HEALTH REGULATIONS FOR AIR TRAVEL

BY

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Medical practitioners are often asked for information on the health regulations in force for passengers travelling by air to foreign countries. It may therefore be of interest to discuss the quarantine procedure as it affects passengers and aircraft leaving the United Kingdom on international flights.

The times taken from London to reach distant points in the world by air are now approximately:

Egypt ..	13 hours	Australia ..	2½ days
Canada ..	20 hours	South Africa ..	3 days
West Africa ..	1 day	New Zealand ..	4 days
India ..	1½ days	Hong Kong ..	6 days

The duties of the health authority are therefore becoming more difficult and responsible in view of the lack of clinical signs of infectious disease to be expected among the passengers examined. More reliance has to be placed on immunization, hence the insistence on the use of vaccines of known efficiency and on the production by the passenger of proof, in the form of certificates, that the operation has been performed satisfactorily. Certificates of immunity have in this way become an essential part of the formalities of air travel and seem likely to remain so for some time to come.

International Convention for Aerial Navigation, 1944

The carriage of infectious disease from one country to another is controlled by this Convention, to which the majority of nations are signatories.

Quarantine Procedure.—The Convention defines the procedure and methods to be adopted by the signatories for the purpose of quarantine. The methods in use are: (a) immunization of persons by inoculation and vaccination against the five major epidemic diseases—yellow fever, smallpox, plague, typhus, and cholera; (b) medical inspection of suspected cases of infectious disease embarking or disembarking at an airport; (c) segregation or surveillance of infectious persons and their contacts; and (d) application of sanitary measures to passengers and aircraft, including the disinfection of persons, clothing, and bedding, and the destruction of mosquitoes and other vectors of disease where considered necessary by the health authorities.

The "Convention" Diseases.—The Convention is intended to cover all infectious diseases, including those carried by insect vectors (e.g., malaria) and in particular those major epidemic diseases referred to above, for which special measures are applicable and are set out in detail in the Convention. The incubation periods of these diseases and the periods of validity of the certificates of immunization agreed on internationally are shown in Table I.

TABLE I

Disease	Incubation Periods	Periods of Validity of Certificates of Immunization
Yellow fever ..	6 (India 9) days	For 10 days to 4 years from date of inoculation
Smallpox ..	14 days	For 14 days to 3 years from date of vaccination
Cholera ..	5 "	For 6 days to 6 months from date of inoculation
Plague ..	6 "	Not stated, but usually for 6 months from date of inoculation
Typhus ..	12 "	For 1 year from date of completion of course of inoculations

Notification of Epidemiological Information.—The Convention also provides for the collection and dissemination of epidemiological information to the signatories. The Interim Commission of the World Health Organization maintains an epidemiological information service at Geneva for this purpose. The service issues a weekly *Epidemiological Record* which gives the notifications concerning pestilential disease and similar information required by health services throughout the world. A *Statistical Supplement* is also issued every

month giving tabular information concerning notifiable diseases and vital statistics. Our Ministry of Health issues a *Weekly Record of Infectious Diseases at Ports, or other localities at home and abroad*. From these sources, and from information sent to airline corporations direct from overseas stations concerning local health regulations, it is possible to deduce the requirements for a passenger on any particular journey.

Health Regulations Affecting Passengers

Inoculation and Vaccination.—The number of inoculations or vaccinations required by a particular passenger depends on the route he will fly. It will be necessary for him to comply with the regulations of each country in which he lands as well as those of the country of departure and of his destination. The regulations, however, usually make a distinction for a passenger who is only in transit through a country and not disembarking into it, and in the former case an alleviation of the rules is sometimes permitted. Health authorities are naturally anxious to prevent the entry of a person incubating any disease into a country where conditions are particularly favourable for its spread. This is the case in India, where regulations against the importation of yellow fever are very stringent in consequence of the presence of the *Stegomyia* mosquito. Similarly in Australia special precautions are insisted on against smallpox.

Variation in Validity of Immunization Certificates.—The periods of validity of certificates of inoculation and vaccination as shown in Table II vary in certain countries, and it is necessary to ensure that each passenger is in possession of certificates that are valid for all countries in which he will land during his journey. It would of course simplify the procedure for passengers if all countries would agree to accept the same periods of validity.

