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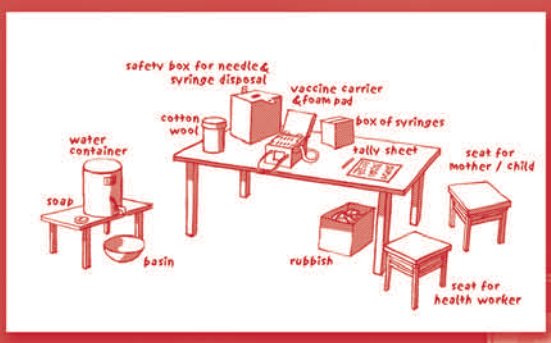
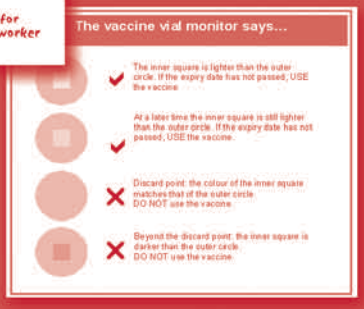
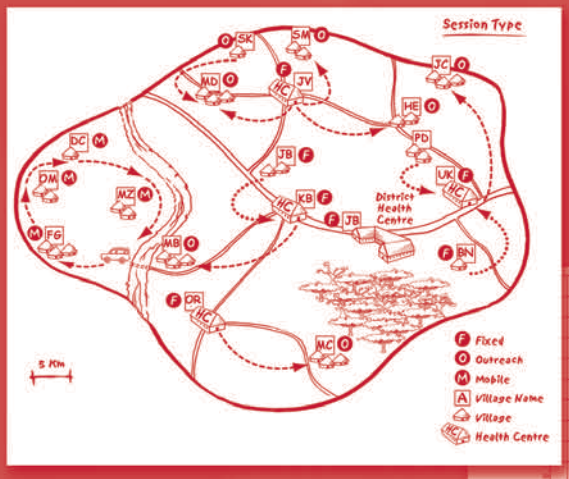
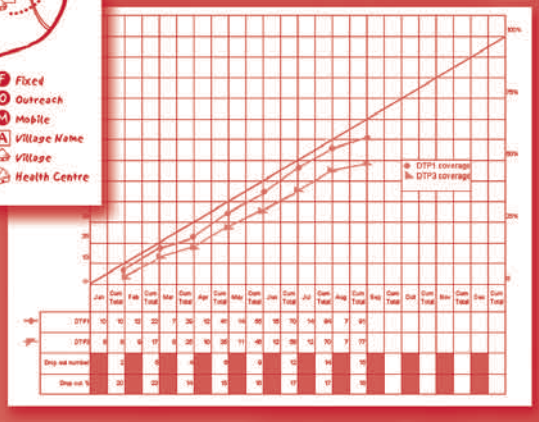
Training for mid-level managers (MLM)

8. Making disease surveillance work









Surveillance : What and why ?

Types of surveillance

Setting up and monitoring

Reporting

Analysis and action

Feedback

Immunization, Vaccines and Biologicals

World Health Organization

Training for mid-level managers (MLM)

Module 8 : Making disease surveillance work

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Introduction to the series

This new series of modules on immunization training for mid-level managers replaces the version published in 1991. As there have been many changes in immunization since that time, these modules have been designed to provide immunization managers with up-to-date technical information and explain how to recognize management and technical problems and to take corrective action and how to make the best use of resources.

More and more new, life-saving vaccines are becoming available, yet the introduction of a new vaccine does not necessarily require a separate plan and separate training. This new series for mid-level managers integrates training for new vaccine introduction into each subject addressed by the modules. In this way, introduction of new vaccines is put into its day-to-day context as part of the comprehensive range of activities required to improve immunization systems.

In the context of these modules, mid-level managers are assumed to work in secondary administrative levels, such as a province; however, the modules can also be used at national level. For district managers (third administrative level), a publication on 'immunization in practice'[1] is widely available. As it contains a large amount of technical detail, it is also recommended for mid-level managers courses.

In writing these modules, the authors tried to include essential topics for mid-level managers, while keeping the modules brief and easy to use. They are intended to complement other published materials and guidelines, some of which are referred to in the text. Many more documents are available on the CD-ROM which accompanies this series. Each module is organized in a series of steps, in which technical information is followed by learning activities. Some knowledge and experience are needed to complete the learning activities, but even new readers should be imaginative and constructive in making responses. Facilitators should also be aware that the responses depend on the national context. Thus, there are no absolutely right or wrong answers, and the series does not set down new 'policies' or 'rules'. The authors hope that the readers of these modules will find them informative, easy to read and an enjoyable learning experience.

Modules in the mid-level managers series

Module 1 : Cold chain, vaccines and safe-injection equipment management
Module 2 : Partnering with communities
Module 3 : Immunization safety
Module 4 : Supportive supervision
Module 5 : Monitoring the immunization system
Module 6 : Making a comprehensive annual national immunization plan and budget
Module 7 : The EPI coverage survey
Module 8 : Making disease surveillance work

[1] *Immunization in practice : A practical guide for health staff*. Geneva, World Health Organization, 2004

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This new series of modules on immunization training for mid-level managers is the result of team work between a large number of partners including the Centers for Disease Control and Prevention (CDC), IMMUNIZATIONbasics, Program for Appropriate Technology in Health (PATH), United Nations Children's Fund (UNICEF), United States Agency for International Development (USAID) and the World Health Organization (WHO). The authors are especially grateful to the consultants from the University of South Australia who have made a major contribution to the development of the modules.

Contents

Introduction to Module 8

Purpose of this module

Are reports of vaccine-preventable diseases sent to your province office every month? Do your health staff understand the value and relevance of the information that they send you? If you suspect that the surveillance information is incomplete or inadequate, or if surveillance needs to be enhanced to include additional diseases, how can you improve the surveillance system to meet these needs?

This module describes various well-established methods of conducting and using surveillance of vaccine-preventable diseases. Various steps common to many diseases are explained, and in addition there are specific details on a number of common vaccine-preventable diseases. There is also a section describing the principal activities for outbreak response.

The purpose of this module is to explain in practical terms the basic concepts of surveillance and how to manage a surveillance system for vaccine-preventable diseases. It is hoped that the participant, after reading this module and discussing the concepts with the facilitator, will have a fair idea of how to start, run and monitor a surveillance system.

This module is organized into the following sections:

Surveillance: What and why? > **Types of surveillance** > **Setting up and monitoring** > **Reporting** > **Analysis and action** > **Feedback**

Many excellent textbooks, guidelines and practical exercises are available on disease surveillance, clinical details of various diseases and laboratory techniques. A list of useful references is given in Annex 1, and some key resources are listed in subsequent annexes.

1. Surveillance : What and why ?

1.1 What is disease surveillance ?

Surveillance is data collection for action. The mere collection and compilation of disease-related data without analysing them and taking appropriate action is not surveillance. Disease surveillance is the systematic collection, analysis and dissemination of data on diseases of public health importance so that appropriate action can be taken to either prevent or stop further spread of disease. It guides disease control activities and measures the impact of immunization services.

1.2 Why is disease surveillance necessary ?

Disease surveillance is used to :

- predict or detect disease outbreaks with a view to investigation and containment ;
- identify high-risk populations and areas requiring special attention ;
- monitor impact and progress towards disease eradication, elimination and control ;
- identify areas in which system performance is poor, so that corrective measures can be taken ;
- determine the frequency of occurrence of a disease in a community and the burden of disease ;
- monitor programme effectiveness by documenting short- and long-term effects of immunization on disease burden and epidemiology ;
- identify circulating strains including serotypes, genotypes and subtypes.

The type of surveillance for a specific vaccine-preventable disease depends on the attributes of the disease and the objectives of the disease control programme —control, elimination or eradication (see section 1.3).

These factors direct the surveillance activities to be implemented. Table 8.1 lists the vaccine-preventable diseases and their associated surveillance activities. You will see that some diseases have more than one disease control objective, according to national and regional goals.

Table 8.1 : Purpose of surveillance of selected vaccine-preventable diseases

Vaccine-preventable disease*	Disease control objective	Surveillance activity			
		Find all cases or chains of transmission	Monitor trends, predict and detect outbreaks and identify at-risk populations	Provide evidence on disease burden, epidemiology of disease and impact of immunization	Identify circulating strains
Diphtheria	Control		x		
Haemophilus influenzae type b	Control			x	x
Hepatitis B	Control		x	x	
Influenza	Control		x	x	x
Japanese encephalitis	Control		x	x	
Measles	Control		x		x
Measles	Elimination	x	x		
Meningococcal disease	Control		x	x	
Neonatal tetanus	Elimination		x		
Pertussis	Control		x		
Pneumococcal disease	Control			x	x
Poliomyelitis	Eradication	x			x
Rotavirus	Control			x	
Rubella or congenital rubella syndrome	Control			x	
Rubella or congenital rubella syndrome	Elimination	x	x		
Yellow fever	Control		x		

*The disease control objectives, case definitions and data requirements for each vaccine-preventable disease are given in Annex 2.

1.3 Definitions of control, elimination and eradication

- *Control*: The reduction of disease incidence, prevalence, morbidity or mortality to a level that is locally acceptable as a result of deliberate efforts. Continued intervention measures are required to maintain the reduction. Example: diphtheria, pertussis.
- *Elimination*: Reduction to zero of the incidence of a specified disease in a defined geographical area as a result of deliberate efforts. Continued intervention measures are required. Example: polio in certain continents. (The elimination of neonatal tetanus is defined differently.)
- *Eradication*: Cockburn's definition[1] is " Eradication is the extinction of the pathogen that causes the infectious disease in question; so long as a single member of the species survives, then eradication has not been accomplished ". In more practical terms, eradication is the reduction to zero of the worldwide incidence of infection caused by a specific agent, the complete interruption of transmission and the extinction of the causative agent so that it no longer exists in the environment. As a result, intervention measures are no longer needed. Example: smallpox.

[1] Cockburn TA. Eradication of infectious diseases. *Science*, 1996, 133:1050–1058.

2. Types of surveillance

The type of surveillance for a particular disease depends on the attributes of that disease and the objectives of the immunization programme. For example, when the objective of the programme is control of measles and surveillance for measles is started, the number of cases is high, and it is important to know where the cases are. Therefore, a system that covers the entire country is needed, but the details of individual cases are not. In contrast, when the number of measles cases is reduced and the programme objectives change to elimination, investigation of individual cases and transmission chains will become necessary.

2.1 Passive surveillance

Regular reporting of disease data by all institutions that see patients (or test specimens) and are part of a reporting network is called passive surveillance. There is no active search for cases. It involves passive notification by surveillance sites and reports are generated and sent by local staff.

A passive surveillance system relies on the cooperation of health-care providers — laboratories, hospitals, health facilities and private practitioners — to report the occurrence of a vaccine-preventable disease to a higher administrative level. Once the data have been received, they must be compiled and then analysed to monitor disease patterns and identify possible outbreaks. Passive surveillance involves the regular collection and reporting of surveillance data and is the commonest method used to detect vaccine-preventable diseases. In most countries with a passive surveillance system, every health facility is required to send a monthly (sometimes weekly/daily) report of all cases of vaccine-preventable disease (and sometimes other diseases of interest) on a standard form.

Passive surveillance is less expensive than other surveillance strategies and covers wide areas (whole countries or provinces) ; however, because it relies on an extensive network of health workers, it can be difficult to ensure completeness and timeliness of data.

Some countries might not have the capacity or resources to identify all cases of a disease, either because the diagnosis of the disease requires specialized clinical skills or because laboratory resources are not available throughout the country. Under these circumstances, passive surveillance can be adapted in a number of ways, depending on the completeness and quality of data required, financial constraints and the availability of specialist skills and services.

