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SMALLPOX ERADICATION PROGRAMME

Report by the Director-General



This report on the programme includes the conclusions and recommendations of the Global Commission for the Certification of Smallpox Eradication, which in December 1979 certified that smallpox has been eradicated from the world. The report of the Global Commission explains the rationale for this conclusion and includes recommendations for future action to ensure that the world remains smallpox-free.

No smallpox for 26 months

1. The world has now enjoyed 26 months of freedom from endemic smallpox; the last case occurred in Somalia in October 1977. Neither special surveillance activities in the last endemic countries nor investigation of suspect cases and rumours elsewhere in the world have revealed any endemic smallpox since then.
2. A laboratory-associated outbreak comprising two smallpox cases occurred in the United Kingdom in 1978 and was quickly contained.

Certification activities

3. The Director-General formed the Global Commission for the Certification of Smallpox Eradication in 1978 at the request of the Executive Board at its sixty-first session.¹ At its first meeting, in December 1978, the Global Commission singled out 79 countries that required special certification procedures because of the occurrence of endemic smallpox in recent years, because of the risk of importation of smallpox leading to the possible establishment of endemic foci, or because the data were inadequate for a proper assessment of the smallpox situation. Of these, 64 countries were certified free of endemic smallpox by December 1978 and the remaining 15 countries were certified during 1979. In addition, declarations have been received from 121 countries and areas attesting to their smallpox-free status.

Global Commission meeting and the final report

4. The Global Commission met in December 1979, reviewed all the available data, and concluded that global smallpox eradication has been achieved. During this meeting the Global Commission prepared its final report, a comprehensive document that covers conclusions, recommendations, and strategies in the intensified smallpox eradication programme, implementation of the programme, and possible sources for a return of smallpox. Details are given of the exhaustive studies carried out before the Commission certified that a country was free of smallpox. A large amount of statistical data relevant to the smallpox

¹ Resolution EB61.R10.

eradication programme is annexed to the report. The Global Commission made recommendations about the discontinuation of smallpox vaccination and about measures ensuring that the world maintains its smallpox-free status.

5. The table of contents, the summary, the conclusions, and the recommendations of the final report of the Global Commission are attached (see Annex). The complete report is at present available in English only for those who may wish to examine it; its translation into other languages is in progress.

6. The Director-General considers that the Global Commission's report provides satisfactory evidence that smallpox has been eradicated from the world, and that the recommendations made in the report are comprehensive enough to ensure the permanence of eradication.

Changes in vaccination policy

7. Vaccination policy in individual countries has been changing as the certification of global smallpox eradication came nearer. Smallpox vaccination is no longer obligatory in 49 countries. In 166 countries and areas smallpox vaccination certificates are not required from any traveller. However, 34 countries still require vaccination certificates.

Research on orthopoxviruses

8. During June and July 1979 a special team consisting of national and WHO personnel conducted ecological and virological studies in northern Zaire to collect information on human monkeypox virus and related orthopoxviruses. Two WHO collaborating centres continued to produce genome maps of certain orthopoxviruses. All these studies confirm that there is no animal reservoir of smallpox.

Laboratories retaining variola virus stocks

9. Of 76 laboratories holding variola virus stocks in 1976 only seven remain (two in the United States of America and one each in China, the Netherlands, South Africa, the United Kingdom and the USSR). In April 1979 officials of these laboratories and of the national control authorities concerned met in Geneva to review safety measures. Each of the laboratories was visited by a WHO inspection team to verify that the virus is being kept under safe conditions. Efforts are continuing to reduce the number of laboratories holding virus stocks.

10. The need to hold laboratory stocks of variola virus in the post-eradication era was considered in February 1979 by a small group of scientific experts not themselves engaged in research with the virus. They concluded that the preservation of such stocks in a limited number of WHO-approved laboratories was justified on scientific grounds, but recommended that the position should be reviewed again early in 1982.

EXCERPTS FROM THE FINAL REPORT OF THE GLOBAL COMMISSION FOR
THE CERTIFICATION OF SMALLPOX ERADICATION

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1. SUMMARY

Smallpox, described by the historian Macaulay as "the most terrible of all the ministers of death", has been a scourge of mankind since ancient times. Repeated epidemics have swept across the world, decimating populations and altering the course of history. Not until Jenner demonstrated that inoculation with cowpox would protect against smallpox was there hope that the disease could be controlled. Jenner himself foresaw the eradication of smallpox, yet, 170 years later, despite improvements in the preparation of vaccine and its widespread use, smallpox persisted in many parts of the world.