TABLE II

Disease	Convention Validity	Limits of Variation*	
		Maximum	Minimum
Yellow fever ..	10 days/4 years	15 days/2-4 years (India)	15 days/2 years (Madagascar)
Smallpox ..	14 days/3 years	21 days/2 years (Egypt)	12 days/1 year (Thailand)
Cholera ..	6 days/6 months	14 days/6 months (Abyssinia)	6 days/3 months (Hong Kong)
Plague ..	None stated	5 days/2 years (Cyprus)	6 days/3 months (Hong Kong)
Typhus ..	—/1 year	12 days/1 year (Lebanon)	8 days/6 months (Cyprus)
Typhoid ..	None stated	6 days/1 year (Burma)	6 days/3 months (Java)

* Calculated from date of completion of inoculation or of vaccination.

Forms of Certificate.—The Convention recommends that certain prescribed forms of certificate should be used for the purposes of travel by air. Airline companies sometimes print and issue these certificates to their passengers on request. These forms, or copies of them, should be used, since certain countries insist on the use of the Convention certificates and may refuse to accept any other as valid, with resulting delay and inconvenience to the passenger. It is important, therefore, that the certificate should be completed in all details; if an official stamp be affixed it will add to the value of the document.

Notification of Health Regulations to the Passenger.—Inoculation and vaccination required by regulations are notified to the passenger through his travel agency, and he should lose no time in consulting his doctor in order to have them completed before starting the journey. It is important that the passenger and practitioner should take into account the interval of time that must elapse before the certificates of these operations become valid. These periods are referred to in Tables I and II. The consequences to a passenger who is not in possession of the requisite certificates may be a refusal to permit embarkation, an enforced period of quarantine at the port of disembarkation, or refusal of permission to land.

Precautionary Inoculation and Vaccination.—Practitioners may be asked what inoculations and vaccinations are recommended as health precautions in addition to those required by the regulations. In general, vaccination against smallpox and inoculation against the typhoid group should be recommended to any person proceeding abroad. Other inoculations need be

advised only when epidemics are known to be in progress, and this information can be ascertained from any of the publications mentioned above.

Health Regulations for Entry into the United Kingdom.—Passengers are required to provide certain details of their travel during the previous 14 days, and are then given a "warning card" to hand to their doctor should they fall ill within the next 21 days. The card notifies the doctor that the patient has come from abroad and may be suffering from a notifiable infectious disease, and requests him, if the diagnosis is confirmed, to notify the local medical officer of health.

Personal Declarations of Health.—These should be completed by each passenger before arrival at a foreign port. Their purpose is to trace the movements of passengers during the period covering the longest incubation period of the Convention diseases, which is that of smallpox—i.e., 14 days. They should be completed and signed before the aircraft lands. The steward usually distributes these declarations in ample time for this to be done.

Medical Inspection of Passengers.—Passengers who have been in contact with an infectious disease or who are suspected of having contracted it may be required to undergo a medical inspection followed by observation in a hospital or surveillance at their place of residence. Under the Convention their persons and personal effects may be cleansed or disinfected according to the circumstances. Passengers who present a clean bill of health and have the necessary valid certificates of immunity are not subjected to any delay for quarantine reasons.

Clinical Details of Inoculations and Vaccinations

The following details of dosages for inoculations may be of value to practitioners. The dosages and instructions are those used in this Corporation in consultation with the Wellcome Laboratories.

(i) **Yellow Fever.**—The only vaccines so far recognized internationally for inoculation against yellow fever are those prepared by: the Rockefeller Foundation and the U.S.A. P.H. Service Laboratory, Montana, in the U.S.A.; the Wellcome Research Institution, in London; the South African Institute of Medical Research, in Johannesburg; and the Pasteur Institute, Dakar. No other vaccines have yet been accepted for the purposes of inter-

by their travel agents of the most convenient medical sources from which approved yellow fever inoculations may be obtained.

(ii) **Cholera.**—Two injections are given at 10 days' interval, consisting usually of 0.5 ml. and 1 ml. respectively for adults. For children under 12 the doses are 0.2 ml. and 0.4 ml.