2.2 Sentinel surveillance

A sentinel surveillance system is used when high-quality data are needed about a particular disease that cannot be obtained through a passive system. Selected reporting units, with a high probability of seeing cases of the disease in question, good laboratory facilities and experienced well-qualified staff, identify and notify on certain diseases. Whereas most passive surveillance systems receive data from as many health workers or health facilities as possible, a sentinel system deliberately involves only a limited network of carefully selected reporting sites. For example, a network of large hospitals might be used to collect high-quality data on various diseases and their causative organisms, such as invasive bacterial disease caused by *Haemophilus influenzae* type b, meningococcus or pneumococcus.

Data collected in a well-designed sentinel system can be used to signal trends, identify outbreaks and monitor the burden of disease in a community, providing a rapid, economical alternative to other surveillance methods. Because sentinel surveillance is conducted only in selected locations, however, it may not be as effective for detecting rare diseases or diseases that occur outside the catchment areas of the sentinel sites.

The following criteria should be considered in selecting a sentinel health facility (usually a general or infectious disease hospital) :

- It should be willing to participate.
- It serves a relatively large population that has easy access to it.
- It has medical staff sufficiently specialized to diagnose, treat and report cases of the disease under surveillance.
- It has a high-quality diagnostic laboratory.

2.3 Active surveillance

Active surveillance involves visiting health facilities, talking to health-care providers and reviewing medical records to identify suspected cases of disease under surveillance. Designated active surveillance staff regularly visit health facilities in person to search for suspected cases among persons who might have attended the facility. It involves physical review of medical records and registers, interviews with health workers and visits to relevant outpatient clinics and hospital wards. When a case is found, the active surveillance staff investigate it, document clinical and epidemiological data, arrange to send appropriate laboratory specimens and report the information rapidly, according to national policy. This method is usually used when a disease is targeted for eradication or elimination, when every possible case must be found and investigated. It is also used for outbreak investigations.

Active surveillance is more difficult to set up and expensive to conduct. It does not replace passive surveillance but complements it. If conducted regularly it has the following advantages :

- helps to improve the timeliness and accuracy of case detection and reporting ;
- enables rapid case investigation, including taking laboratory specimens ;
- is closely linked to the laboratory system through individual case identification ;
- enables timely action to be taken in response to the detected case.

Active search

The term 'active search' is used to describe searches for cases in the community. There is also 'retrospective record search', which is used to search hospital and clinic records and is used for diseases under elimination. This is sometimes (mistakenly) also referred to as active search. In active search, health staff usually go door-to-door asking about cases of the disease in question. Active search may also be conducted where an outbreak is ongoing (such as commercial centres, working areas, schools, universities etc.). This is a very resource-intensive way of finding cases, requiring many people and large amounts of money, and is used only in certain situations, e.g. during outbreaks to locate unreported cases and during polio immunization campaigns to find cases of acute flaccid paralysis.

Table 8.2 : Comparison of surveillance methods

	Type of surveillance		
	Nationwide routine/passive surveillance	Sentinel surveillance	Active surveillance
Population under surveillance	Whole country	Cases seen and treated at selected health facilities	All cases attending selected health facilities
Outcome measures	Cases and deaths Incidence rates Trends in epidemiology	Cases and deaths in selected health facilities	Cases and deaths in selected health facility Full case investigation with details on each case
Advantages	Can provide accurate rates and data on burden if reporting is complete and supported by reliable laboratory results	Requires limited resources Can be managed easily Can contribute to basic understanding of disease burden	Can represent the whole country Directs eradication or elimination programmes Can be expanded to include additional diseases as required Rapid detection of outbreaks
Disadvantages	Needs extensive clinical and laboratory capacity and resources Reporting is rarely complete and timely Heavy demands on data management	Cannot be used to calculate incidence rates Is not representative of the whole country	Resource-intensive Requires dedicated staff, transport, management Heavy demands on data management

Notes :

3. Setting up and monitoring surveillance

3.1 Setting up passive surveillance

In consultation with the national programme manager, a list should be drawn up of all health facilities (both public and private) and practitioners who are likely to see cases of the disease. Most countries already have some form of passive disease surveillance system ; however, these might have to be strengthened and should be supervised regularly. The institutions and persons should be visited and briefed about case definition, frequency of reporting, reporting format, deadlines for each report and the address to which the report should be sent. They should be instructed to send a periodic report even if no cases are seen during the reporting period.

When no cases are seen, 'zero reporting' is used, with a '0' in the report, also known as negative reporting. This is important to ensure the completeness of reporting for monitoring the quality of the surveillance system and gives provincial and national authorities confidence that the surveillance system is operational, even if no disease is identified. A simple table should be maintained to track the completeness of reporting, such as in the example given below (in August of that year).

Table 8.3 : Table to track the completeness of reporting, year 2007

Reporting institution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hospital 'A'	√	√	√	√	√	√	√					
Health centre 'B'	√	√		√			√					
Practitioner 'X'	√		√		√	√						

It can be seen from this table that health centre 'B' did not send a report for March, May or June and practitioner 'X' did not report for February, April and July. Such missing reports should always be followed up, both to indicate that someone is tracking the reports and to tell the institution how much and why their report is important.

A similar table with dates (shown below) should be maintained to track whether the reports came in within the agreed time limit. The reason for maintaining two separate tables is that reports can be delayed ; in this example, for instance, health centre 'B' sent the reports for February, April and July in August, and practitioner 'X' sent the reports for May and June in August. Such grossly delayed reports, although received, serve no useful purpose. A time limit should be set beforehand (e.g. the 15th of the next month), after which time reports should be considered late. Another limit (e.g. the 25th of the next month) should be set after which reports will be classified as missing.

Table 8.4 : Table to track timeliness of reporting

Reporting institution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hospital 'A'	02 Feb	03 Mar	06 Apr	07 May	04 Jun	07 Jul	09 Aug					
Health centre 'B'	15 Feb	08 Aug		08 Aug			08 Aug					
Practitioner 'X'	05 Feb		05 Mar		10 Aug	10 Aug						

3.2 Setting up sentinel surveillance

Sentinel surveillance is the collection and analysis of data by designated institutions selected for their geographical location, medical specialty and ability to diagnose and report data accurately. Generally, sentinel surveillance is useful for answering specific epidemiological questions, but, because sentinel sites may not represent the general population or the general incidence of the disease, they might be of limited use for analysing national disease patterns and trends.

When it is not possible to set up a network of all possible sites or when detailed information is needed for certain diseases, a list of large hospitals (public and private) that are likely to see cases of the disease in question should be drawn up, in consultation with the national programme manager. These institutions should have the clinical and laboratory expertise to provide the necessary information, for instance, for surveillance of *Haemophilus influenzae* type b meningitis (laboratory needed) or congenital rubella syndrome (clinical expertise needed). Sentinel surveillance provides useful indicators about, e.g. trends of disease occurrence, case fatality rates and early information on outbreaks. They do not provide information on the full extent of the disease, such as geographical distribution and the total number of cases.

Overview of sentinel surveillance method

System description	Advantages	Disadvantages
Limited catchment area Comprises network of hospitals and laboratories selected from among all hospitals and laboratories in the surveillance area Usually includes largest hospitals in the area Pre-evaluation needed to select appropriate sentinel sites	Easy to collect data on individual patients Less costly and less demanding on resources Flexible system design Useful for documenting trends Allows routine monitoring of resistance to antibiotics	Although less costly than population-based surveillance, may still require significant investment in personnel and resources Data may be biased or skewed Data are not generalizable to the population of the area Does not allow collection of data on incidence

The steps in setting up sentinel surveillance are as follows :

1. Decide on the disease for which the system is being set up, and determine its attributes, e.g. age group affected, geographical distribution, seasonality and causative organism.
2. Decide the boundaries of the area within which the system is to be set up.
3. Enumerate all large, medium and small hospitals and private practitioners in that area.
4. For each institution or practitioner, decide how likely it is that it will see cases of the disease. Those with the highest likelihood should be included first, usually including all large hospitals and/or reference core hospitals. Depending on available resources, expand the network to include other hospitals and practitioners.
5. Meet the decision-maker at each hospital and the practitioners to be included. Their participation should be voluntary, and financial incentives are best avoided. Non-financial incentives, such as attractive certificates printed on glossy paper attesting that a hospital or clinic is a part of the network, often work well and are sustainable.
6. In consultation with the staff of the hospital or the practitioner, decide on a standard case definition, the need for laboratory support, reporting and periodicity of reporting. Standard formats for case investigations, laboratory investigations and periodic reports must be agreed upon and provided to the participating units. The method of reporting—by mail, fax, e-mail—must be decided in advance.
7. Identify and obtain the agreement of laboratories capable of processing specimens and willing to take on the extra work. A smaller number of more advanced 'reference' laboratories for doing additional testing would also be needed. Determine the method and mechanisms for the flow of specimens.
8. Regular feedback in the form of tables summarizing the data on disease, classification of cases and others is essential.
9. Tables to track the completeness and timeliness of reporting should be used for sentinel reporting sites, as described in section 3.1 for passive surveillance.

3.3 Setting up active surveillance

The following steps are involved in establishing an active surveillance system. It requires personnel at the senior management level who will manage active surveillance, train staff at various levels and help select the reporting sites.

Identify surveillance officers

Surveillance officers will be the focal points responsible for visiting designated active surveillance sites in the network, conducting core investigations and making follow-up visits. These could be staff already engaged in related activities, such as district immunization workers.

Seek the cooperation of health facilities

The choice of active surveillance reporting sites depends on several factors, including the disease under surveillance and the behaviour of the community towards illness. The selection should be made in consultation with persons at the senior management level, and they may include hospitals, clinics, private practitioners and traditional healers.

The surveillance officer should make an effort to meet busy health-facility staff personally to obtain their commitment, cooperation and continued involvement in active surveillance. It is useful to conduct an introductory meeting at which the hospital staff, clinicians and health workers are provided with information, such as booklets or posters, to improve their knowledge about the disease and to explain the rationale for conducting active surveillance. At the meeting, the standard case definitions should be introduced, and it should be emphasized that all cases that fit the case definition must be reported, even if the diagnosis is uncertain. Clinicians must be assured that the results of laboratory investigations will be sent to them as soon as they are available.

One staff member in each facility should be identified who will be the focal point for that institution, responsible for assisting in active case detection and reporting.

Frequency of active surveillance visits

In addition to active case detection by staff, regular surveillance visits to the reporting site should be conducted by the surveillance officer. The frequency of visits to any particular site is determined by the likelihood of suspected cases being admitted, so that timely epidemiological investigations can take place. If the likelihood of a suspected case being seen at the institution is high, the surveillance officer should make weekly visits ; if the likelihood is medium, the visits can be monthly, and if the likelihood is low, the visits can be quarterly. Annex 4 gives examples of active surveillance monitoring forms.

Content of an active surveillance visit

The five key steps in an active surveillance visit are summarized below and given in more detail in Annex 3.

1. *Visit all places in a hospital where cases might be found*. Cases might be seen in both outpatient departments and inpatient wards. For instance, an uncomplicated case of measles will be seen and treated in an outpatient department, while a measles case with complications might be admitted to the paediatric ward, and measles cases with neurological symptoms might be admitted to a neurology ward.
2. *Examine all records that might yield information.* Outpatient registers, inpatient registers, discharge summaries, laboratory request forms and hospital record rooms can all yield useful information.
3. *Consult anyone who might know of a case*. It is always preferable first to contact the focal point of the institution on every visit, who might already have a list of cases or records. Then, meetings should be arranged with department heads, chiefs of units in the department, resident doctors, staff nurses in charge of indoor wards, laboratory chiefs and doctors in the emergency room.

