

EPIDEMIOLOGY OF AIR TRAVEL

Squadron Leader, J. K. SEHGAL.

Assistant Director of Hygiene

Time taken to fly from one country to another is now so short that infectious diseases can be easily carried back and forth by insect vectors and passengers. The incubation period of most infectious diseases varies from 5 to 14 days. A passenger carrying infection can do a round-the-world trip these days without the disease becoming manifest. Therefore, in this air age, every country of the world must take adequate sanitary precautions against this new risk of infection.

Aircraft as a Carrier of disease

Every country's Public Health Service has a new responsibility of Air Port Health Control. The various steps taken to ensure proper control of spread of infectious diseases by air from one country to another is popularly known as Aircraft Health Clearance. From the health point of view a Transport aircraft consists of passengers and crew, cargo and the aircraft itself. The aims of aircraft health clearance can be summarised as follows:—

1. To ensure that none of the passengers and crew are suffering from any of the infectious diseases.
2. All the passengers and crew have been successfully protected against the main infectious diseases by suitable inoculation/vaccination.
3. The cargo is free from infected mosquito or other vectors.
4. The aircraft itself is not infected or if infected has been subsequently disinfected/disinsected.

There are two essential requisites for any practical scheme of health control at an Air port i. e. speed and effectiveness. All control measures have to be so framed that they are effective without undue delaying the aircraft and passengers.

International Control Over Spread Of Infection by Air Travel

To control the spread of dangerous epidemic diseases an International Sanitary Convention was held at Hague on 12th April, 1933. The Convention prescribed sanitary measures applicable to 5 major infectious diseases of Public Health importance i. e. Plague, Cholera, Yellow-Fever, Typhus, and Smallpox. It also prescribed International precautions against the spread of Yellow Fever by aircraft.

The formulation of International Sanitary Convention designed to prevent or control the spread of epidemics from one country to another is significant. It not only demonstrates advances in International Hygiene and knowledge of epidemic diseases, but also shows a real desire among peoples of different political and cultural ideologies to co-operate in

International health activities. The various nations have recognised the element of truth in the saying that "health has no frontiers, disease anywhere is a danger to anyone everywhere."

In 1943, the United Nation Relief and Rehabilitation Administration (U.N.R.R.A.) was formed and one of its chief functions was to help in the prevention of infectious diseases. Early next year International Sanitary Convention for Aerial Navigation 1944 was formulated. The important articles of this Convention were as follows:—

Two types of aerodromes were recognised i.e. "Custom Aerodromes" and "Sanitary Aerodromes". It was made imperative for the Sanitary Aerodromes to have the following facilities:—

1. An organised medical service with a medical officer and at least one Assistant Officer acting under his direction.
2. A place for medical inspection.
3. Facilities for isolation, transport and care of the sick, for the contacts separately from the sick, and for carrying out any other prophylactic measure in suitable premises either within the aerodrome or in proximity to it.
4. The apparatus necessary for carrying out disinfection, disinfestation and deratisation etc.
5. The Convention also implied to make aerodromes as free from mosquitoes as possible.
6. The sanitary aerodrome should be provided with mosquito proof dwelling in which passengers and crew could be accommodated and hospitalised if necessary. It should be provided with a sufficient supply of wholesome drinking water and a proper and safe system for the disposal of excreta and refuse.
7. Yellow Fever area was defined as a "region in which Yellow Fever exists in a form clinically, biologically or pathologically." The relevant areas of Africa and South America were outlined in the Convention.

U.N.R.R.A. was made responsible for approving all Yellow Fever vaccines used, if certificates of inoculation against the disease were to be accepted as valid. This organisation was an advisory body and lacked Government authority to make its recommendations binding on the various countries. This defect was rectified in 1946 by the creation of the World Health Organisation.

The actual application of the sanitary measures adopted, however, have been left to the discretion of the various member countries. The principal aim being to make the regulations uniform to prevent inconvenience and loss of time to passengers which would otherwise defeat the purpose of air travel.

Disinfection of Aircraft.

If a person known or suspected to be suffering from any of the infectious diseases is found on an aircraft, the aircraft and its interior has to be suitably disinfected. Disinfection of the aircraft presents a difficult problem since there is danger of damaging the costly upholstery and there is danger of fire. Considering both these risks it has been found that 5% Formalin spray is the best disinfection. It does least damage to the upholstery and presents the least risk of fire. The details of disinfection are entered in the log book of the aircraft.

