

WORLD HEALTH ORGANIZATION  
Regional Office  
for the Eastern Mediterranean

REGIONAL SEMINAR ON SMALLPOX ERADICATION  
Dacca: 29 October - 5 November 1969

EM/SEM.SE/18  
ENGLISH ONLY

INTERNATIONAL PROBLEMS IN SMALLPOX  
TRANSMISSION

by

Dr Ian D. Carter  
Epidemiological Surveillance & Quarantine Unit, Geneva

## Introduction

The importation of smallpox into countries free of the disease is an acknowledged epidemiological hazard. In view of the enormous increase in both the speed and volume of international traffic, particularly by air, the risk of such importation must be considered imminent as long as the disease remains endemic in some countries.

## The extent of the problem

In considering the transmission of smallpox from one country to another it must be appreciated that the data available are far from complete. The incidents reported to the Organization from 1960 until the present are shown in Annex 1, and can be taken to represent the true situation for the countries of Europe. For the less well known routes however we have very little information about the amount of traffic nor the extent this movement influences the spread of smallpox. A special problem will exist in future in relation to the risk of re-introduction of the disease into countries that have recently undertaken smallpox eradication. In Ghana for example, after six years without a case eight outbreaks of smallpox affecting 112 persons occurred in 1967. Epidemiological investigation suggested that the source of infection could have been an international market town in north-eastern Ghana frequented by people from nearby Togo and Upper Volta. Therefore, although documented information is available to WHO for some 50 instances of international transmission of smallpox by sea and air since 1960 this is by no means the complete picture.

## Local extension following importation

As suggested above one of the major factors determining the spread of smallpox within a country subsequent to the introduction of an individual case is the degree of development and alertness of epidemiological surveillance. Firstly however one should perhaps consider to what extent the nature of the disease determines the spread of smallpox subsequent to its importation. Despite its reputation smallpox is probably not as infectious as generally believed. Certainly prior to the eruption, transmission must be rare and although many people must have been in contact with cases in air travel during the incubation period there has never been a documented instance in which such circumstances have given rise to infection. The seating arrangements on aircraft, which tend to restrict passenger movement, and efficient ventilation may play a role in reducing the transmission in the aircraft itself. However, as there is no risk of infection until the rash and fever are present it is far more probable that this lack of transmission is because cases do not travel other than in the incubation period. Beyond this the individual usually feels too sick or the presence of a rash is an effective deterrent to travel.

It should be appreciated however that the 10 - 14 day incubation period of the disease being a relatively long one is a factor in favour of spread. In modern travel enormous distances can be covered in this space of time and it may be quite difficult to recollect ones contacts and detailed movements

of the preceding two weeks. This is of particular importance if the imported case clinically manifests itself in an atypical form. Such a situation may well have been responsible for the occurrence of some 71 cases in England in April - July 1966. These cases which occurred in four separate areas are referred to in Annex 1 although epidemiological investigation never revealed an initial imported case or cases indicating introduction by air or sea.

Fortunately the atypical case of smallpox is the exception rather than the rule and the disease is relatively dramatic. In general it could be said that because of the nature of the rash there is far less likelihood of missing the single case of smallpox than that of falciparum malaria which presents only with fever or at least give consideration to smallpox in the differential diagnosis. It should be remembered that most physicians in the world have never seen a case of these diseases. Thus the possible difficulty of diagnosis of an imported case of smallpox is only part of the much larger problem of detecting exotic diseases in returning travellers. The extent of international voyaging today makes it essential that all medical examinations have a "travel history" as a focal point. Passengers too should be informed, perhaps by distribution of the "yellow card" type of warning notice of the possibility that they may have contracted an illness abroad and the importance of drawing their doctor's attention to their previous travel in the event of illness. The value of these measures in the early identification of the imported case of smallpox and thus the reduction of risk of extension of the disease is self-evident and does not warrant further elaboration in this context.

#### Measures to reduce incidence of importation and subsequent spread

It is evident that the higher the incidence of smallpox the greater the probability of its spread both within and beyond frontiers. The best defence therefore against importation is the low incidence of the disease elsewhere. Until such time that national eradication programmes achieve their goal however, adequate vaccination of the traveller is essential. If one appreciates the virtually complete degree of protection for a minimum of three years which results from applying potent freeze dried vaccine with the simple but proven techniques, it is difficult to accept that importation should continue to occur in scheduled air and sea travel. Where then in the vaccination of travellers are the failings which should be remedied? Who is it that is not being properly vaccinated and could therefore potentially spread the disease? Contrary to many beliefs it has been shown on the basis of introduction of smallpox into Europe that as many as 75 per cent of imported cases are in fact citizens of the country into which the disease is introduced. Proper vaccination policy on the national level could therefore contribute drastically to a reduction in the importation of smallpox.

Potent freeze dried vaccine and adequate technique as suggested above virtually ensure complete protection in every case whether for primary vaccination or revaccination. Leaving aside for the moment deliberate falsification of certificates and accepting that an adequate technique could hardly be simpler, it would appear that vaccination failure is attributable in the main to unsatisfactory vaccine. In the vast majority of such instances

it is a liquid lymph vaccine or impotent freeze dried vaccine which is at fault and whether this is due to poor production or poor individual storage practices is irrelevant once a supposedly protected person has become infected. This is a particularly unfortunate situation because the exclusive and proper use of potent freeze dried vaccine would help to eliminate this particular aspect of the problem.

The addition of the "origin and batch no. of vaccine" to the smallpox international vaccination certificate was intended as a further safeguard enabling verification of original potency of a vaccine which is suspected not to have given adequate immunity. A further measure which, if carefully implemented, could considerably reduce the number of false certificates as well as enabling identification of individual vaccinators is the introduction of serially numbered official stamps. Such a system has difficulties in implementation but it is suggested that these would be more than justified by the resulting control and subsequent reduction in false and invalid certificates, which in turn mean greater safety and less inconvenience to the international traveller.

The problems of diagnosis in situations where smallpox is not endemic have already been referred to. In addition to the importance of obtaining a travel history which has been stressed, distribution of visual material such as the recent excellent pictorial guide to diagnosis prepared by the Smallpox Eradication Unit at WHO Headquarters and periodical informatory material to physicians and hospital staff is recommended.

As suggested earlier the introduction of a single case of smallpox should not give cause to great concern in any situation where an adequate communicable disease surveillance programme exists. The likelihood of transmission of the disease from materials handled by the patient prior to the onset of clinical manifestations are remote. With prompt diagnosis and isolation of the patient and his contacts further cases should not occur. This presupposes that the immunity of high risk groups and in particular hospital and medical staff is maintained by routine periodic vaccination.

#### The role of the International Health Regulations (ISR)

The International Health Regulations adopted by the Twenty-second World Health Assembly (WHA22.46) will replace the ISR and come into effect on 1 January 1971. The compulsory vaccination of international travellers has been maintained and it is to be hoped that health administrations will endeavour to ensure that vaccination procedures within their country provide the protection which is so readily available.

Fortunately measures in excess of the International Sanitary Regulations in relation to smallpox are not common although there have been one or two relatively recent instances. In one case a health administration attempted to impose fines on airline operators for every passenger arriving without a valid smallpox vaccination. The provisions of the Regulations do not permit such action and arbitrary decisions by individual states can serve no useful purpose.

The means for the prevention of international transmission of smallpox are known, they are simple, and relatively inexpensive. Its achievement is purely dependent on the efficiency with which health administrations enforce vaccinations of their citizens who intend to travel in international traffic.