4. *Collect the information on suspected cases on standard questionnaires according to the disease.*
5. *Take appropriate action when a case is found.* The staff nurse or doctor on duty should be informed that a suspected case has been found, and the case should be worked up on a standard questionnaire. Appropriate specimens should be collected and sent to the designated laboratory, and arrangements should be made for follow-up examinations and feedback of laboratory results to the reporting hospital. Appropriate infection control measures should be implemented in the health facility to prevent disease transmission.

Active surveillance visits should be monitored closely. One way to keep a record is to note on the margins of the hospital or clinic registers the date of the visit, name of the person examining the records and the number of cases that were detected during the visit. Permission to write on the registers should be obtained from the institutions' authorities beforehand.

3.4 Collecting information for a surveillance system

There is wide variation in the level of detail required from surveillance data collected. No matter what type of surveillance is chosen, the starting point is a standard case definition.

Standard case definitions

A standard case definition is an agreed set of criteria, usually clinical, used to decide if a person has a particular disease. Use of standard definitions ensures that every case is detected and reported in the same way, regardless of where or when it occurred or who identified it. The commonest case definitions for vaccine-preventable diseases are given in Annex 2. As soon as a case meets the standard case definition it is labelled as a 'suspected' case. Once necessary steps for confirmation of diagnosis have been undertaken, including appropriate laboratory tests, and the diagnosis is confirmed, the case is labelled as a 'confirmed' case.

Syndromic reporting

Some case definitions in Annex 2 do not refer to a specific diagnosis but rather to a syndrome or collection of symptoms and signs. This improves the likelihood of finding the disease of interest, although other similar diseases might also be detected.

Example: The syndrome of rash and fever can describe measles, rubella or dengue haemorrhagic fever. Further case investigation and laboratory specimen testing are necessary to confirm which cases are of interest and which are not.

As a mid-level manager, you should encourage health workers to report cases on the basis of the clinical picture of the disease (signs and symptoms) and on the basis of their experience and clinical judgement. It is better to have a system that over-reports suspected cases than one that fails to report communicable diseases in a timely manner. Suspected cases can always be confirmed or discarded after further investigation; a missed case is a fault of the surveillance system, a discarded case is not.

Cases to be investigated

The objectives of the disease control programme in your country must be considered when deciding on the number of cases to be investigated ; however, as a general rule :

1. If the disease is under eradication or elimination, every suspected case should be investigated.
2. If the disease is to be controlled, it may not be necessary to investigate every case, and it might be sufficient to investigate the index case(s) of a cluster to confirm the diagnosis and to do an active search to determine the extent of the cluster/outbreak.
3. Use case investigation forms to investigate cases. These are disease specific. Information is usually collected face to face, sometimes requiring visits to the home, hospital or community. The quality of data recorded on the form is extremely important, as it will be used to decide whether public health action is necessary.

3.5 Monitoring surveillance quality

Monitoring is the systematic, continuous examination of data, measurement of progress, identification of problems, formulation of solutions and planning of interventions. It should be conducted regularly and, when necessary, lead to corrective action. A range of strategies can be used to monitor the quality of surveillance, some of which are summarized below. Details of monitoring an immunization programme are given in Module 5.

Performance indicators

To get the most out of monitoring the quality of a surveillance system, including the data that are reported, there must be a set of performance and quality indicators against which progress and accomplishment can be measured. These will vary by disease but can include the following :

- completeness of weekly or monthly reporting (including 'zero' reports) ;
- timeliness of weekly or monthly reporting (including 'zero' reports) ;
- investigation of cases within 48 hours of being reported ;
- proportion of cases for which specimens were collected and sent to a laboratory ;
- mapping of reporting sites to ensure that all areas are covered.

A well-designed indicator is an independent measure that can be used in different settings so that comparisons can be made. Module 5 of this series (*Monitoring the immunization system*) provides more details on designing and using indicators.

Many documents have been published describing disease-specific indicators and performance measures for both immunization coverage and disease control. The box below shows the recommended indicators for bacterial meningitis taken from the WHO-recommended standards for surveillance of selected vaccine-preventable diseases.

Figure 8A. Recommended performance indicators of surveillance quality for bacterial meningitis

Performance indicators of surveillance quality

- Percentage of all probable cases for which CSF/blood was obtained for evaluation ≥90%
- Percentage of probable cases in which a bacterial pathogen was identified from CSF or blood :
  - Among CSF with 10 or more white blood cells/ml^3 ≥15%
  - Among CSF with 100 or more white blood cells/ml^3 ≥40%
- Percentage of CSF isolates which are *Haemophilus influenzae* ≥20%

Note

Although persons with bacterial meningitis have a wide range of CSF white blood cell counts the proportion of probable bacterial meningitis cases with identifiable bacterial causes increases with increasing CSF cell count. For the evaluation of perfomance, immunization personnel may wish to determine the proportion of potential bacterial meningitis cases in which bacterial causes have been identified in one or both of the above categories. Result below the target levels suggest that some cases of bacterial meningitis are not being identified from the probable cases and that laboratory and clinical practices should be reviewed.

Source : *WHO-recommended standards for surveillance of selected vaccine-preventable diseases* (WHO/V&B/03.01).

Recommended performance indicators of surveillance quality for polio

- Rate of non-polio acute flaccid paralysis (AFP cases) ≥1/100 000 children under 15 per year
- Proportion of AFP cases with 2 adequate stools taken within 14 days of paralysis onset ≥80%

Avoiding duplication

Care must be taken to avoid double-counting cases when reporting them to a higher level. Double-counting is accidental inclusion of the same case more than once. This is possible for cases that are reported immediately, for instance when both active and passive reporting systems are operating for the same disease. One way to avoid duplication is to make a list of cases and check for identical entries e.g. names and addresses or case numbers.

Learning activity 8.1. Completing a case investigation form

You are the mid-level manager in Bundu Province and have just received the following case investigation form from Sister Mari at Luaga Health Centre, in a low-risk district for neonatal tetanus.

Task 1 : What is the case definition for neonatal tetanus (refer to Annex 2) ?

Task 2 : Does the case investigation form give enough information to determine whether this is a case of neonatal tetanus ? If not, what other information is needed ?

Task 3 : What advice could you give to Sister Mari about completing a neonatal tetanus case investigation form in future ?

Sample investigation form for death from suspected neonatal tetanus

Investigator's name : Sister Mari Investigation date : 21/10/2007

Case identification and household location

Name of respondent : Mambeni Battula Relationship to baby : Mother
Address of respondent : House 5
Baby's date of birth : 17/10/2007 Baby's date of death :
Age at death in days : 4 days Sex of baby : Male : ☐ – Female : ☒
How many pregnancies has the mother had (regardless of outcome, including this one)?___

Mother's immunization status

Does the mother have an immunization card ? Yes : ☐ No : ☒
Immunization history by : Card ☐ – Memory ☒ – Both ☐ – Unknown ☐
How many TT doses did the mother receive during the last pregnancy : 1
How many TT doses did the mother received before the last pregnancy (on any occasion) : 2
If by card, give dates : 1.__/__ /__ 2. __ /__ /__ 3. __/__/__ 4. __/__/__ 5. __/__/__

Mother's antenatal care history

How many antenatal care visits were made during this last pregnancy ?

Delivery practices

Place of delivery ? Health facility : ☐ – Home : ☒ – Outside : ☐ – Other : ☐ – Unknown : ☐
Who assisted with the delivery ? Doctor : ☐ – Midwife : ☐ – Nurse : ☐ – TBA : ☒ – Relative : ☐ – Nobody : ☐
Other : ☐ – Unknown : ☐
On what surface was the baby delivered ? Dirt floor
What was used to cut the cord ? Kitchen knife
Was any substance put on the cord stump ? Yes : ☒ – No : ☐
If yes, specify Unknown

Baby's signs/symptoms - ask respondent to describe in open-ended questions and record the findings below. Do not ask the questions literally.

Did the baby suckle normally for at least the first 2 days of life ? Yes : ☒ – No : ☐ – Unknown : ☐
Did the baby stop sucking after the first 2 days ? Yes : ☒ – No : ☐ – Unknown : ☐
Baby's age at which illness was suspected by the mother/informant Days : 4 – Unknown : ☐
Did the baby have the following signs :
- Spasm when stimulated by touch, sound or light ? Yes : ☐ – No : ☐
- Developed " pursed lips " and/or clenched fists ? Yes : ☐ – No : ☒
- Become rigid or stiff as illness progressed ? Yes : ☐ – No : ☒
- Had tremors, fits or stiffness ? Yes : ☐ – No : ☐

Ask the mother to describe the baby's illness, and record the responses on the back of this form.

Treatment and outcome

Was the sick baby taken to a health facility ? Yes : ☐ – No : ☒ – Unknown : ☐
If yes, give name of health facility : _____
What was the final outcome for the baby ? Alive : ☐ – Dead : ☒ – Unknown : ☐
Final diagnosis by the health facility_____
Visit the health facility if there is doubt whether the case died of neonatal tetanus.

Case response

Has the mother received TT since the birth of this baby ? Yes : ☐ – No : ☒ – Unknown : ☐
Did other women in same locality receive TT in response to the case ? Yes : ☐ – No : ☒ – Unknown : ☐

Conclusion

What does the respondent say was the cause of the baby's death ? _____
On the basis of the evidence, was this a case of neonatal tetanus ? :
Confirmed case : ☒ – Suspected case : ☒ – Discarded case : ☐ – Unable to classify : ☐
Comments :

Learning activity 8.2 : Diphtheria case investigation

You are the mid-level manager in Idzuvic Province. According to the disease control guidelines of your country, the aim of the diphtheria surveillance programme is to control the disease and prevent epidemics.

Two suspected cases of diphtheria have recently been identified by active surveillance in a high-risk district in your province.

Task 1 : On the basis of the information in Annex 2, should you complete an individual case investigation for each of these cases ?

Task 2 : If you decide to investigate, what information or specimens should be collected ; who will gather the data and from where ?

3.6 Case Confirmation

Methods

A case reported from the periphery meeting the standard case definition is called a 'suspected' case. A suspected case has the signs and symptoms of the disease and meets the standard case definition. Suspected cases need to be investigated further. If a suspected case has an epidemiological link to another confirmed case and/or has positive laboratory tests, it is 'confirmed'. Laboratory confirmed cases do not need to demonstrate an epidemiological link to a confirmed case because laboratory confirmation alone is sufficient to confirm a case.

The laboratory tests necessary to confirm cases of the other vaccine-preventable diseases, the clinical pictures and case definitions are described in Annex 2. Tetanus is the only vaccine-preventable disease for which the clinical case definition is sufficient for confirmation, as laboratory confirmation and epidemiological links are often not possible.

The diagnostic methods used to confirm a case of vaccine-preventable disease are described below.

Standard case definition

To meet the standard case definition, cases must present with the signs and symptoms listed in the nationally agreed standard case definition for that disease. For example, the measles standard case definition might be : fever *and* maculopapular rash *and* cough or coryza or conjunctivitis.

Epidemiological associations

An epidemiological association can be proven when a case can be linked back to contact with a laboratory-confirmed case any time during the infectious period. For example, an epidemiological association for measles might be as follows : 15 days ago, a child with measles confirmed by a blood test attended a party with another child, who now has a rash. The incubation period of measles is 7–18 days and rarely up to 21 days. The usual period between exposure and development of rash is around 14 days.

Laboratory confirmation

For laboratory confirmation, results must be available for specimen(s) that have been collected, shipped and tested adequately, and indicate acute infection. For example, a laboratory confirmation for measles might be the presence of measles-specific immunoglobulin M (IgM) antibodies in the serum in a sample collected 4–28 days after the onset of rash.

