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INTERNATIONAL CERTIFICATE OF VACCINATION OR REVACCINATION  
AGAINST SMALLPOX

Prepared by the Secretariat

INTRODUCTION

In 1951 the Fourth World Health Assembly, in adopting the International Sanitary Regulations, agreed that the validity of an International Certificate of Vaccination or Revaccination against Smallpox would extend, in so far as revaccination is concerned, for a period of three years beginning on the date of revaccination (Appendix 4, International Sanitary Regulations).

During the Fifteenth World Health Assembly (1962) some Member States from Europe raised the question of the advisability of stating the results of the revaccination in the revaccination certificate.<sup>1</sup> It is recalled that during 1961 and early 1962 six international air travellers infected with smallpox were imported into Europe. Five were migrants from Karachi to the United Kingdom and one child entered Belgium from Leopoldville. Karachi was experiencing an unusually severe smallpox epidemic. This was regularly notified to the Organization which routinely notified all health administrations. Migrants are covered only by Article 103 of the International Sanitary Regulations and belong to that group of persons who "may be subjected to additional sanitary measures conforming with the laws and regulations of each State concerned, and with any agreement concluded between any such State". At the time the first importations occurred no arriving traveller, migrant or otherwise, was required to present a smallpox vaccination certificate on entry to the United Kingdom. Later, however, the smallpox vaccination certificates of arrivals were examined.

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<sup>1</sup> A15/P&B/Min/5, Off. Rec. Wld Hlth Org. 119, Part II

The Committee on International Quarantine, as requested by the Fifteenth World Health Assembly, again considered the question of the smallpox revaccination certificate - see section 70-90, eleventh report of the Committee. One member of the Committee recorded his divergent opinion, which is shown in Annex A. In its conclusions the Committee stated that the specific proposals contained in the divergent opinion might interfere with world traffic without any proportionate degree of enhancement of protection, and without in fact providing for complete protection against all importations of the sort recently experienced. The Committee, however, requested the Director-General to refer the problem to appropriate experts and provide it with recommendations at an early date (the Committee already knew of the proposal of the Director-General to convene an expert committee on Smallpox).

The question was again raised at the Sixteenth World Health Assembly<sup>1</sup> and the Director-General arranged to have it considered by the proposed Expert Committee on Smallpox and the Committee on International Quarantine before the Seventeenth World Health Assembly.

The question was also discussed by the Regional Committee for Europe at its Thirteenth Session. (Draft Resolution of this Committee is attached - Annex B.)

#### Imported Smallpox

From 1958 to 30 November 1963, persons infected with smallpox and entering countries normally free of smallpox have been almost entirely limited to those entering Europe and North America. Of these most came by air.

Details are shown in Annex C.

Five importations in the United Kingdom were in migrants. Since 1 August 1963 the health administration of the United Kingdom requires all arriving international travellers coming from a smallpox infected local area and from countries in Africa, Asia and America (except Canada and the United States of America) to present an International Certificate of Vaccination or Revaccination against Smallpox.

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<sup>1</sup> A16/P&B/Min/14

The imported infected person in Sweden did not present on entry a valid vaccination certificate; it was subsequently determined that he had an up-to-date certificate, but it was not in the international form.

The imported infected person in Canada presented, on arrival in New York City, an up-to-date vaccination certificate which was not in the international form. In fact he had not been vaccinated, but was issued with a certificate.

In Budapest the origin of infection of the one non-imported case was not determined.

Based on International Civil Aviation Organization (ICAO) Statistics the ratio of imported infected persons (by air) to number of passengers carried on scheduled international airlines is given below:

Year	Number of infected persons	Number of passengers (in millions)	Ratio
1958	1	17	1:17 millions
1959	1	20	1:20 millions
1960	2	23	1:11.5 millions
1961	7	26	1:3.7 millions
	(4	26	1:6.5) <sup>1</sup> millions
1962	6	29	1:4.8 millions
	(4	29	1:7.25) <sup>2</sup> millions
1963	4	29 <sup>3</sup>	1:7.25 millions

<sup>1</sup> Three United Kingdom migrants excluded

<sup>2</sup> Two United Kingdom migrants excluded

<sup>3</sup> 1962 data used

### Smallpox Vaccination Requirements

As of 30 November 1963, 164 states and territories require a smallpox vaccination certificate of all or nearly all arriving international travellers. This is 84 per cent. of the number of states and territories listed in Vaccination Certificate Requirements for International Travel, World Health Organization, 1963. A number of other states require a smallpox vaccination certificate of departing travellers; this is in partial fulfilment of their obligations under Article 30. An additional 17 states require a smallpox vaccination certificate only from travellers coming from smallpox infected local areas.