The World Health Assembly, from the time of its first meeting in 1948, expressed increasing concern about smallpox. In 1958 it reviewed the question of the eradication of smallpox from the world and in 1959, emphasizing the urgency of achieving eradication, it recommended that smallpox-endemic countries should launch special programmes for that purpose. A number of countries became smallpox-free during the following years, but in the major

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endemic areas of Africa south of the Sahara, Brazil, and South-East Asia little progress towards eradication had been made. In 1966 the Nineteenth World Health Assembly decided that an intensified programme was necessary, financed from the regular budget of the Organization, and it requested Member States and multilateral and bilateral agencies to provide additional assistance.

The overall development and coordination of the intensified programme were carried out by a smallpox unit established at WHO headquarters in Geneva, which worked closely with WHO staff at regional offices and, through them, with national staff and WHO advisers at country level. Earlier programmes had been based on a mass vaccination strategy. The intensified campaign called for programmes designed to vaccinate at least 80% of the population within a period of two or three years, during which time reporting systems and surveillance activities would be developed that would permit detection and elimination of the remaining foci of the disease. Support was sought and obtained from many different governments and agencies.

Progress was slow in some countries but rapid in others. The countries of west and central Africa became smallpox-free in 1970, Brazil in 1971, Indonesia in 1972, and the countries in eastern and southern Africa in 1973. Major campaigns by the countries of the Indian subcontinent, with increased WHO support, achieved eradication there between 1973 and 1975. Finally, in the Horn of Africa, Ethiopia became smallpox-free in 1976 and Somalia in 1977.

Two years or more after the national programmes had achieved eradication, and following a period of intensive surveillance, each country in which smallpox had been endemic in 1967 or after, and other countries at special risk of importations of cases of the disease, were visited by an international commission. The commissions reviewed all aspects of the programmes, particularly the surveillance component, to assess the capability of the country's health services to detect continuing smallpox transmission. Among the aspects considered were the effectiveness of the reporting system, data from surveys of persons to detect facial pockmarks, and the laboratory results for specimens collected from chickenpox cases and suspected smallpox cases. The awareness of the population about smallpox and, where appropriate, their knowledge of the reward for reporting smallpox cases were also assessed. Commission members conducted field studies that extended to many parts of each country before certifying that the country was smallpox-free.

In 1978 the Global Commission for the Certification of Smallpox Eradication was formed. This Commission reviewed all previous certification activities and recommended additional programmes for obtaining sufficient information from each country to permit it to be recognized as smallpox-free. A number of countries known to have been infected in the recent past were visited by WHO consultants or staff and special programmes were developed to assess the quality of the evidence that no smallpox had occurred since the last reported case.

The Global Commission also considered the question of the possible re-establishment of smallpox infection from virus held in laboratories or from natural or animal reservoirs. All escapes of variola virus from laboratories have been well contained. Because of the great reduction in the number of laboratories holding variola virus and the strict containment conditions required of the laboratories, the risk of escapes is now considered minimal. Dried crusts and variolators' stocks provided a natural reservoir in which variola virus could survive for some months, but the passage of several years since the last case of smallpox also renders this risk negligible.

From the outset of the intensified campaign special attention was paid to the possibility that there was an animal reservoir of variola virus. No evidence of such a reservoir has been found. However, 45 cases of a new human disease resembling smallpox clinically have been discovered since 1970 in west and central Africa. It is caused by a distinct species of orthopoxvirus called monkeypox virus. Although cases of presumed human-to-human transmission of monkeypox virus have been recorded, this virus is genetically different from variola virus and is not believed to have the potential for epidemic spread.

As a result of its deliberations in December 1979, the Global Commission concluded that global eradication of smallpox had been achieved and made a number of recommendations for WHO policy in the post-eradication era. They include the discontinuation of smallpox vaccination, continuing surveillance of monkeypox in west and central Africa, supervision of the stocks and use of variola virus in laboratories, and a policy of insurance against the return of the disease that includes thorough investigation of reports of suspected smallpox, the maintenance of an international reserve of freeze-dried vaccine under WHO control, and measures designed to ensure that laboratory and epidemiological expertise in human poxvirus infections should not be dissipated.