Annex 2 describes the necessary laboratory tests for confirming cases. Specimens of blood, cerebrospinal fluid, stools or nasopharyngeal secretions might be required, depending on the disease. Guidelines are available for the collection and shipment of specimens. Before collecting specimens, call or otherwise contact the laboratory to find out the exact requirements, because the specimens might not be analysed if they were incorrectly collected, handled or shipped, or if the accompanying documentation is insufficient.

Are laboratory specimens needed for every case ?

For vaccine-preventable diseases subject to eradication or elimination, laboratory specimens are needed from every suspected case. For example, stool samples should be taken from all cases of acute flaccid paralysis and blood samples from suspected measles cases in countries in the elimination phase.

For other vaccine-preventable diseases, including those subject to control, specimens are not always needed from every case, and it may be sufficient to take a sample of specimens (as per national policy) to confirm an outbreak. Note that no specimens are required for neonatal tetanus, because a clinical diagnosis can confirm the disease.

Notes :

4. Reporting

4.1 Summarizing and reporting data

Aggregated reports

The number of cases of many vaccine-preventable diseases can be reported on one form, a disease surveillance report. Aggregate data give a quick summary of the magnitude of the problem, covering several diseases, but are not detailed enough to enable case tracking. Aggregated data can be useful for analysis and display when full details are not required and are often used for reporting monthly data from passive surveillance systems.

Line lists

A line list is a convenient means for consolidating information on a number of cases of the same disease ; it includes more detail than an aggregated report. Data acquired from case investigation forms should be entered as soon as possible into a line list, thereby allowing prompt analysis and visual assessment and identification of possible clustering. An example of a line list for AFP cases is given in Annex 4.

Case reports

Case-based surveillance data provide details of individual cases of vaccine-preventable diseases. Case-based surveillance requires the use of a standard case definition and a case investigation form to record information, such as the patient's name, age, immunization status, date of last immunization against the suspected disease, address, date of disease onset, suspected diagnosis and laboratory results (when available). Case-based data are often used for diseases that require urgent public health action or are subject to accelerated disease control goals or during suspected outbreaks of epidemic-prone diseases, such as diphtheria, meningitis and yellow fever. An example of a case investigation form for neonatal tetanus is given in Learning activity 8.3.

4.2 Frequency

As indicated above, the disease control guidelines in each country give the control objectives for each disease, and these objectives determine the frequency of surveillance reporting and the types of report needed. Reports are usually sent from the level where the disease was detected first (perhaps by a village health worker or district health officer), through each administrative level to provincial and national authorities. When immediate reporting is required, the priority is to notify a higher level as soon as possible, although the report should be copied to other levels, for information and to avoid duplication.

Monthly reports

This is the usual schedule for reports, and most data collected through passive surveillance and sentinel sites are reported in this way. Monthly reports comprise aggregated data (the total number of cases of each disease) rather than providing details of each case, except for sentinel surveillance of some diseases.

Weekly reports

Weekly reporting is usually used for diseases for which an active surveillance system is in place or when the disease control objective is elimination or eradication, such as for polio. These data are often sent in the form of a 'line listing' or as case investigation reports.

Immediate reporting

Immediate reporting is usually indicated if outbreaks of the disease are likely or if the disease is subject to eradication or elimination initiatives. These diseases are defined by national policy and can include measles, polio, maternal and neonatal tetanus and yellow fever. Immediate reporting can be done by e-mail, fax, telephone, telegram, radio or any other rapid means available in the country. The maximum possible essential information should be conveyed, including a provisional diagnosis, location and age of the case. An immediate report should be followed as soon as possible by a case investigation.

Learning activity 8.3 : Completing a line list

In Learning Activity 8.1 : Completing a case investigation form, you reviewed the neonatal tetanus case investigation form submitted by Sister Mari. As mid-level manager in Bundu Province, you are now required to send the weekly data on neonatal tetanus to the national level.

Task 1 : Use the data on the case investigation form to complete this line listing.

Example of line listing of suspected cases of neonatal tetanus

Country : Province : District :
Period covered by this line-list :

EPID number	Name	Date of birth	Date of onset	Sex	Mother's address or village	Location delivery	Place of delivery	Attendant at delivery	Total TT doses of mother	Case-investigation indicated ?	Case-investigation done ?	Outcome	Classification
1	2	3	4	5	6	7	8	9	10	11	12	13	14

1. Unique case identification number (e.g. similar to acute flaccid paralysis EPID numbers)
2. The infant's or parent's name
3. Date of birth of infant
4. Date of onset of symptoms
5. Sex of the infant with neonatal tetanus
6. Address (at least village name) of the mother
7. Location (at least village name) where infant was delivered
8. Place of delivery, such as health facility, home or outside
9. Person attending the delivery : doctor, nurse, midwife, traditional birth attendant, neighbour, family member, nobody (mention only the person with the highest relevant qualification)
10. Total number of doses received by the mother before the birth of the infant, with year of last dose in brackets

11 Yes or No to indicate whether, on the basis of local guidelines, the case should be investigated further

12. Yes or No to indicate whether a case investigation was done ; if yes, a completed case investigation form should be available
13. Whether the infant is alive, dead or unknown vital status
14. Confirmed case of neonatal tetanus, discarded case, difficult to classify

Notes :

5. Analysis and action

In this section, we give examples of data analysis that the mid-level manager can perform. Analysis is essential for understanding how well an immunization programme is performing and for identifying gaps. Data analysis also provides the basis for taking action, be it introducing new vaccines, targeting communities at risk or modifying programme design.

5.1 Determining patterns

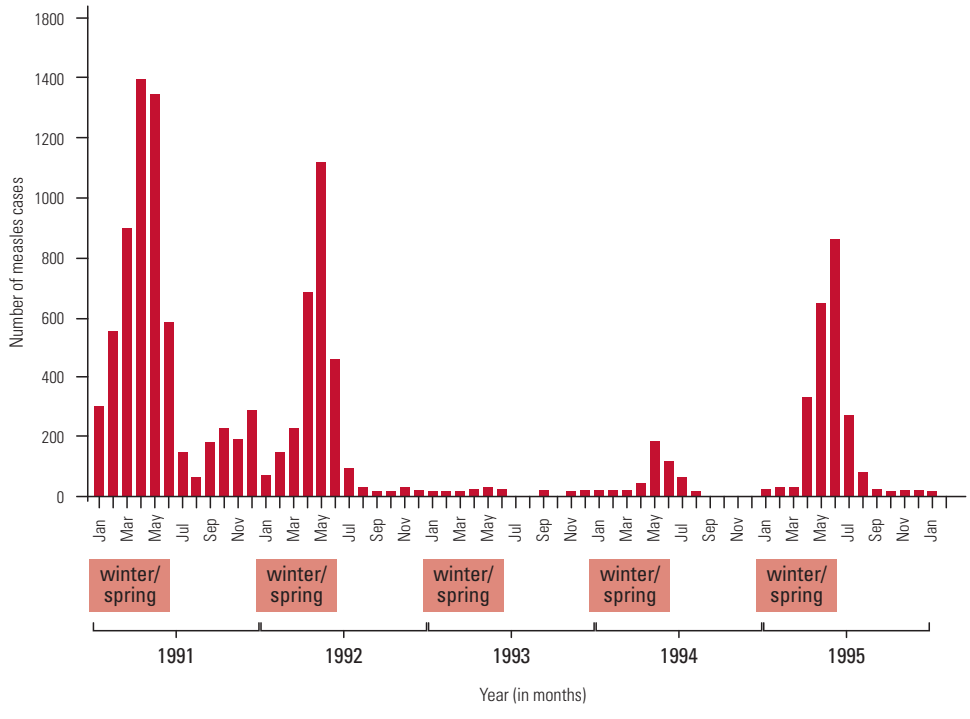
Data are often analysed with three questions in mind.

Is there a pattern over time ?

Extract the date of onset of symptoms for all reported cases. The number of cases occurring in a month or in a week is then calculated. This data is plotted with the weeks or months on the X axis and the number of cases on the Y axis. Any clustering of cases over the reporting periods (month or week) will immediately become visible. In case of some short but explosive outbreaks (e.g. cholera, ebola etc.) the number of cases by day may need to be plotted.

Seasonal variations in the incidence of some diseases (for example, influenza and measles) are more noticeable than for other diseases (such as tuberculosis). When immunization coverage increases, seasonal variations may become blurred.

Figure 8B. Number of measles cases per month. Country X, 1991-1995

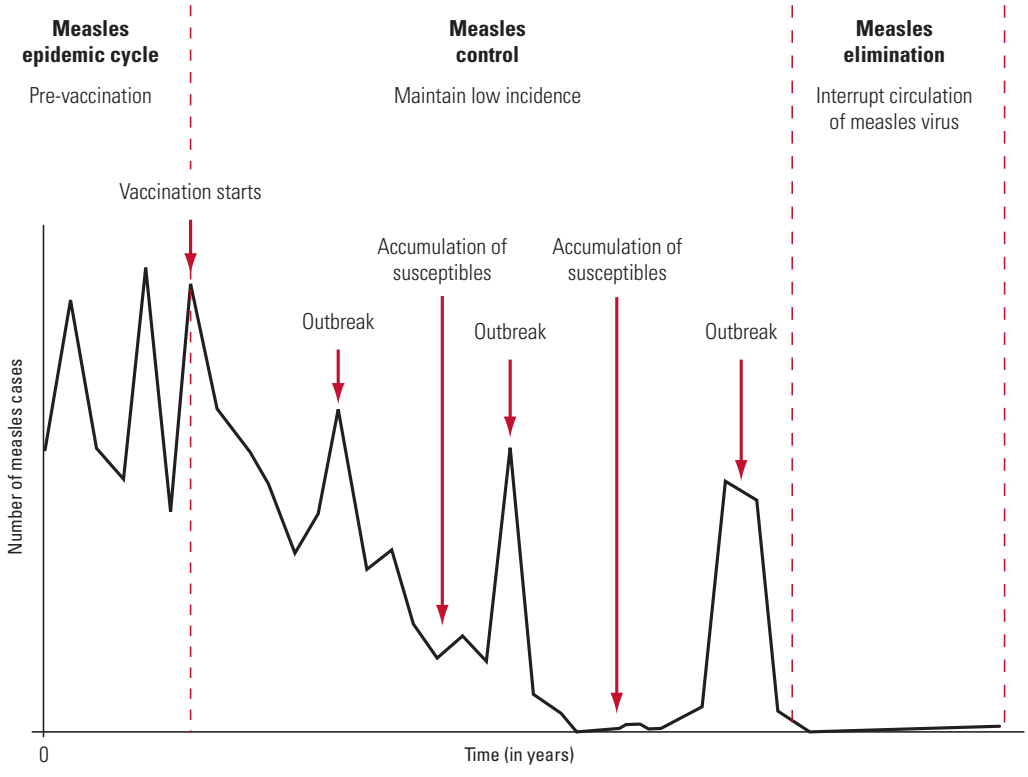


Some diseases naturally occur periodically as epidemic years followed by non-epidemic years. Typically, an epidemic year will be followed by one or more years with relatively few cases of the disease, until another epidemic year occurs. Increasing immunization coverage changes the epidemic pattern so that the time between epidemics increases.

When disease incidence reaches low levels due to effective immunization activities, the epidemic pattern might not be evident. In analysing surveillance data, consider the influence of epidemic patterns by asking yourself :

- How does this year's pattern compare with those of previous years ?
- Can the increase (or the decrease) be explained ? Consider interventions such as improvements in routine immunization coverage or mass immunization campaigns as shown in Figure 8C.

