



Self-Learning Package - English language course

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Main Topic: SMALLPOX

Sub-Topic: BASIC EPIDEMIOLOGY, SURVEILLANCE AND CONTAINMENT

Relation to functions of an epidemiologist

Among the functions of an epidemiologist are directing and if necessary improving the surveillance system, diagnosis of cases, analysis of data, and formulating, initiating and evaluating control measures.

Educational Objective (Ref. No. 8.5)

After studying this document and working through the exercises you should be able to describe the basic epidemiology, surveillance and control measures of smallpox relevant to the current global situation.

Part A. Diagnosis and Epidemiology

First: read reference documents 1 and 2.

1. What are the following basic characteristics of smallpox:*

Causative Agent:

Mode of transmission:

Incubation period:

Prodromal symptoms and duration:

Stages of rash and duration:

Distribution of rash:

2. Complete the following table of aids to the differentiation of smallpox and chickenpox.

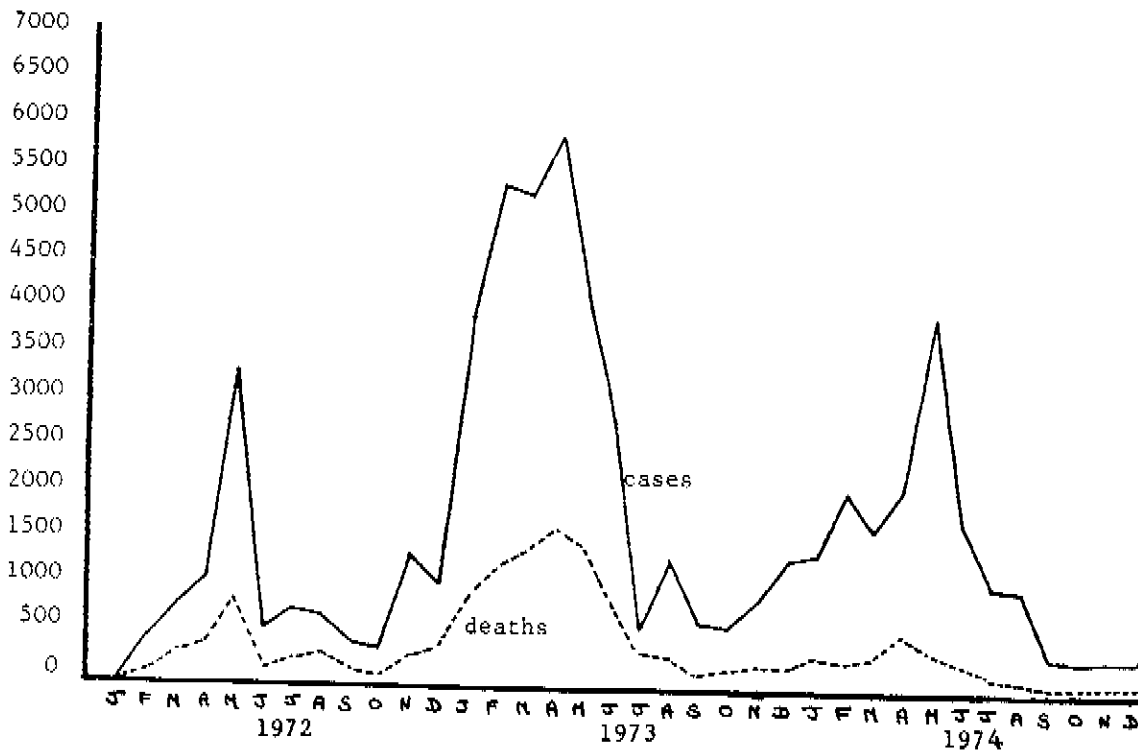


* The correct answers to all exercises may be found at the end of this document.

Feature	Smallpox	Chickenpox
Fever		
Appearance of rash		
Stages of rash		
Distribution of rash		
Duration of illness		

Figure 1

Cases and deaths



3. Figure 1 shows the number of smallpox cases and deaths for the period 1972-1974 in a certain country. Assume that it is now 1 January 1975. Government health planners have decided that the major effort in smallpox control in 1975 (including a nation-wide house-to-house search utilizing all health workers) should be launched in April, the month of maximum incidence in previous years. The Minister of Health has requested your advice with respect to this plan.

Summarize (in 10 lines) your recommendations and the reasons behind them.

Part B. Surveillance

First: read reference documents 3, 4, 5 and 6.

To adequately monitor the smallpox situation in a country it was often necessary to modify the routine disease reporting system (primary surveillance) and to introduce methods specifically for detection of smallpox (secondary surveillance).

1. List four features essential in a effective primary surveillance system for smallpox.
2. List six secondary surveillance methods which proved suitable for smallpox surveillance in India and Bangladesh.

Answers to the exercises

Part A. Diagnosis and Epidemiology

1. What are the following basic characteristics of smallpox:

Causative agent: Variola virus.

Mode of transmission: Human to human - close contact.

Incubation period: 7-17 days.

Prodromal symptoms and duration: Fever, headache, body aches 2-4 days.

Stages of rash and duration: Macules (1 day), papules (2 days), vesicles (2 days), pustules (6-7 days), scabs (1 month). Refer to reference document 2.

Distribution of rash: Maximum face and extremities.

