operational aspects.

representativeness	A surveillance system that is representative accurately observes both the occurrence of a health event over time and the distribution by person and place of that event in the population at any point in time.
sensitivity	The ability of a surveillance system to detect true health events i.e. the ratio of the total number of health events detected by the system over the total number of true health events as determined by an independent and more complete means of ascertainment.
simplicity	Simple systems are easy to understand and implement, cost less.
specificity	A measure of how infrequently a system detects false-positive health events i.e. the number of individuals identified by the system as not being diseased or not having a risk factor, divided by the total number of all persons who do not have the disease or risk factor of interest. Because of the difficulties in ascertaining the total population at risk in surveillance, determination of the number of misclassified cases (false positives) can be used as a measure of the failure of the system to correctly classify health events.
timeliness	The interval between the occurrence of an adverse health event and (i) the report of the event to the appropriate public health agency, (ii) the identification by that agency of trends or outbreaks, or (iii) the implementation of control measures.
usefulness	The usefulness of a surveillance system is measured by whether it leads to prevention or control or a better understanding of health events.

Related Documents

Protocol for the Assessment of the Quality of Surveillance and Control of EPI Diseases. Geneva, World Health Organization, 1993 (unpublished document EPI/GEN/93.22, 12 pages; available on request from the Global Programme for Vaccines and Immunization, World Health Organization, 1211 Geneva 27, Switzerland).

WHO recommended Surveillance Standards (WHO, in preparation).

Guidelines for the Assessment of national Health Information Systems (WHO, in preparation).