(iii) **Typhus.**—The adult dose is three injections of 1 ml. at weekly intervals, and is used for all ages down to 12 years. From 7 to 12 years the dose is 0.5 ml., and from 2 to 7 years 0.33 ml.

(iv) **Plague.**—This vaccine is apt to cause some reaction, and is given only in the presence of an epidemic or where health regulations require it. The adult dose consists of two injections at one week's interval. The gradation of dosage for children should be that recommended for typhoid (T.A.B.).

(v) **Typhoid (T.A.B.).**—Doses recommended for alcoholized vaccine are: Adults: first dose, 0.25 ml.; second dose, 0.5 ml. Children under 12 should receive vaccine two-fifths of the full strength, as follows: From 6 to 12: first dose, 0.25 ml.; second dose, 0.5 ml. From 2 to 5: first dose, 0.2 ml.; second dose, 0.4 ml. The injections are separated by a minimum interval of 10 days.

(vi) **Smallpox.**—The method used is the making of one dermal scratch, then applying lymph and making a second scratch through the lymph.

The interpretation of vaccination reaction may be briefly described as follows:

Day of Vaccination	Reaction		
	Primary Vaccinia	Accelerated (Vaccinoid)	Reaction of Immunity
1			Papule
2			No vesicle
3			Rapidly fades
4			
5	Papule	Papule	
8	Vesicle	Vesicle	
11	Pustule	Pustule	
16-21	Scab	Scab	
	Scab off	Scab off	
Immunity of individual before vaccination	Nil	Fair	Good

Inoculation and Vaccination of Children.—Children under 2 years of age may be vaccinated against smallpox and inoculated against yellow fever unless there are medical indications to the contrary. The remaining inoculations are not recommended for children of this age unless there is an epidemic in progress or health regulations make them essential.

Health Regulations affecting Aircraft and Crews

The same regulations apply to aircrews as to passengers. It is customary, however, for aircrews to have their health certificates always up to date in order to avoid delays and to ensure that they are available for service on any route without additional medical preparation. Airlines have their own organization for carrying out these inoculations at regular intervals.

(i) **Sanitary Measures.**—An aircraft may act as a carrier of disease in several ways. In addition to the passengers, who may be incubating human diseases, it may carry vectors in the form of mosquitoes, lice, fleas, other insects, or infected rodents. It may also carry infection in food, water, cargo, or sewage. In addition to the sanitary measures applicable to passengers there are therefore special measures for the aircraft itself. The usual processes of disinfection of the interior of aircraft and cleansing of food-containers and water supply present few difficulties.

(ii) **Disinsectization.**—The killing of mosquitoes or other insects, known as "disinsectization" or "disinsection," however, requires special mention. This measure is required to be applied to an aircraft whenever it arrives or departs from an airport in a yellow fever zone or a malarial district. It is best done with the aircraft loaded but without passengers or crew on board. The method employed in the U.K. for aircraft flying to India is as follows:

The interior of the aircraft is sprayed with a pyrethrin from aerosol containing not less than 0.4% pyrethrins, or not less than 0.2% pyrethrins and 3% D.D.T. applied from an aerosol dispenser at a rate of not less than 15 seconds per 1,000 cu. ft. (28.3167 cu. metres) of free air space. The dispenser used is of the Westinghouse type, and the cap is removed completely during the process. All openings in the aircraft are kept tightly closed during the spraying and for a period of five minutes thereafter.

(iii) **Certificate of Disinsectization.**—A certificate of disinsectization issued under the authority of the Ministry of Health in Great