### Technical Considerations

If the policy for international travel required that all revaccinations should be examined and only vesicular reactions should be considered as evidence of success, the interpretation of "immediate reaction" or "no reaction" to smallpox revaccination would acquire special importance, since these responses are not accompanied by the production of vesicular reactions and would be considered as failures.

When revaccinations are performed two or three years following a successful vaccination, a proportion of the revaccinated persons, from 30 to 60 per cent. according to the potency of the vaccine used and the immunity status of the patient, respond with an "immediate reaction" or "no reaction".

It has been demonstrated that an "immediate reaction" can be produced in revaccinated persons by using inactive vaccines and that this is due to an allergic reaction to vaccinia antigens. It has also been shown that this reaction, as well as "no reaction" can be obtained after the inoculation of a fully potent vaccine and that in this case it indicates the presence of a substantial residual immunity. Studies on the serological response to vaccination indicate that "immediate reactions" after revaccination with potent vaccines may be accompanied by increases in antibody titres.

The following experiments reported by Dr R. M. Cross (Bull. Wld Hlth Org. 1961, 25, 7-17) are pertinent:

Experiment 1 - to determine the reaction to inactivated standard dried vaccine. Fifty subjects who had previously been successfully revaccinated within two years were again revaccinated by the linear scratch method, using heat-inactivated standard dried vaccine. A control scratch, using no vaccine, was made at least one inch (2.5 cm) away from the test insertion.

The reactions were inspected on the third and seventh days; the results are shown in Table I.

TABLE I. RESPONSE OF 50 SUBJECTS REVACCINATED WITH INACTIVATED VACCINE AND A CONTROL SCRATCH

Type of response	Inactivated vaccine		Control scratch	
	3rd day	7th day	3rd day	7th day
Itching alone	2	-	-	-
Itching, induration and erythema	31	-	-	-
Induration and erythema alone	6	37	-	-
Itching, induration, erythema and vesicle	1	-	-	-
Induration and eschar	-	1	-	-
Negative	10	12	50	50
Enlargement of glands	-	-	-	-

Experiment 2 - a similar investigation as in Experiment 1 but using active standard vaccine. The same 50 subjects as in the previous test were again revaccinated 10 days later by the linear scratch method under similar conditions, using active standard dried vaccine. The results are shown in Table II.

TABLE II. RESPONSE OF SAME SUBJECTS AS IN TABLE I REVACCINATED  
10 DAYS LATER WITH STANDARD DRIED VACCINE AND A CONTROL SCRATCH

Type of response	Standard vaccine		Control scratch	
	3rd day	7th day	3rd day	7th day
Itching alone	2	-	-	-
Itching, induration and erythema	30	-	-	-
Induration and erythema alone	4	24	-	-
Itching, induration, erythema and vesicle	5	-	-	-
Induration and eschar	-	5	-	-
Negative	9	11	50	50
Enlargement of glands, induration and erythema	-	10	-	-

Experiment 3 - to investigate the serological evidence of immunity following an immediate reaction after the use of active vaccine. Serological studies were carried out by Dr C. Kaplan at the Lister Institute of Preventive Medicine on eight of the subjects who showed immediate reactions when vaccinated by standard vaccine in the previous experiments. The results are shown in Table III.

TABLE III. SEROLOGICAL STUDIES ON IMMEDIATE REACTIONS PRODUCED BY STANDARD VACCINE ON EIGHT OF THE SUBJECTS IN TABLE II

Serum from subjects	50 per cent. poek inhibition titre	
	Before revaccination	7 days after revaccination
1	1/300	1/1000
2	1/20	1/20
5*	1/640	1/1000
6*	1/630	1/1200
7	1/650	1/700
10	1/200	1/200
19*	1/100	1/300
24	1/1800	1/130

\* These subjects had enlarged glands in the axilla

Experiments 1 and 2 show that similar numbers of the different types of response were obtained when 50 subjects were revaccinated with an inactivated and a fully potent vaccine. Experiment 3 shows that positive serological responses can be obtained following "immediate reaction" after vaccination with a potent dried vaccine.