Figure 8C. Number of Measles cases per year and measles prevention strategies by year. Country X, 1940-2007



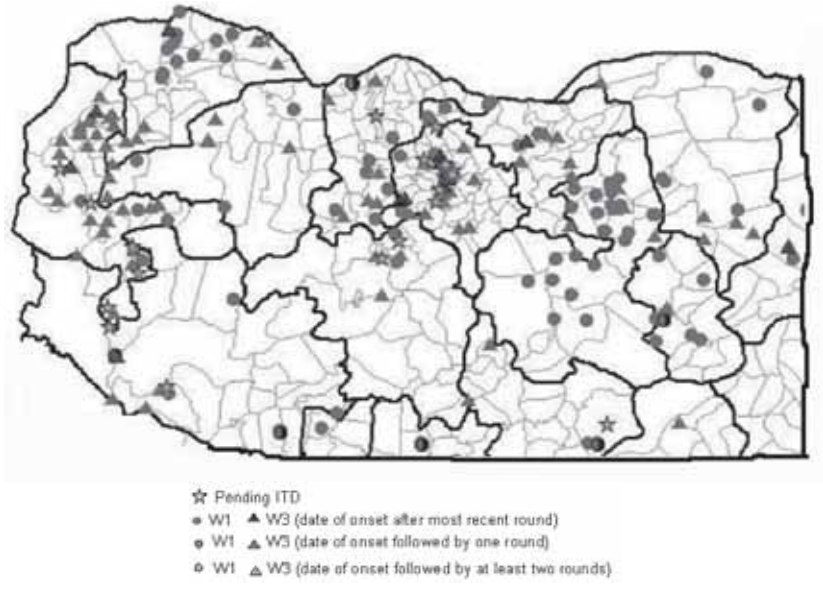
Analysis of disease data over a long period can show trends that are important for monitoring programme performance, such as a decrease in measles. Trend analysis by time can reveal patterns that can help in finding suitable control measures or predicting the likely extent of disease in the future.

Is there a pattern over place ?

The place where the case was residing at the time of onset of symptoms must be determined for all reported cases. The location of cases is then plotted on a map either manually or with the help of computerized mapping programmes. Any spatial clustering of cases will immediately become visible.

It is important to determine whether a group of cases is clustered in place and time. This is often best displayed by plotting the location of cases on a local map and writing the date of onset next to each case. This information can be used to guide interventions, such as immunization response.

Figure 8D. Distribution of AFP cases by provinces and type of virus. Country X, Jan -Dec. 2005



Is there a pattern by person ?

Minimal data on a case, describing the person affected by the disease (for example age, sex, immunization status and location) can help to target interventions appropriately.

Table 8.5 : Age and sex distribution of cases of 'mystery fever' in Village Fictitia

Age Sex	0-5 months	6-11 months	1-4 years	5-9 years	10-14 years	15-34 years	35-64 years	65+ years	Total
Male	0	0	0	2	10	35	24	1	72
Female	0	0	0	1	6	26	13	0	46
Total	0	0	0	3	16	61	37	1	118

From the above age and sex distribution, one can see : (a) males are more affected than females in the ratio of 2 :3 ; (b) very few cases in the young and the elderly, 98 of 118 (83%) cases are in the 15-64 age group with the greatest proportion 61 of 118 (52%) occurring in young adults 15-34 years of age. This distribution can be seen for example in communities who depend on contact with the forest to gather food or other forest produce and are therefore exposed to various insects (e.g. ticks) that live in the forest. Able-bodied young males are the population most at risk.

5.2 Taking action on surveillance reports and data analysis

It is important to determine whether the increase in the number of reported cases is due to an increase in disease incidence or to better reporting when a surveillance system is implemented in a region with no previous surveillance.

If an unusual increase in the number of cases of a vaccine-preventable disease is reported, action in the form of surveillance and immunization might be required. The nature of the surveillance and immunization responses is often determined by the disease and by national policies, many of which are listed in Annex 1.

The increase in cases might, however, be associated with problems in the immunization coverage or system, such as the cold chain or vaccine supply, which require a response. *Module 5 : Monitoring the immunization system* describes ways of solving problems in immunization systems that require urgent, medium- or long-term action.

Always look carefully for the underlying causes of reported increases in vaccine-preventable diseases in order to propose an effective intervention to control and prevent disease transmission.

The surveillance response may involve :

- searches for additional unreported cases (active search) ;
- detailed investigation of cases (case investigation form) ;
- confirmation of suspected cases (laboratory confirmation) ;
- analysis of data to understand the situation in time, place and person ;
- reporting conclusions and results of the analysis to appropriate levels ;
- taking suitable public health precautions to minimize spread of the disease ;
- treatment of cases and contacts appropriately.

Action may depend on the quality and detail of data on time, place and person, for example, whether full case investigations or only simple counts of cases are available.

Immunization response

The immunization response to an increase in the number of reported cases will vary greatly, depending on the disease and current policies. Some diseases, such as polio, require urgent, large-scale supplementary immunization, as recommended by global policy laid down by the World Health Assembly. For others, such as measles and neonatal tetanus, the magnitude of the immunization response depends on national or local policy (see Annex 1 and other disease-specific guidelines).

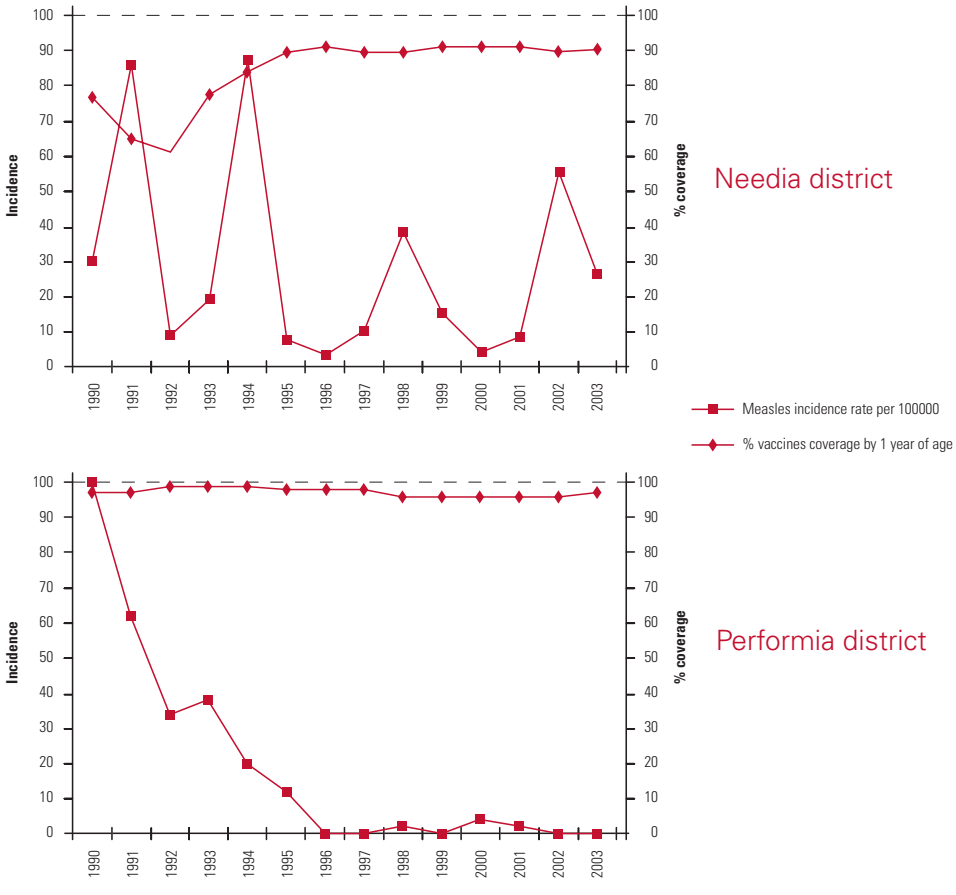
Outbreak response

The term 'outbreak' is generally used when the number of cases observed is greater than the number normally expected in a given geographical area during a given period. The definition can, however, vary depending on the nature of the disease and the disease control objectives.

When an increase in the number of cases is observed, you should determine whether the increase can be termed an 'outbreak' or an expected trend, for example by season. As an outbreak can trigger a previously determined set of activities, outbreak investigation and response are described separately in Annex 6.

Learning activity 8.4 : Data analysis and action

As mid-level manager in Activia Province, you regularly analyse data to monitor the performance of your immunization programme. The graphs below show measles immunization coverage and incidence in two of your districts :



Needia district

Performia district

Task 1 : What can you conclude so far about these two districts ?

Task 2 : What questions might you ask the district data manager to help you understand the graphs better ?

Task 3 : What further data analyses might be useful, and what data would be needed to perform them ?

Task 4 : What recommendations would you make to the (1) district data manager, (2) provincial surveillance officers, (3) Ministry of Health ?

6. Feedback

6.1 To reporting sites

Feedback to reporting sites encourages their continued involvement and commitment. Feedback can consist of urgent feedback for an outbreak or individual cases ; specific feedback such as the laboratory results of each case of acute flaccid paralysis in the Polio Eradication Programme ; or general feedback.

The main reasons for providing feedback are to :

- facilitate the use of data by providing an analysis in greater depth. For example, if the peripheral level is not computerized, the central level might provide computerized tables, graphs and maps.
- place local data in the context of regional data, to allow comparison of disease incidence and programme performance ; visualize the extent of outbreaks (localized or more generalized) ; allow enhanced surveillance and preventive measures in cases where disease is reported in the surrounding region but has not been seen in that area ; and improve performance by showing national progress towards public health goals and comparing performance between regions ;
- increase the motivation of data providers by acknowledging their hard work and making them aware that their data are analysed and used ;
- improve the accuracy and promptness of reports ;
- verify with the peripheral levels that the data received at more central levels are correct.

Methods of providing feedback are :

- periodic meetings and discussions with participation of mid-level manager and staff at peripheral levels ;
- supervisory visits to district level and health centres ;
- quarterly newsletters highlighting important achievements and problems ;
- talking to health centre staff when they visit the office of the mid-level manager.

6.2 To the community

As a mid-level manager, you should encourage your staff to inform communities about services, and always involve local politicians, religious leaders, school directors and teachers, community group leaders and parents in planning and implementing disease control activities, including immunization.

Community cooperation during house-to-house active searches is essential, as community members often can provide comprehensive, accurate information about travel and movement between communities that can be invaluable for mapping the spread of disease. Other ways of providing feedback to and involving the community are outlined in *Module 2 : Partnering with communities*.

6.3 Calculating vaccine effectiveness

It is often useful to be able to calculate vaccine effectiveness (also known as vaccine efficacy). This calculation is a useful tool for measuring how well a particular vaccine is working in the field. It is especially helpful for mid-level managers, as it may help them to identify problems in the quality of the programme, such as inadequate storage of vaccines.

Consider the example of Needia District in Learning activity 8.4, which appeared to have uncontrolled outbreaks of measles disease despite high immunization coverage. In your response, you should have identified the following possible reasons for this :

- incorrect coverage data
- incorrect disease data
- incorrect diagnosis of measles (that is, this was not an outbreak of measles but of some other clinically similar disease).

But did you consider that the data were correct and there really is an uncontrolled outbreak of measles disease despite high immunization coverage ? It is possible. One explanation might be that the measles vaccine was damaged due to poor storage, possibly in the Needia District store before being distributed to each health facility.

Calculating the vaccine effectiveness could clarify whether the situation in Needia District is due to a data problem, a diagnosis problem or a storage problem (in rare circumstances, it might be due to all three). To calculate vaccine effectiveness, you should use the following formula :

Figure 8E. Formula for calculating vaccine effectiveness

$$\text{Vaccine effectiveness} = 1 - \frac{[PCV(1 - PPV)]}{[(1 - PCV)PPV]}$$

Where :
PCV is the proportion of cases vaccinated
PPV is the proportion of the population that is vaccinated (i.e. vaccine coverage).

Warning : Mid-level managers must perform this calculation if they are concerned about the effectiveness of a vaccine, rather than relying on a visual assessment of the data, as visual assessment can be misleading.