TABLE III

City	Address	Telephone Number	Times of Attendance
London ..	Wellcome Research Institution, 183-193, Euston Road, N.W.1	Euston 4668	Mondays and Fridays, 10.30 a.m.-12.30 p.m. Tuesdays and Thursdays, 4-5 p.m.
Aberdeen ..	City Hospital Laboratory, City Hospital, Urquhart Road	Aberdeen 2242 Ex. 11	Thursdays 3 p.m. or by prior arrangement
Birmingham	Regional Blood Transfusion Centre, 17, Highfield Road	Edgbaston 1182	Tuesdays 2-3 p.m.
Bristol ..	Regional Blood Transfusion Centre, Southmead Hosp.	Bristol 68021	Tuesdays 2-3 p.m.
Cardiff ..	Regional Blood Transfusion Centre, Newport Road	Cardiff 4521	Mondays 2.30-3.30 p.m.
Edinburgh	Bacteriological Dept., Edinburgh Royal Infirmary, Edinburgh, 3	Edinburgh 26031	Mondays and Wednesdays 2.30-3.30 p.m.
Glasgow ..	Public Health Clinic, 20, Cochrane Street, Glasgow, C.1	Glasgow Central 9600 Ex. 302	Fridays 2.30 p.m.
Leeds ..	Regional Blood Transfusion Centre, Meanwood Park Colony	Leeds 52651	Fridays 2-3 p.m.
Manchester	Regional Blood Transfusion Centre, Manchester Royal Infirmary, Oxford Road	Ardwick 3832	Tuesdays 2.30-3.30 p.m.
Newcastle-upon-Tyne	Regional Blood Transfusion Centre, 78, Jesmond Road	Jesmond 2992	Mondays 2-3 p.m.
Oxford ..	Southern Regional Blood Supply Depot, Churchill Hospital, Headington	Oxford 61316	Mondays 2-3 p.m.

national certificates. The vaccine must be kept at a temperature between 0° C. and 4° C. The dosage is made up to an injection of 0.5 ml. with water or normal saline for an adult. Children under 2 years receive half the normal dose. A list of official yellow fever inoculation centres notified by the Ministry of Health is shown in Table III. This list is not exhaustive, and passengers are informed

Britain, using the method described above, is accepted by the Indian Government as proof of the aircraft being "clean" in respect of yellow fever. Passengers from the U.K. in an aircraft so treated would therefore not require to possess certificates of immunity to yellow fever on entering India unless they had been in a yellow fever area within the previous nine days.

(iv) *Regulations for Aircraft Entering India.*—The Indian Government defines the sanitary state of aircraft entering India in respect of yellow fever under the Indian Aircraft (Public Health) Rules, 1946. This may be summarized as follows: (1) "Suspect" if it arrives in India from the west. (2) "Infected" if it has on board a case of yellow fever or it has not been subjected to the prescribed measures since the disposal of such a case, or if there is a person on board who has been in a yellow fever area within nine days and does not possess a certificate of immunity, or if the aircraft has come from a yellow fever area and has not been disinfected. Similar definitions are applied to aircraft in relation to the other four Convention diseases, and the special measures that may be applied are given in detail in these regulations and in Part III of the Sanitary Convention.

Aircraft Declaration of Health.—This is required under the Convention to give information on the sanitary condition of the aircraft and its passengers and cargo. The declaration amplifies the information formerly given in the bills of health and is analogous to the "declaration of health" now in use for shipping. It is required to be signed by the commander of the aircraft and handed to the health authority on arrival at an airport.

Summary

The main features of the quarantine position as it affects commercial flying are briefly surveyed. If the methods employed to control the entry of disease into countries by air appear to assume an importance not hitherto known in sea or land transport, it should be remembered that practically all international flights are, from the point of view of quarantine, well within the incubation period of the major epidemic diseases.

Relaxation of health controls could only come about through a general raising of the standard of hygiene in all countries and the elimination or more effective control of pestilential diseases. Consideration might be given, however, to the standard of hygiene of airports used on international flights. The 1944 Convention gives the definition of a sanitary airport, but the standards of hygienic requirements might well be extended to include immunization of personnel serving at the airport and the establishment of a zone surrounding the airport which would be completely epidemic-free and be built to the best hygienic standards so that passengers and aircraft in transit could land without risk of infection. Such a scheme would do much to relieve passengers of the health requirements now enforced for transit passengers.

Standards similar to those enforced for immunization also require to be laid down for the disinsection of aircraft. Methods of disinsection vary in certain countries, with the result that a certificate issued at one airport on a route may not be valid for the whole route. This is a cause of much duplication of work and expenditure of materials. An agreed standard would serve to satisfy all authorities and remove a source of delay and inconvenience.