Disinfestation of Aircraft.

Active precautions are essential to prevent carriage of infected disease vectors to other countries where conditions for the spread of the disease exist, but where the disease is not so far prevalent. For the destruction of mosquitoes and other insects the most frequent and convenient method commonly employed in most countries is the 'Aerosol bomb'. This gives a fine mist of deposit which disperses well in an enclosed space. The insecticidal solution used in Aerosol bomb has both "knock down" and killing effect. It contains Pyrethrum extract 2% D.D.T. 3% in Freon base. The time required for the spray to be effective varies, with the size of the aircraft.

	CUBIC CAPACITY	TIME
Dakota	2000 cu. ft.	30 seconds
York	4200 cu. ft.	75 seconds
Skymaster	5000 cu. ft.	90 seconds
Constellation	5000 cu. ft.	90 seconds

After fumigation the doors and windows of aircraft must be kept closed for another three minutes.

Mosquitoes and other insects have been found in in-accessible places such as interior of wings, behind panelling and in the cargo compartment. At all Indian air ports the luggage compartment is sprayed with a power spray. As a further safeguard stationery aircraft in endemic Yellow Fever areas are covered with fine mesh netting.

In modern aircraft due to routine cleaning and maintenance there is very little chance of rat and other infestation. If, however, there is evidence of rat infestation, fumigation with one of the recognised fumigants such as Hydrogen-Cyanide is performed.

During 1930, Public Health Service of America reported that out of a total of 398 aircraft inspected during the year for possible mosquito infestation, 187 were found to harbour dead and live insects of various species. A total of 651 insects were recovered of which 166 were alive when captured, 45 mosquitoes were found, 40 dead and 5 alive. *Musca Domestica* (House fly) were the most predominant insects recovered in the aircrafts throughout the year. Other insects found were beetles, wasps, ants, moths, cock-roaches and Stable flies.

Fewer live mosquitoes are now found than in preceding years. This might be due to more efficient disinsectisation. It appears, however, that in spite of precautions taken by Health authorities and Air Line Companies live mosquitoes are still being transported by aircrafts.

International Health Certificates.

In accordance with the provisions of International Sanitary Convention of Aerial Navigation it has been agreed by all countries that the proof of inoculation against Yellow Fever or immunity against Yellow Fever, of inoculation against Typhus, of inoculation against Cholera, of inoculation against Plague and of vaccination against Small Pox shall consist of health certificates for these diseases. These certificates must be on international prescribed forms and should be completed carefully to include details. Incomplete entry may result in the certificate not being recognised by other countries and passengers may in consequence be placed in quarantine. The prescribed forms also show the minimum and the maximum validity periods of such certificates. To be valid, the certificates have to be within the prescribed time limits. There is no prescribed form for Plague inoculation, but the form for Cholera may be used by substituting the word "Plague" for Cholera.

In India, inoculation against Yellow Fever, on account of certain technical difficulties in the storage and administration of Yellow Fever vaccines is carried out at the following places only.

1. Haffkine Institute, Bombay.
2. All India Institute of Hygiene & Public Health, Calcutta.
3. Central Research Institute, Kasauli.
4. Provincial Health Laboratory, New Delhi.
5. Air Port Health Officer, Santa Cruz, Bombay.
6. Chief Medical Officer, Porbander.
7. King Institute, Guindy, Madras.
8. Navangar State Irwin Hospital, Navangar.

Inoculation against Yellow Fever, therefore, has to be arranged by appointment with the nearest Centre, where Internationally recognised certificates are issued.

Yellow Fever inoculation certificates are not normally required by other countries from passengers coming from India except by a few African countries. Passengers proceeding to African countries and to South America particularly those going to endemic Yellow Fever areas are, however, advised in their own interest to be in possession of valid Yellow Fever certificates obtained from one of the above centres. Passengers who eventually return to India by air may also as a precautionary measure get themselves inoculated against Yellow Fever, prior to their departure, in order to avoid the possibility of their being placed in quarantine in India if they happened to arrive in an infected plane.

Passengers from India proceeding abroad require for most countries valid Small Pox and Cholera certificates only.

Persons proceeding to China are required to be in possession of inoculation certificates against Typhoid also. As no International form is prescribed for Typhoid, the Cholera inoculation form may be used for this purpose after substituting the word "Typhoid" for "Cholera."