2. CONCLUSIONS AND RECOMMENDATIONS

2.1 Conclusions

The Global Commission concludes that:

1. smallpox eradication has been achieved throughout the world;
2. there is no evidence that smallpox will return as an endemic disease.

2.2 Recommendations: policy for the post-eradication era

Vaccination policy

Smallpox vaccination of the general public. As smallpox has been eradicated, smallpox vaccination is no longer justified. Because vaccination may result in serious complications, which are occasionally fatal, no one except investigators at special risk should be vaccinated in any country, including those where monkeypox cases have occurred.

RECOMMENDATION (1). Smallpox vaccination should be discontinued in every country except for investigators at special risk.

Smallpox vaccination certificates for international travellers. With the certification of global eradication of smallpox, no country should now require vaccination certificates from international travellers.

RECOMMENDATION (2). International smallpox vaccination certificates should no longer be required of any travellers.

Reserve stocks of vaccine

Although human-to-human transmission of smallpox has been interrupted everywhere and the Global Commission believes that the likelihood of reintroduction of smallpox from laboratories or natural or animal reservoirs is negligible, it is prudent for WHO and national health authorities to be prepared for unforeseen circumstances. One measure that should be taken is to ensure that adequate reserves of potent freeze-dried vaccine are available. This vaccine should be stored at -20°C and its potency periodically checked. Seed lots of vaccinia virus for the further preparation of vaccine should be maintained, and stocks of bifurcated needles should be available.

RECOMMENDATION (3). Sufficient freeze-dried smallpox vaccine to vaccinate 200 million people should be maintained by WHO in refrigerated depots in two countries, together with stocks of bifurcated needles.

RECOMMENDATION (4). The stored vaccine should be periodically tested for potency.

RECOMMENDATION (5). Seed lots of vaccinia virus suitable for the preparation of smallpox vaccine should be maintained in designated WHO collaborating centres.

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RECOMMENDATION (6). National health authorities that have vaccine stocks should be asked to inform WHO of the amount of vaccine maintained.

Investigation of suspected smallpox cases

Experience in many countries indicates that reports of suspected cases of smallpox can be expected to be received from many sources for several years after the certification of global eradication. The importance of thorough investigation of these reports, if necessary with laboratory testing, is illustrated by the fact that one such report led to the recognition of human monkeypox. It is also important that public confidence in the fact of eradication should be maintained by thorough and prompt investigation of all reports and disclosure of the results to health officials throughout the world.

Suspected smallpox cases should therefore be investigated by experienced personnel. WHO should provide an effective system to promote, coordinate, and participate in the investigation of suspected smallpox cases. The international smallpox rumour register that was established by WHO in Geneva in January 1978 should be maintained.

The reward of US\$ 1000 established by the Director-General in 1978 in accordance with resolution WHA31.54 should be discontinued, since global eradication has now been certified.

RECOMMENDATION (7). In order to maintain public confidence in the fact of global eradication, it is important that rumours of suspected smallpox, which can be expected to occur in many countries, should be thoroughly investigated. Information should be provided to WHO, if requested, so that it can be made available to the world community.

RECOMMENDATION (8). WHO should maintain an effective system to coordinate and participate in the investigation of suspected smallpox cases throughout the world. The international smallpox rumour register should be maintained.

Laboratories retaining variola virus stocks

A committee of experts meeting in February 1979 advised the Global Commission that it was necessary for scientific reasons to preserve stocks of variola virus in a few laboratories, but that the position should be reviewed in 1982. In view of the potential danger of reintroduction of smallpox from variola virus stocks held in laboratories, no more than four WHO collaborating centres should be approved as suitable for the storage of and work with variola virus in accordance with WHO safety standards. These WHO collaborating centres should report annually to WHO and their containment facilities should be periodically inspected to ensure that storage is secure and that safe operating conditions are maintained. All other laboratories should be asked to destroy any stocks of variola virus that they hold, or transfer them to an approved WHO collaborating centre.

RECOMMENDATION (9). No more than four WHO collaborating centres should be approved as suitable to hold and handle stocks of variola virus. A collaborating centre would be approved only if it had adequate containment facilities. Each such centre should provide WHO with relevant information on their safety measures annually and should be inspected periodically by WHO.