It is to be hoped that the joint consultation of the World Health Organization and the International Committee on Aerial Organization will prove a fruitful source of agreement and so permit of a reduction of the controls without loss of efficiency.

I am indebted to Sir William Tyrrell, Director of Medical Services, British Overseas Airways Corporation, for permission to publish this article, and to Colonel P. G. Stock, Brigadier H. T. Findlay, Brigadier J. S. C. Boyd, and Air Commodore J. Kyle for their kind help in preparing it.

The summer number of *Nutrition: Dietetics: Catering* (subscription for 4 issues 10s., from Newman Books, Ltd., 356-366, Oxford Street, London, W.1) opens with an address by Sir Jack Drummond on the "Scientific Approach to Food Problems During the War." He reviews the nutrient requirements of different types of workers, their deficiency in the nation's food supply, and the best food from which to obtain them. He also discusses the most suitable composition of bread. Prof. J. R. Marrack gives a general account of folic acid, and there follows a speech delivered at the Oxford Conference of Dietitians in 1945 by Sir John Boyd Orr, now Director General of F.A.O., on "The British War Food Policy and the Future World Food Policy." Other writers discuss nutrition in industry, school meals (including a short account of breakfast in Norwegian schools), and the catering system at the Radcliffe Infirmary, Oxford.

ECONOMICS OF PUBLIC HEALTH

Dr. F. Hall chose this subject for his presidential address to the Society of Medical Officers of Health on Oct. 23.

He said that the appointment of the first medical officer of health was "a business proposition," as evidenced by the salary of £750 per annum paid to Dr. Duncan. The wealth of a nation lay in the physical and mental energy of its people, and it was not just a coincidence that in this centenary year there had been placed upon the Statute Book an Act for the establishment of a National Health Service. The administrative provisions of the Act had been noted by medical officers of health with a certain amount of apprehension and disappointment, in that the local government organizations had been given what appeared to be a minor part to play in carrying out the purposes of the Act.

Dr. Hall reviewed briefly the sequence of events which led to the Act. Public, voluntary, and private medical services had worked in close association, and especially during the recent war in matters of civil defence and in the Emergency Medical Services. The success achieved and the administrative pattern evolved probably contributed to the decision taken during the war that a National Health Service should be established.

New statutory administrative bodies had now been created, and the ease with which this had been accomplished was a striking example of the position Parliament occupied as the supreme policy-making and administrative authority. By the decision of Parliament, well-organized and apparently stable local government authorities would lose many of their health functions, and the voluntary hospital system, with its long tradition of service, passed under a new form of control. This demonstration of what was the real power in the constitution had no doubt been observed by medical officers of health with "the enthusiasm of good democrats."

The factual reports of the hospital surveyors had drawn attention to the low standards, in matters of premises and equipment, of a great many of both the voluntary and the rate-provided hospitals. They could have stated with equal truth that the responsible authorities were for the most part quite unable to face the financial burdens which the modernization of these hospitals would have involved. The transfer of administrative function from one type of authority to another neither removed the necessity for such modernization nor materially altered the cost. An alteration in the responsibility for these services would have an important effect, however, in that the expenses incurred by treating sickness in hospitals and other institutions would not be partly hidden by gifts, either of money or of service, but would appear in the nation's accounts with due publicity. Here then was an economic factor in public health which would call for renewed attention by administrators.

Efforts to make the nation "health conscious" would perhaps be more successful when public health authorities obtained a greater degree of support from the organizations and associations which represented the industrial and commercial undertakings. To make people living under slum or near-slum conditions "health conscious" was a formidable, if not an impossible, task. The evacuation of overcrowded districts during the war plainly indicated that progress in this matter had been slow and that new methods of approach should be attempted.

He had stressed the economic aspect of public health work because in the difficult times before this country it was clearly necessary that in using the scientific and financial resources which might be available certain priorities should be observed. Much remained to be accomplished, and there was no easy way of preventing ill-health. Of the measures proved useful there were some which could be carried out by central authorities, but the majority demanded local investigation and personal contact with the people, and formed the day-to-day work of public health officers. Further improvements in the productive capacity of the nation would be most profitably effected by extending and intensifying this form of activity. Many branches of medical science were involved, and team work was clearly essential.