Pincus, W. B. & Flick, J. A. (1963) Journal of Public Health, 53, 898, also report rises in specific antibodies in three adults who had been successfully vaccinated in infancy and who failed to produce a detectable lesion after revaccination.

Some "immediate reactions" and "no reactions" will be obtained in revaccinated persons having a good level of immunity and the shorter the interval since previous vaccination the higher will be the proportion of these reactions.

The most important elements in ensuring an immunogenic response after revaccination are the use of a potent vaccine and the correct vaccination technique. If a good vaccine and a good vaccination technique have been used and the revaccination has taken place two or three years after a successful vaccination or revaccination, an "immediate reaction" or "no reaction" will in most of the cases indicate a good protection. If, on the other hand, a weak vaccine or a poor vaccination technique has been used, even a repetition of the revaccination will not ensure a high proportion of effective immunizations.

It is therefore impossible to differentiate by the clinical examination of the responses to vaccination whether the "immediate reaction" or "no reaction" is an indication of immunity or allergic reaction to the vaccinal antigen.

It should be recognized that even the most stringent requirements for the provision of an International Certificate of Vaccination and Revaccination Against Smallpox will not prevent the introduction of the disease into smallpox-free countries as long as it is endemic in other areas of the world. Only world-wide eradication will obtain these results. It is towards this objective that the main efforts should be directed.

#### Certain Administrative Considerations

To require all revaccinations to be read after four days and the result recorded penalizes the traveller, without affording absolute protection against the importation of an infected case.



DIVERGENT OPINION ON THE QUESTION OF AMENDMENT TO THE INTERNATIONAL  
CERTIFICATE OF VACCINATION OR REVACCINATION AGAINST SMALLPOX

Recent experience in Western Europe has shown that importations of smallpox continue to occur. This will remain a problem until eradication of the disease has been achieved in the endemic areas.

Until this is achieved, and bearing in mind the changed nature, volume and speed of international traffic, in particular air traffic, safeguards to cut down the risk, additional to those already provided by the International Sanitary Regulations, are needed.

There is a growing body of well-informed and responsible opinion which is seeking amendment to the International Certificate of Vaccination which would make it better evidence of successful revaccination by showing the result of revaccination, and by requiring a second insertion if no result of the first is seen. In addition it may be desirable to cover the risk of infection from a person primarily vaccinated during the incubation period by requiring a second insertion if no result of the first is seen, and requiring that the first insertion of lymph be made at least 14 days before the certificate becomes valid.

The Committee gave careful consideration to the comments made by delegations to the Fifteenth World Health Assembly, to the reports made by Member States in their current reports and those of members of the Secretariat responsible for dealing with smallpox questions, and to the individual views of its members.

Furthermore, the Public Health Committee of the Council of Europe which, representing as it does the health administrations of the eight countries of Western Europe party to the Agreement on Health Control of Sea and Air Traffic, had transmitted through the Committee of Ministers of the Council a formal request to the Organization to re-examine the International Certificate of Vaccination with a view to adding information on the result of revaccination. Being aware of this request I felt it my duty to place it on record through the medium of this divergent opinion.

Annex A

The Committee's recommendations do not offer hope of any additional safeguards at an early date to those countries which are at risk. Because of this, it is my opinion that the Sixteenth Assembly should consider amending Appendix 4 and Article 85 of the International Sanitary Regulations which will provide some additional safeguards. The proposed amendments which follow aim to do so.

I. Replace existing Appendix 4 by the following:

APPENDIX 4

International Certificate of Vaccination or Revaccination against Smallpox

This is to certify that ..... date of birth..... sex .....  
whose signature follows .....  
has on the date indicated been vaccinated or revaccinated against smallpox.

Date	Show by "X" whether:		Signature and professional status of vaccinator	Approved stamp
( (	1.	Primary vaccination or revaccination 1st or 2nd attempt*		
(		Primary Vacc.		
(		Performed		
(		Revacc.		
		Read as successful		
		Unsuccessful		

\* Delete primary vaccination or revaccination and 1st or 2nd as appropriate.

APPENDIX 4 (continued)

2. Primary vaccination or revaccination 1st or 2nd attempt*			
	Primary Vacc.		
	Performed		
	Revacc.		
	Read as successful		
	Unsuccessful		
3. Revaccination 1st or 2nd attempt*			
	Performed		
	Read as successful		
	Unsuccessful		

\* Delete primary vaccination or revaccination and 1st or 2nd as appropriate.