For example : In Maxima Province, there is 95% measles immunization coverage (PPV) and 60% of measles cases are vaccinated against the disease (PCV). This may appear to be a high proportion, and possibly indicative of a vaccine effectiveness problem, but,

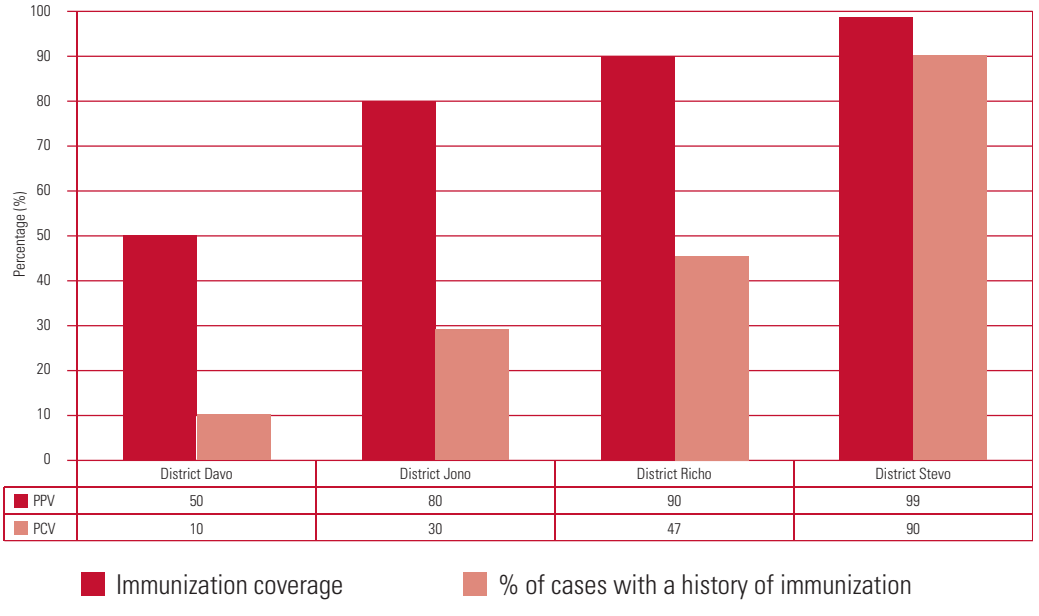
$$\text{vaccine effectiveness} = 1 - \frac{[0.6(1 - 0.95)]}{[(1 - 0.6)0.95]} = 1 - \frac{0.03}{0.38} = 1 - 0.08 = 0.92.$$

Therefore, the effectiveness of the measles vaccine in Maxima Province is 92%, which is satisfactory, and it is incorrect to blame the vaccine. This situation often occurs in areas where there is high immunization coverage.

Learning activity 8.5 : Calculating vaccine effectiveness

You are the mid-level manager in Batavia Province and are conducting a review of the immunization programme quality in four districts. You have noticed that Stevo District has a high proportion of measles cases in persons who have been vaccinated against the disease, and you decide to investigate. As well as reviewing other aspects of quality in each district, such as data, you decide to calculate vaccine effectiveness.

Task 1 : First, without calculating anything, look at the graph below and see if you can estimate which district has the highest vaccine effectiveness.



	District Davo	District Jono	District Richo	District Stevo
PPV	50	80	90	99
PCV	10	30	47	90

Task 2 : Now, using the formula in Figure 8E, calculate the vaccine effectiveness in each of the four districts of Batavia province.

Task 3 : Was your initial assessment correct ? If not, explain why you may have made a mistake. If your initial assessment was correct, describe how the vaccine effectiveness differs in each district and suggest reasons why this might be.

Annex 1 : Bibliography

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Annex 2 : Surveillance and response activities for selected vaccine-preventable diseases

Vaccine-Preventable Diseases	Disease control objectives	What symptoms should be reported (syndromic reporting)	Case definition	Recommended type(s) of surveillance	Investigation	Confirmation of the case	Data collection tools	Surveillance and immunization response	Use of data for decision-making
Polio	Eradication of the virus.	All cases of acute flaccid paralysis (AFP) should be reported.	(1) Any child under 15 years of age with sudden onset of floppy paralysis **OR** (2) any person of any age with paralytic illness if polio is suspected.	**Active :** all hospitals, clinics, and other sites seeing children are visited regularly to find AFP cases. All reported or rumoured outbreaks should be investigated immediately.	All AFP cases under 15 years of age or with paralytic illness at any age where polio is suspected should be reported immediately and investigated within 48 hours, and two stool specimens should be collected at least 24 hours apart within 14 days of the onset of paralysis.	**Laboratory :** Isolation of wild poliovirus in one or both the stool specimens. **Clinical :** Residual paralysis at 60 days, **OR** death before follow-up, **OR** lost to follow-up.	1.Case investigation form filled for each AFP case. 2. Line list all AFP cases. Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Surveillance :** Visit reporting sites and look for AFP cases in the area, including active search in the community. **Immunization :** Appropriate, large-scale, supplementary immunization activity in response to indigenous or imported wild poliovirus confirmed case. All children under 5 years of age regardless of immunization status.	- Track wild poliovirus circulation. - Monitor performance of surveillance (by means of the standard indicators) in all geographical areas and focus efforts in low-performing areas. - Monitor seasonality to determine low season of poliovirus transmission in the interest of planning national immunization days (NIDs). - Identify high-risk areas with a view to planning mop-up immunization campaigns. - Provide evidence to certification commissions of the interruption of wild poliovirus circulation.
Measles	Depending on the national/regional measles goal : 1. **Control phase :** control of disease and prevention of deaths. Reduce the number of measles deaths by 90% by 2010 (compared to 2000 estimates). 2. **Elimination phase :** Achieve and maintain interruption of indigenous measles transmission. Regional goals vary.	All cases of fever with rash should be reported and investigated.	(1) Any person in whom a clinician suspects measles infection, **OR** (2) Any person with fever **AND** maculopapular (non-vesicular) rash **AND** cough, coryza (runny nose) or conjunctivitis (red eyes).	**Control phase :** Routine monthly reporting of aggregated data on clinical measles cases : by location, age group and immunization status. **Elimination phase : Active** case-based surveillance should be conducted and every case should be reported and investigated immediately.	**Control phase :** Outbreaks should be investigated. During outbreaks it is useful to attempt to document measles mortality. Laboratory confirmation may be attempted by sampling approximately 5 to10 cases per outbreak. **Elimination phase :** Laboratory confirmation of every suspected case should be carried out. Samples for measles virus detection should be collected.	**Laboratory :** Presence of measles-specific IgM antibodies in the serum (in absence of measles vaccination within previous 6 weeks). Blood sample is collected within 28 days after rash onset. **Epidemiological :** A case that meets the clinical case definition and is linked epidemiologically to a laboratory confirmed case.	**Control phase :** Aggregate data on number of cases by location, age groups and immunization status **Elimination phase :** Case investigation form for each suspect measles case. All cases entered on a line list.	**Case management** **Surveillance :** Outbreak investigation, case management, active search for measles cases in the reporting sites. **Immunization :** Appropriate strengthening of routine EPI and/or follow-up campaigns as necessary.	**Control phase :** Monitor incidence and coverage to assess progress and identify areas at risk. Describe the changing epidemiology of measles in terms of age, immunization status and interepidemic period. Assist in determination of optimal age groups to be targeted by second opportunity for measles vaccination (including mass vaccination campaigns). **Elimination phase :** Identify chains of transmission. Monitor the epidemiology (age groups at risk, interepidemic period, status of measles) and accelerate immunization activities accordingly to avert potential outbreaks. **During all phases :** Detect and investigate outbreaks to ensure proper case management, and determine why outbreaks occurred (e.g. failure to vaccinate, vaccine failure or accumulation of susceptibles).
Neonatal Tetanus	Elimination of disease as a public health problem (i.e. less than 1 NT case per 1000 live births in every district).	All cases of neonatal deaths (deaths before a baby is 28 days old) should be reported.	Any neonate with normal ability to suck and cry during the first 2 days of life **AND** who, between 3 and 28 days of age, cannot suck normally **AND** becomes stiff or has spasms (i.e. jerking of the muscles).	**Active** surveillance in selected hospitals, in combination with AFP and measles.	**High Risk areas :** Investigate cases during and as part of the immediate response. **Low Risk areas :** Investigate all suspect cases.	**Clinical only,** based on symptoms and signs as in the case definition. No laboratory confirmation.	**Aggregate reporting of:** - Number of suspect NT cases and TT immunization status of mothers. **Case Investigation Form :** To be used for all cases coming from a low-risk area, and all cases still in hospital when the case is being reported. **Line list :** At district and superior levels. Minimum data : Unique case-identifier, name of mother, sex, address, DOB, date of onset, outcome, classification, doses of TT received by mother with dates.	**Surveillance :** Search for unreported cases in area where case is investigated. **Immunization :** Immunize mother with TT, as well as all eligible women in surrounding neighbourhood or village(s) of the case.	Monitor progress towards maternal and neonatal tetanus elimination in every geographical area (progress towards neonatal tetanus elimination is a proxy for maternal tetanus elimination) - Identify high-risk geographical area and conduct supplemental immunization activities. - Periodically verify the sensitivity of NT reporting by comparing the number of reported cases with cases identified through active surveillance, hospital record reviews, and active searches.
Diphtheria	Control of disease and prevention of epidemics.	Severely ill children with sore throat.	An illness characterized by laryngitis OR pharyngitis OR tonsillitis **AND** the presence of an adherent membrane of the tonsils, pharynx, and/ or nose.	Routine monthly reporting of aggregated data. **Active** surveillance in areas known to be at high risk or outbreak situation.	Investigate all suspect cases. Laboratory specimens where feasible.	**Clinical :** see case definition. **Laboratory :** Isolation of Corynebacterium diphtheriae from a clinical specimen (the membrane), **OR** a fourfold or greater rise in serum antibody (but only if both serum samples are obtained before the administration of diphtheria toxoid or antitoxin).	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Case management :** Institute appropriate anti-toxin and antibiotic treatment for cases and contacts. **Surveillance :** Search for unreported cases in area from where case is reported. **Immunization :** Immunize population of susceptible age group in affected area with DTP, DT, Td as appropriate.	- Determine age-specific incidence rate, geographical area and season of diphtheria cases to know risk groups and risk periods. - Detect and investigate outbreaks and implement control measures. - Monitor incidence rate to assess impact of control efforts.
Pertussis	Control of disease and prevention of deaths.	Children with persistent fits of coughing especially if accompanied by a 'whoop' at the end of each bout and vomiting.	A person with a cough lasting at least two weeks **AND** with at least one of the following symptoms : (1) Paroxysms (i.e. fits) of coughing, (2) Inspiratory whoop, or (3) post-tussive vomiting (i.e. vomiting immediately after coughing) without other apparent cause.	Routine monthly reporting of aggregated data. Active surveillance in areas known to be at high risk or outbreak situation.	Investigate all suspect cases. Laboratory specimens where feasible.	**Clinical : See case definition** **Laboratory :** Isolation of Bordetella pertussis from nasopharyngeal secretions OR positive paired serology.	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Case management :** Institute appropriate antibiotic treatment for cases and contacts. **Surveillance :** Search for unreported cases in area from where case is reported. **Immunization :** Immunize population of susceptible age group in affected area with pertussis- containing vaccine.	- Determine age-specific incidence rate, geographical area and season of pertussis cases to know risk groups and risk periods. - Detect and investigate outbreaks and implement control measures. - Monitor incidence rate to assess impact of control efforts.
Bacterial meningitis	Control of disease and prevention of deaths. Early detection of epidemics and implementing an appropriate response.	Any person with acute onset of fever (usually > 38.5° C rectal or 38.0° C axilliary), neck stiffness.	Bacterial meningitis is characterized by acute onset of fever (usually > 38.5° C rectal or 38.0° C axilliary), and one of the following signs : neck stiffness, altered consciousness or other meningeal signs. Hib, meningococcal meningitis and pneumococcal meningitis cannot be differentiated on clinical grounds alone.	1. Routine monthly reporting of aggregated data. 2. **Epidemic season :** routine weekly reporting of suspected and confirmed cases and **active** surveillance.	Investigate all cases, lumbar puncture with CSF specimen sent to lab.(blood sample where feasible). **Epidemic season :** lab confirmation of initial cases.	**Laboratory :** A child with a clinical syndrome consistent with bacterial meningitis AND either 1) Culture of CSF or blood, (2) Antigen detection of CSF or blood **OR** (3) Gram stain of CSF.	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Case management :** Institute appropriate antibiotic treatment for cases. **Surveillance :** Search for unreported cases in area from where case is reported. **Immunization (epidemic situation) :** Immunize population of susceptible age group in affected area with appropriate meningitis vaccine. Treat contacts.	During the epidemic season : 1. timely detection of epidemics. 2. provision of sufficient antibiotics for case management. 3. timely identification/confirmation of causal pathogen. 4. selection and provision of appropriate vaccine for epidemic response. At any time, to describe the epidemiology of bacterial meningitis by aetiological agent in order to : 1. determine the local disease burden (cases, deaths, disability).
Hepatitis B	Control of disease and prevention of deaths as a result of chronic infection.	Jaundice	An acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness. **Note :** Most infections occur during early childhood. A variable proportion of adult infections are asymptomatic.	Routine monthly reporting of aggregated data. **Active surveillance** in areas known to be at high risk or outbreak situation.	Normally not needed. Blood samples where feasible.	**Laboratory :** Positive for IgM anti-HBc **OR** hepatitis B surface antigen (HBsAg).	**Aggregate data :** on number of cases by location, age groups and immunization status of infants.	Case management	Monitor incidence rate to assess impact of control efforts.
Yellow fever	Control of disease and prevention of deaths. Early detection of epidemics and implementing an appropriate response.	Jaundice and fever	All cases characterized by acute onset of fever followed by jaundice within two weeks of the onset of the first symptoms.	Routine monthly reporting of aggregated data Active surveillance (case-based) in areas known to be at high risk or outbreak situation.	Investigate all suspect cases. Laboratory specimens where feasible. Specimens should be collected to confirm epidemics as rapidly as possible. Priority should then be given to collecting specimens from new or neighbouring areas (other than the areas where epidemics are already confirmed).	**Laboratory :** Presence of yellow-fever-specific IgM or a fourfold or greater rise in serum IgG levels (acute or convalescent) in the absence of recent yellow fever vaccination, **OR** isolation of yellow fever virus, **OR** detection of yellow fever virus genomic sequences in blood or organs by PCR. **Epidemiological :** A suspected case that is epidemiologically linked to a laboratory-confirmed case or outbreak.	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Case management** **Surveillance :** Search for unreported cases in area from where case is reported. When case is confirmed, outbreak investigation (including entomological investigation) to determine level of transmission, and type of outbreak (sporadic sylvatic case or urban outbreak). **Immunization :** Appropriate, supplementary immunization activity in the presence of continued virus transmission.	- Investigate suspect cases and collect laboratory specimens to confirm an outbreak and mobilize emergency immunization activities. - Identify areas at risk of a yellow fever outbreak so that preventive measures can be made before the outbreak occurs.
Mumps	Control of disease and prevention of deaths	Swelling of the parotid or other salivary gland.	Acute onset of unilateral or bilateral tender, self-limiting swelling of the parotid or other salivary gland, lasting 2 or more days and without apparent cause.	Routine monthly reporting of aggregated data.	Investigate all suspect cases. Laboratory specimens where feasible.	**Laboratory :** Isolation of mumps virus from an appropriate clinical specimen **OR** at least fourfold rise in serum mumps IgG **OR** positive serology for mumps-specific IgM antibodies.	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Case management** **Surveillance :** Search for unreported cases in area from where case is reported.	In countries where mumps is endemic, monitor the incidence and coverage to assess progress and identify areas at high risk or with poor programme performance. Detect and investigate outbreaks. In countries with a high level of control, monitor the epidemiology such as age groups at risk and the interepidemic period, and accelerate immunization activities according to potential outbreaks.
Rubella and Congenital Rubella Syndrome (CRS)	Prevention of congenital rubella syndrome (CRS)	All cases of fever with rash	**Rubella :** Fever maculopapular rash, cervical, suboccipital or postauricular adenopathy, or arthralgia/arthritis. **Suspected CRS :** an infant 0-11 months if mother has a history of rubella during pregnancy. **OR :** an infant 0-11 months with heart disease, and/or suspicion of deafness and/or one or more of the following eye signs : cataract, diminished vision, nystagmus, squint, smaller eyeball (microphalmus), or larger eyeball (congenital glaucoma).	**Control phase :** Routine monthly reporting of aggregated data on clinical CRS and rubella cases by location, age group and immunization status. **Elimination phase : Active** case-based surveillance should be conducted and every CRS case should be reported and investigated. Laboratory specimens should be collected from every suspect rubella case.	**Control phase :** Case investigation of suspected CRS cases 0-11 months ; Rubella outbreak investigation. **Elimination phase :** Same as control plus : immediate case investigation of all rash and fever cases, including collection of blood samples for laboratory confirmation.	**Laboratory :** CRS : an infant with clinically-confirmed CRS who has a positive blood test for rubella-specific IgM. Rubella : rubella-specific IgM.	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Control phase :** outbreak investigation and analysis. **Elimination phase :** Outbreak investigation plus search for and investigation of rash+fever cases in pregnant women. **Immunization all phases :** no immunization response indicated.	Understanding epidemiology and burden of CRS and its epidemiology to guide rubella immunization strategies. Investigate rash illness in pregnancy and follow up. Identify high-risk areas, age groups and populations for rubella immunization, linked with measles surveillance.
JE	Control of disease and prevention of deaths	Acute encephalitis syndrome (AES)	Febrile illness of variable severity associated with neurologic symptoms ranging from headache to meningitis or encephalitis. The encephalitis cannot be distinguished clinically from other central nervous system infections.	Areas where no JE transmission has been detected but where the vector is present : Surveillance for AES syndrome ; investigation of clusters with fever. Areas where disease is endemic with seasonal variation in transmission, and areas where epidemic JE is occurring : Routine monthly reporting of aggregated data. Active surveillance in areas known to be at high risk or outbreak situation.	All clustered fever cases with AES should be investigated and reported.	**Laboratory :** Presence of JE- specific IgM in a single sample of CSF or serum, as detected by a JE-specific IgM capture antibody ELISA, where cross-reactions to other flaviviruses have been excluded, **OR** detection of JE virus, antigen or genome in tissue, blood or other body fluid by immunochemistry or immunofluoroscence or PCR **OR** fourfold or greater rise in JE virus-specific antibody in paired sera through IgG, ELISA, haemagglutination-inhibition or virus neutralization test .	**Aggregate data :** on number of cases by location, age groups and immunization status of infants. **Case Investigation Form :** To be used where feasible. **Line list (all cases):** Should include the name, age, address, sex, immunization status, lab specimen collection dates and lab results, final classification and outcome.	**Case management** **Surveillance :** Search for unreported cases in area from where case is reported. **Immunization :** little role in an outbreak.	Understanding epidemiology and burden of JE. Identify areas of JE transmission. Identify the season of JE transmission. Plan JE immunization campaigns before the high season.