2. Complete the following table of aids to the differentiation of smallpox and chickenpox.

Feature	Smallpox	Chickenpox
Fever	2-4 days before rash.	Occurs at same time as rash.
Appearance of rash	Rash appears in 1-2 days.	New lesions appear over many days.
Stages of rash	Similar stage of rash at any one time on any one part of the body.	Different stages of rash at same time.
Distribution of rash	Maximum face and extremities.	Maximum on body.
Duration of illness	3 weeks +.	10-14 days.

3. Figure 1 shows the number of smallpox cases and deaths for the period 1972-1974 in a certain country. Assume that it is now 1 January 1975. Government health planners have decided that the major effort in smallpox control in 1975 (including a nation-wide house-to-house search utilizing all health workers) should be launched in April, the month of maximum incidence in previous years. The Minister of Health has requested your advice with respect to this plan.

Summarize (in 10 lines) your recommendations and the reasons behind them.

Maximum surveillance and containment effort should be launched as early as possible in 1975 while disease incidence is low, i.e. a smaller number of outbreaks will require containment in order to break the chain of transmission. Surveillance effort should also

be maximized - the lower the incidence the greater must be the effectiveness of surveillance in order to detect outbreaks. The aim should be to interrupt transmission before the predicted seasonal increase commences.

Part B. Surveillance

1. List four features essential in an effective primary surveillance system for smallpox.
 - (a) Complete geographical coverage.
 - (b) Specific smallpox reporting (i.e. not combined with other diseases).
 - (c) Regularity - weekly reports with monitoring and action on default.
 - (d) Routine "nil" reporting in the absence of disease.
2. List six secondary surveillance methods which proved suitable for smallpox surveillance in India and Bangladesh.
 - (a) Periodic systematic house-to-house searches.
 - (b) Full-time smallpox surveillance teams.
 - (c) Market searches.
 - (d) School searches.
 - (e) Use of other health programme workers, e.g. malaria programme.
 - (f) Publicity of reward for reporting smallpox.
3. What was the single most important parameter used to monitor the success of smallpox eradication programmes?

The number of cases reported. NOT reports of programme activities - e.g. vaccinations performed, vaccination coverage, immunity levels.

4. What additional parameters proved useful in India and Bangladesh?
 - (a) Number of outbreaks or "infected villages".
 - (b) Detection or surveillance interval.
 - (c) Containment interval.
 - (d) Percentage of outbreaks for which the source of infection could be positively identified.
5. It is probable that the reported number of smallpox cases in any country does not reflect the true incidence of the disease. Design a survey to estimate the actual incidence of variola major in a country during the past 10 years and show how this could be used to assess surveillance effectiveness over the same period.

Complete answer: reference 6.

Main steps involved:

- (a) Select appropriate sampling method and sample.

- (b) Examine sample for facial pockmarks according to the stated definition.
 - Record age of persons and year of smallpox attack.
- (c) Extrapolate findings to entire population:
 - for each age group,
 - for each year of smallpox attack.
- (d) Correct survey findings for:
 - case fatality,
 - loss of facial pockmarks,
 - general mortality,
 - age distribution of smallpox cases.
- (e) Estimate number of cases occurring by year.
- (f) Compare estimate with reported number of cases by year.

Part C. Control Measures

1. A smallpox case has been reported in the capital city of your country. List five headings under which the necessary emergency action may be organized.
 - (a) Isolation of patient and laboratory specimen collection.
 - (b) Vaccination of all persons in area of detection of the case and area of isolation.
 - (c) Identification, tracing vaccination and surveillance of contacts.
 - (d) Contact with all medical institutions and doctors.
 - (e) Publicity.
2. List at least five points which must be established in your interview with a suspect smallpox case.
 - (a) Exact nature of symptoms.
 - (b) Exact date of onset of symptoms.
 - (c) Any known contact with person with similar illness.
 - (d) Persons contacted from 18 days prior to rash until present.
 - (e) Places visited (even briefly) during same period.
 - (f) Smallpox vaccination history.
3. Define a "contact".

A person who has been in such association with an infected person or a contaminated environment as to have had opportunity to acquire the infection. In tracing contacts of a case of smallpox, persons who may have had possible simultaneous exposure with the case and persons who may have been infected by the case should be located. Persons who were in any of the following categories in the time period from 18 days before the onset of the case's symptoms until he is no longer infectious should be considered contacts:

- (a) Any person who had face-to-face contact with the case.
- (b) Any person who travelled on the same conveyance with the case.
- (c) Any person in the same residence with the case.
- (d) Staff members of hotels or restaurants visited by the case.

Part D. Vaccination

1. It is found that in your country many smallpox vaccinations are not successful; apparently the vaccine is not of consistently good quality. List three steps you would take to overcome this problem.
 - (a) Ensure use of freeze dried vaccine only.
 - (b) Ensure adequate storage conditions.
 - (c) Ensure regular testing of vaccine by WHO reference laboratory.
2. Considering that no smallpox case has occurred in your country for some years, what do you feel is a reasonable official policy toward smallpox vaccination? (one or two sentences)

Routine smallpox vaccination should not be continued. The benefits of routine vaccination are, in the absence of smallpox, outweighed by the risk of complications.

3. List three major complications of smallpox vaccination.
 - (a) Encephalitis.
 - (b) Vaccinia necrosum.
 - (c) Eczema vaccinatum.