Aircraft Health Clearance Procedure.

In accordance with the International Sanitary Convention 1944, all in-coming and out-going aircraft have to land at and depart from Sanitary aerodromes where proper facilities for necessary medical examination of passengers and crew are available and also where facilities for quarantine of suspected contacts and other sanitary measures in respect of infected aircraft and cargo can be undertaken.

As already stated health clearance is required both on arrival as well as departure of aircrafts. The procedure usually followed is as follows.

On Arrival of Aircraft:

1. The Captain of the aircraft when it is two hours out from the aerodrome informs the Flying Control if any passenger on board is suffering from any illness other than air sickness. This information about the E.T.A. of the aircraft is conveyed to the Port Health Officer who reaches the airport at least one hour before the arrival of the aircraft.

2. All aircrafts arriving in India from the West are regarded as infected or suspected to be infected with Yellow Fever and hence are to be disinsectised.

3. When coming to land the Captain of the aircraft is asked to close all cockpit windows and other openings of the aircraft.

4. Port Health Officer boards the aircraft first and the door of the aircraft is then closed. No other person is allowed to enter the aircraft, unless it is fumigated. The method used is the Aerosol bomb. The interior of the aircraft including the cockpit cabin is sprayed. All openings of the aircraft are kept closed for at least three minutes. In the meantime log book of the aircraft is examined to determine if the aircraft has been to a Yellow Fever area.

5. Freight compartments are fumigated and also kept closed for at least three minutes. Freight is not unloaded until this has been done.

6. All passengers and crew are then led to the Port Health Office for medical check-up.

7. The Captain of the aircraft has to fill in a form called "Aircraft Declaration of Health". This form gives full information to the Health Officer about the health conditions of passengers and cargo of the aircraft.

8. The passengers are required to fill "Personal Declaration of Health" form. The

purpose of the Form is to trace the movements of the passengers during the last 14 days.

9. In addition, all passengers are required to enter their particulars including the address of destination in a register kept in the Port Health Office.

10. Govt. of India have placed no quarantine restrictions on passengers coming from abroad except in respect of Yellow Fever. The Air Port Health Officer, however, is authorised to take all necessary measures (in accordance with Aircraft Public Health Rules) if the aircraft is infected or suspected to be infected with any infectious disease.

11. The details about the disinsectisation carried out are entered in the journey Log book of the aircraft in the form of a certificate.

This completes the health formalities observed on arrival of an aircraft.

On Departure of Aircraft.

The crew and passengers' list is delivered in the Port Health Office at least one hour before the E.T.D.

1. All persons leaving by air are medically examined by the Port Health Officer.

2. No person suffering from an infectious disease or likely to transmit infection to others is allowed to travel in an aircraft unless the aircraft is specially chartered for the purpose.

3. Any cargo or personal effects which in the opinion of Port Health Officer, are infected with any infectious disease are prevented from embarkation. The bedding and clothing of the crew and passengers bound for the countries which have imposed quarantine restrictions on account of Plague are disinsectised by spraying with 10% D.D.T.

4. Health certificates of passengers and crew are checked. Number of inoculations and vaccinations required by a passenger will depend upon the route he will fly. It is necessary for him to comply with the health regulations of the country in which he lands as well as the country of destination. The required certificates must be on International forms.

5. Before the departure of the aircraft the Port Health Officer enters in the journey Log book, particulars of sanitary measures applied to the aircraft. He also issues a health certificate to the Captain of the aircraft showing particulars of occurrence during the previous 15 days of any infectious diseases in the local area in which the aerodrome is situated. This enables the Health Officer at the next aerodrome to determine the health conditions of the aircraft on its arrival there. This health certificate is valid for 24 hours only and becomes non-valid after this period or if there is any change in the crew and passengers when a new health certificate becomes necessary.

References.

1. Aviation Medicine - Armstrong:
 2. Hygiene and Public Health - B. N. Ghosh.
 3. Recent Advances in Public Health - J. L. Burn.
 4. Modern Trends in Public Health - Arthur Massey
 5. Indian Aircraft Manual.
 6. Indian Aircraft (Public Health) Rules 1946.
 7. Govt. of India, Ministry of Health Notifications.
 8. Weekly Fasciculi - World Health Organisation.
 9. Manual of Tropical Medicine - National Research Council.
 10. Health Horizon - July 1950.
-