Annex 3 : Five steps in conducting an active surveillance visit

1. Where : Make a list of likely places in a hospital where cases will be recorded.

- emergency or casualty departments
- internal, general medicine, paediatric, orthopaedic wards
- outpatient clinics
- rehabilitation centres (especially for acute flaccid paralysis)

2. What : Identify which records should be consulted.

- inpatient records
- outpatient records
- admission registers
- discharge summaries
- death records

3. Who : Decide who to consult.

- doctors and nurses in children's wards
- outpatient staff

4. How : Decide how the information will be collected.

- form to collect data from records and reports
- case investigation forms
- list of standard case definitions

5. When : Plan a response if a case is found

If the patient is still in the hospital :

- Conduct a case investigation and complete the form.
- Take a laboratory specimen if relevant.
- Notify the case to the relevant authority according to national policy.
- Enter the data in a line list.

If the patient is no longer in the health facility :

- Collect as much information on the case as possible using a case investigation form.
- Schedule a visit to the case if this is feasible to complete the case investigation form.
- Collect a specimen for laboratory testing if still relevant.
- Decide whether reporting can be done immediately, or if more information is needed.

Annex 4 : Sample reporting forms

Form 1 : Example of an aggregated data form for computer-based data entry

Aggregate Reporting of Vaccine-Preventable Diseases From Province Level-2005

Province_____ Date Reported_____
Total Number of Reporting Units in Province_____ Number of Units Reporting this Month_____

Year 2005 Month	Aggregate Measles Reporting								Aggregate Case Counts for Other VPDs From All Reporting Sources					Adverse Events Following Immunizations (AEFI)			
	Routine Reporting		Outbreak Reporting			Measles/Rubella Lab											
	Number of Measles from routine	Number of Measles Deaths	Number of Measles Outbreak	Number of Cases from Outbreak	Number of Measles Deaths	Number of Samples Tested	Number of Lab Confirmed Cases		Neonatal Tetanus (NNT)	Diphthe-ria	Pertussis	Rubella	Encepha-litis	Number of Cases of AEFI	Number of Hospita-lizations	Number of Deaths	Antigen (s) Involved
							Measles	Rubella									
Column : 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
January																	
February																	
March																	
April																	
May																	
June																	
July																	
August																	
September																	
October																	
November																	
December																	
Total																	

State : _____
Report Date : _____/_____/_____
Reported by : _____ (Name)

Weekly Report
Line Listing of AFP Cases

Week No : _____
Beginning : _____/_____/_____
Ending : _____/_____/_____

Case ID Number (EPID Number)	State Code	District Name	Block Name	Religion (1)	Sex of child (2)	Date of birth (3)	Date Paralysis Onset (4)	Date Case Notif. (5)	Date Case Invest. (6)	Total Doses Invest. (7)	Date last OPV (8)	Fever at Onset (9)	Asym. Paral. (10)	Hot AFP case (11)	Date Collection Stool 1 (12)	Date Collection Stool 2 (13)	Date F/up Exam (14)	Result F/up Exam (15)	Final Dx (16)
IND-																			
IND-																			
IND-																			
IND-																			
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(1) Religion : H = Hindu / M = Muslim / O = Others
(2) Sex of child : M = Male / F = Female
(3) Date of birth
(4) Date of Onset of paralysis
(5) Date of case notification
(6) Date of case investigation
(7) Total doses OPV : 99 = Unknown
(8) Date of last OPV dose
(9) Fever at onset of paralysis : 1 = YES / 2 = NO / 9 = Unknown
(10) Asymmetric paralysis : 1 = YES / 2 = NO / 9 = Unknown
(11) Hot AFP case : 1 = YES / 2 = NO
(12) Date of first stool specimen collection from case
(13) Date of second stool specimen collection from case
(14) Date of follow-up clinical examination
(15) Results of follow-up : 1 = residual weakness / 2 = no residual weakness / 3 = lost to follow-up / 4 = died
(16) Final diagnosis : 1 = Guillain-Barre Syndrome / 2 = Transverse Myelitis / 3 = other / 9 = unknown

Form 3 : Example of an active surveillance chart for monitoring completeness of active surveillance for individual active surveillance sites (for acute flaccid paralysis, measles and neonatal tetanus)

	Week >	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reporting facility v															
	Date														
	Acute flaccid paralysis														
	Measles														
	Neonatal tetanus														
	Date														
	Acute flaccid paralysis														
	Measles														
	Neonatal tetanus														
	Date														
	Acute flaccid paralysis														
	Measles														
	Neonatal tetanus														

Instructions : Enter the date of the active surveillance visit and the number of cases found. Write '0' (zero) if no cases were found.