The validity of this certificate shall extend for a period of three years beginning 14 days after a successful primary vaccination or four days after a successful revaccination.

Vaccination or revaccination shall for the purposes of this certificate be recorded as successful only when it results in vesicle formation.

When the first attempt at primary vaccination or revaccination is unsuccessful a second attempt shall be made not less than eight days after the attempt at primary vaccination or not less than four days after the attempt at revaccination. In such cases the validity of the certificate shall extend for a period of three years beginning in the case of attempts at primary vaccination 14 days after the date of the first attempt and in the case of attempts at revaccination on the date of the second attempt. The approved stamp mentioned above must be in a form prescribed by the health administration of the territory in which the vaccination is performed.

Annex A

APPENDIX 4 (continued)

Any amendment of this certificate, or erasure, or failure to complete any relevant part of it may render it invalid.

II. Article 85 - paragraph 1, sub-paragraph (a)

Add at the end of this sub-paragraph . . ."or who is in possession of a valid certificate of vaccination which does not show a successful vaccination or successful revaccination within the previous three years".

Explanatory notes on these amendments

1. The certificate reverts to the practice in force before 1951 of requiring the result of a revaccination to be recorded.
2. The certificate requires a second attempt to be made should the first attempt at primary vaccination or at revaccination not be successful.
3. The certificate defines for the purposes of the International Sanitary Regulations successful vaccination and successful revaccination.
4. The validity of the certificate extends for three years beginning 14 days after successful primary vaccination and four days after successful revaccination.

When a first attempt at primary vaccination or revaccination is not successful, a second attempt must be made. The second attempt must be made not less than eight days after the attempt at primary vaccination or not less than four days after the attempt at revaccination. In such cases the validity of certificate extends for three years beginning in the case of attempts at primary vaccination 14 days after the first insertion and in the case of revaccination on the date of the second attempt.

5. The rules of the certificate permit a certificate to be valid even if it does not show a successful result of revaccination. This will limit the amount of interference with international travel.

The amendment to Article 85 allows the measures of that Article to be applied to a suspect who is in possession of a certificate which does not record a successful result during the previous three years.

(signed) L. H. Murray

ANNEX B

DRAFT RESOLUTION OF THE FOURTH MEETING OF THE REGIONAL  
COMMITTEE FOR EUROPE (THIRTEENTH SESSION)

The Regional Committee for Europe,

Having studied the paper submitted by the Regional Director,<sup>1</sup>

1. NOTES the great interest this problem has aroused among representatives in the Committee;
2. EXPRESSES its concern regarding the repeated episodes of imported smallpox in Europe;
3. REQUESTS the Regional Director to transmit the account of the discussion on this matter to the Director-General, asking him that the views expressed be taken into account by the WHO Committee on International Quarantine during its next session;
4. NOTES particularly the frequency of secondary infection in hospital and associated staff inside and outside the hospital and in other health services staff; and
5. DRAWS ATTENTION to the vulnerable position of such staff and the necessity of ensuring that all members are protected by routine vaccination.

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<sup>1</sup> Document EUR/RC13/6

SMALLPOX INFECTIONS IMPORTED BY AIR

	No. Imported Infections	From	Into	No. Secondary Cases
1958	1	India	Heidelberg	11
1959	1 (same imported case as in 1958)	Calcutta	East Berlin	-
		India	Heidelberg	19
1960	1	Malaya	United Kingdom	-
	1	India	Moscow	45
1961	1	Bombay	Madrid	15
	1	Delhi	Ansbach	3
	1	Delhi	Moscow	-
	1	Leopoldville	Brussels	-
	1	Karachi	United Kingdom	2
	1	Karachi	United Kingdom	1
	1	Karachi	United Kingdom	13
1962	1	Karachi	United Kingdom	-
	1	Karachi	United Kingdom	45
	1	Monrovia	Dusseldorf	3
	1	Calcutta	Bangkok	-
	1	Brazil	Toronto	-
	1	Bombay	Monschau	33
	1	Gabon	Pointe Noire	-
1963 (up to 30.11)	1	Bulgaria	East Berlin	-
	1	India	Poland	116
	1	?	Stockholm	24
	1	Gabon	Zurich	-