RECOMMENDATION (10). Other laboratories should be asked to destroy any stocks of variola virus that they hold, or transfer them to an approved WHO collaborating centre.

Human monkeypox

Human monkeypox is a rare zoonosis that was not recognized until smallpox was eliminated from the area where it occurs. Clinically it resembles smallpox. Human cases can be expected to appear where the ecological conditions are appropriate and perhaps to show some increase as smallpox vaccination ceases and immunity wanes. Because it is caused by a poxvirus distinct from variola virus and has a limited capacity to spread between humans, monkeypox virus does not constitute a threat to the permanence of smallpox eradication. However, it is important that close surveillance of human cases should continue and that further investigation should be made into the natural history of the disease.

RECOMMENDATION (11). In collaboration with country health services, WHO should organize and assist a special surveillance programme on human monkeypox, its epidemiology, and its ecology in areas where it is known to have occurred. The programme should continue until 1985, when a further assessment of the situation should be made.

Laboratory investigations

There are still some important unsolved virological problems that are relevant to smallpox eradication, especially in relation to the "whitepox" viruses. The solution of those problems and preparedness for unexpected problems that might arise in relation to smallpox or other poxvirus diseases of man call for the maintenance of suitable virological expertise.

Besides encouraging scientists in various nations to continue research on orthopoxviruses, WHO has responsibility for the regular testing of the potency of the WHO vaccine reserves and for the provision of laboratory diagnostic facilities for suspected smallpox cases. It can best discharge this responsibility by continuing the system of WHO collaborating centres. If competent research workers from laboratories not approved by WHO for work with variola and whitepox viruses wish to conduct experiments with them that are approved by the appropriate WHO committee, facilities should, if possible, be provided by a suitable WHO collaborating centre.

RECOMMENDATION (12). WHO should continue to encourage and coordinate research on orthopoxviruses.

RECOMMENDATION (13). WHO should maintain the system of WHO collaborating centres for carrying out diagnostic work and research on orthopoxviruses.

RECOMMENDATION (14). Research workers who do not work in a WHO collaborating centre and who wish to carry out experiments with variola or whitepox virus that are approved by the appropriate WHO committee should be offered the use of the special facilities in a WHO collaborating centre.

RECOMMENDATION (15). Research on poxviruses other than variola or whitepox viruses should not be performed under circumstances where there is any possibility of cross-contamination with these two agents.

Documentation of the smallpox eradication programme

The eradication of smallpox is a unique event in human history and a signal achievement of WHO. It should be fully documented by the publication of a comprehensive book. Further, it is essential for future historians that all relevant documents covering matters of scientific, operational, or administrative interest should be catalogued and preserved in suitable archives. The feasibility of distributing copies of this archival material to several centres, perhaps as microfiche, should be explored.

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It is important that the experiences of the smallpox eradication programme that are applicable to other health programmes should be defined and elaborated, in order to help public health officials develop strategies and tactics for the conduct of other programmes, especially those for the control of infectious diseases. However, the problem is complex since the lessons learnt from the smallpox eradication programme need to be evaluated in each instance by the health programme to which they may be applied.

RECOMMENDATION (16). WHO should ensure that appropriate publications are produced describing smallpox and its eradication and the principles and methods that are applicable to other programmes.

RECOMMENDATION (17). All relevant scientific, operational and administrative data should be catalogued and retained for archival purposes in WHO headquarters and perhaps also in several centres interested in the history of medicine.

WHO headquarters staff

The foregoing recommendations cannot be carried out successfully without central coordination, which should be provided at WHO headquarters. Since it is expected that the Global Commission for the Certification of Smallpox Eradication will be dissolved after the World Health Assembly in 1980, another mechanism is needed to enable the headquarters staff to obtain advice and assistance from scientists. This could be achieved by setting up a committee on orthopoxvirus infections.

RECOMMENDATION (18). An interregional team consisting of not less than two epidemiologists with past experience in the smallpox eradication campaign, plus supporting staff, should be maintained at WHO headquarters until at least the end of 1985. At least one additional field officer should be assigned to cover areas where human monkeypox is under investigation.

RECOMMENDATION (19). WHO should set up a committee on orthopoxvirus infections.