Example of a weekly aggregated active surveillance chart for monitoring completeness of active surveillance at all active surveillance sites (for acute flaccid paralysis, measles and neonatal tetanus)

Week >	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Disease v														
Acute flaccid paralysis														
Measles														
Neonatal tetanus														

Instructions : Consolidate the active surveillance data to show the number of cases of each disease found each week.

Annex 5 : Impact of the new International Health Regulations on surveillance of vaccine-preventable diseases in your country

What are the new International Health Regulations (2005) ?

The aim of the new regulations is to " prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade ".

The new regulations require that countries must notify WHO within 24 hours of :

- all events that may constitute a public health emergency of international concern within their territory, and
- any health measures implemented in response to these events.

Do the regulations mention any specific diseases of concern ?

The regulations specifically mention that every case of smallpox, wild polio, severe acute respiratory syndrome and human influenza caused by a new subtype must be notified. Yellow fever and a number of other diseases are of special interest, but not every case has to be notified.

Annex 6 : Outbreak investigation

6.1 Introduction

An investigation of a reported outbreak of any disease presents an opportunity to put into practice all the principles of surveillance described elsewhere in this module, including detection, investigation, confirmation, reporting, analysis and feedback. In addition, the mid-level manager may be responsible for taking action to prevent the spread of the outbreak.

The term 'outbreak' is generally used when the number of cases observed is greater than the number normally expected in a given geographical area during a given period. The definition can, however, vary, depending on the nature of the disease and the disease control objectives.

For example: In a country that is implementing a measles elimination programme, even a single case of measles constitutes an outbreak and should be responded to as such. That is, the number of cases observed (1) is greater than the number expected (0).

An outbreak investigation should be triggered by a suspected outbreak. Do not wait until the outbreak is confirmed, because that may be too late.

6.2 Steps in an outbreak investigation

Step 1. Visit the area concerned.

Alert your superiors to the suspected outbreak immediately, and inform them of any necessary resources you will need to investigate and control it. Before leaving for the field, ensure that all logistical, technical and administrative preparations have been made, including vehicles, fuel, funding, forms and travel approvals.

Step 2. Verify the diagnosis and confirm the existence of an outbreak.

Perform clinical examinations and undertake appropriate laboratory investigations of suspected cases. Use a disease-specific case investigation form, and complete one form per suspected case. The form should contain, as a minimum, the identification data, age, sex, immunization status, address, history, details of specimens taken and sent for laboratory investigation, results of investigation (filled in when these are received), outcome (recovered, sequelae, death), and final diagnosis. Details of disease-specific data collection tools and laboratory specimens are given in Annex 2.

Use the preliminary data to define the case clearly.

Step 3. Search for additional cases.

Sometimes the outbreak response is initiated after only one or two suspected cases have been found, and there may be cases that have not been reported. The search for and finding of unreported cases may determine what action should be taken even before these cases have been confirmed. The search for additional cases must include health facilities and the community.

- Health facilities: Visit the health facilities serving your catchment area. Talk to the doctors and nurses to see if they are seeing suspected cases of the disease you are investigating. Visit hospital wards and outpatient departments, and search all patient registers for cases that fit the case definition or diagnoses consistent with the disease under investigation.
- The community: Visit the communities from which cases were seen in the health facilities. Talk to community leaders and others who might have influence in the community. If feasible, organize a rapid house-to-house search of the affected area(s) to find similar cases.

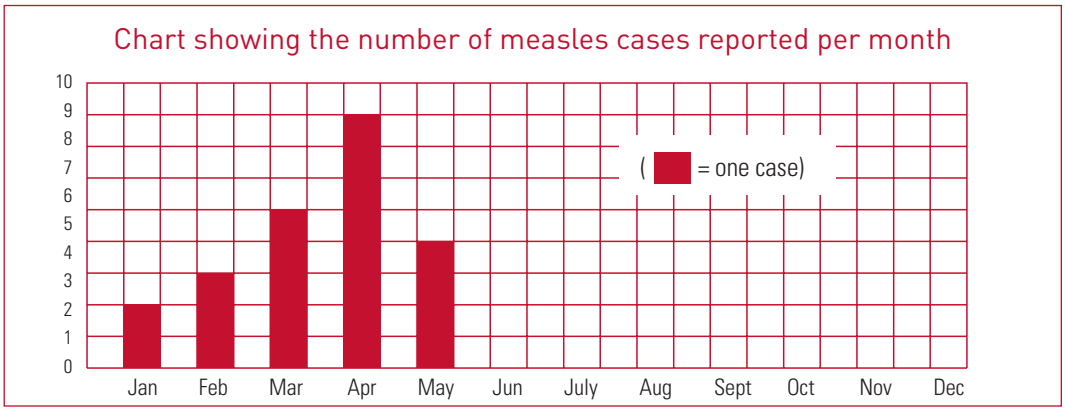
Alert all reporting sites in your catchment area and ask for daily reports of suspected cases. Determine the extent of the outbreak by visiting or calling health facilities in neighbouring areas. Depending on the disease, you might need to trace contacts.

Step 4. Describe the outbreak.

From the case investigation forms, create a line list with the name, age, address, sex and immunization status of each case. Include laboratory results as soon as these become available. Decide if sufficient laboratory results are available or whether more specimens are required; e.g. if a laboratory confirms the clinical diagnosis of measles in a suspected measles outbreak, specimens need not be collected from all cases; however, if the laboratory results show that the cases are due to rubella, more specimens might be needed to establish whether the outbreak is purely of rubella or a mixed measles and rubella outbreak.

Analyse the data on the case investigation forms. Draw an epidemic curve and a spot map. In addition, analyse the immunization status and ages of cases. Develop hypotheses about the source and spread of the disease. A detailed analysis will allow description of the chain of events leading to the outbreak and the progress of control measures.

Figure 8F. Example of an epidemic curve, or histogram



Source: *Immunization in practice: A practical guide for health staff*. Geneva, World Health Organization, 2004.

Step 5. Examples of outbreak responses

It is usually possible to manage an outbreak by implementing a range of activities, which include rapid identification of new cases, treatment or management of cases and sometimes segregation or isolation to prevent additional spread. Specifically, attention must be paid to:

- case management (e.g. administration of antibiotics for diphtheria cases and vitamin A for measles; exclusion of pertussis cases from school);
- surveillance and correction of problems in the surveillance system (e.g. active surveillance to find more cases; review of completeness of zero reporting and timeliness of reporting);
- identification of other problems in the immunization system (e.g. evaluation of components such as coverage, status of cold chain, training and availability of manpower at various levels).

Some outbreaks can be contained or halted by a rapid, focused, immunization response. The decision to respond to an outbreak by launching immunization is determined by national policy, usually based on international recommendations such as those listed in Annex 2 and the WHO-recommended standards for surveillance of selected vaccine-preventable diseases.

The following issues should be considered in preparing an immunization response to an outbreak:

- extent of the outbreak, including geographical considerations;
- starting date of the immunization campaign and the time available for completion;
- availability of adequate resources, transport, supplies, personnel and funds;
- a good logistics plan, details of the target population, vaccine supply and clear delineation of responsibility.

Step 6. Analyse the lessons learnt from the outbreak investigation and response, and write a report

One of the most important parts of an outbreak investigation is ensuring that the lessons learnt are communicated and acted upon. These lessons might refer to:

- surveillance quality (e.g. implement zero reporting in every health centre);
- performance of the immunization system (e.g. district immunization staff require training in stock management and storage);
- preparedness for an outbreak (e.g. guidelines for outbreak investigation and response needed);
- management of the outbreak, including investigation, response, problems with the immunization system (e.g. consider developing guidelines for an immunization response to measles outbreaks; implement a packaging policy; evaluate refrigeration requirements).

The report should include details of the outbreak, the investigation, the response to date, problems identified in the immunization system that are related to the outbreak, and recommendations to prevent further outbreaks.

Annex 7 : Revision exercises

Learning activity 8.6 : Strengthening the surveillance system

You are the immunization manager in a province with a population of 2 000 000. Every year, a few cases of diphtheria are reported during the winter (first quarter of the year). This year, you notice that the number of reported cases in the first two months has risen to a total of 60 cases and six deaths, which is beyond what was expected.

Details of 60 cases of diphtheria in first quarter of the year			
Age (years)	No. of cases	% of all cases	No. of deaths
0 - 4	3	5	0
5 - 9	9	15	2
10 - 14	15	25	1
15 - 40	33	55	3
Total	60	100	6

Task 1 : What additional data do you need ?
Task 2 : What analysis should you conduct ?
Task 3 : What are the possible reasons for the outbreak ?
Task 4 : What action should you take ?

Revision exercise

You are the mid-level manager in Niallo Province and have been asked to help improve the existing vaccine-preventable disease surveillance system, which is functioning poorly. The system relies on government health workers sending reports; however, they are rarely completed and often arrive late. You have heard that there are outbreaks of disease but have never received an official report.

Task 1 : For each of the seven steps outlined in this module, recommend and describe one strategy that will help improve vaccine-preventable disease surveillance quality in your province.

For each of the seven steps, recommend and describe one strategy that will help improve surveillance quality.		
1	Detection	
2	Case investigation	
3	Confirmation of the diagnosis	
4	Reporting	
5	Analysis and action	
6	Feedback and monitoring quality	
7	Outbreak investigation	

The World Health Organization has provided technical support to its Member States in the field of vaccine-preventable diseases since 1975. The office carrying out this function at WHO headquarters is the Department of Immunization, Vaccines and Biologicals (IVB).

IVB's mission is the achievement of a world in which all people at risk are protected against vaccine-preventable diseases. The Department covers a range of activities including research and development, standard-setting, vaccine regulation and quality, vaccine supply and immunization financing, and immunization system strengthening.

These activities are carried out by three technical units: the Initiative for Vaccine Research; the Quality, Safety and Standards team; and the Expanded Programme on Immunization.

The Initiative for Vaccine Research guides, facilitates and provides a vision for worldwide vaccine and immunization technology research and development efforts. It focuses on current and emerging diseases of global public health importance, including pandemic influenza. Its main activities cover: i) research and development of key candidate vaccines; ii) implementation research to promote evidence-based decision-making on the early introduction of new vaccines; and iii) promotion of the development, evaluation and future availability of HIV, tuberculosis and malaria vaccines.

The Quality, Safety and Standards team focuses on supporting the use of vaccines, other biological products and immunization-related equipment that meet current international norms and standards of quality and safety. Activities cover: i) setting norms and standards and establishing reference preparation materials; ii) ensuring the use of quality vaccines and immunization equipment through prequalification activities and strengthening national regulatory authorities; and iii) monitoring, assessing and responding to immunization safety issues of global concern.

The Expanded Programme on Immunization focuses on maximizing access to high quality immunization services, accelerating disease control and linking to other health interventions that can be delivered during immunization contacts. Activities cover: i) immunization systems strengthening, including expansion of immunization services beyond the infant age group; ii) accelerated control of measles and maternal and neonatal tetanus; iii) introduction of new and underutilized vaccines; iv) vaccine supply and immunization financing; and v) disease surveillance and immunization coverage monitoring for tracking global progress.

The Director's Office directs the work of these units through oversight of immunization programme policy, planning, coordination and management. It also mobilizes resources and carries out communication, advocacy and media-related work.

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