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CHAPTER 13

Air Conditioning in the Prevention and Treatment of Disease

Control of Airborne Infection, Value of Air Cooling Under Tropical Conditions, Treatment of Disease, Operating Rooms, Nurseries for Premature Infants, Fever Therapy, Cold Therapy, Allergic Disorders, Oxygen Therapy, Evacuation of Sick and Wounded, General Hospital Air Conditioning

THE late war has caused an increase of interest in the preventive aspects of air conditioning. It has re-emphasized the importance of the control of airborne infection and has demonstrated the value of air cooling under tropical conditions for the prevention of heat rash, for proper rest and sleep, and in the convalescence of patients.

CONTROL OF AIRBORNE INFECTION

Any program of air sanitation is influenced by a number of factors [1, 2, 3, 4]. In the winter months, the closing of doors, windows and other means of access to the outside air to conserve warmth and further the crowding of persons indoors provides conditions conducive to a high incidence of contagion. This seasonal phenomenon, illustrated in Fig. 1 which represents a study made by the U. S. Public Health Service, will concern the ventilating engineer in so far as air quality, determined by temperature, humidity, air replenishment and type of air movement and by freedom from contamination, is a major intrinsic factor. Apart from the seasonal picture of airborne contagion are such extrinsic factors as rate of turnover of personnel and the marked susceptibility of the recruit in comparison with permanent personnel [5] as shown by studies of military personnel housed in barracks, Fig. 2. These extraneous variables and the factor of contact infection (direct spray) tend to complicate any evaluation of the effectiveness of air sanitation for elimination of microorganisms in droplet-nuclei and droplet-dust. Thus, control measures may eliminate consistently 90 per cent of airborne organisms in laboratory tests, but cannot effect a decrease in actual incidence of infection exceeding 30 per cent. Thirty per cent may be the maximal reduction in infection possible by air treatment methods. The distinction should be clearly drawn, therefore, between the effectiveness of a procedure in laboratory tests and its effectiveness and applicability in actually reducing the incidence of airborne disease.

The following sequence of events has been postulated as occurring in a large proportion of intra-ward infections: (*a*) ejection of relatively large protected infective particles from patients, (*b*) rapid venting or settling of these particles so that those remaining airborne are in low concentration, (*c*) survival of infective particles to permit the accumulation of high concentrations on surfaces, (*d*) repeated reintroduction of infective particles into the air under the stimulus of ward activities or by air currents of the order of 50 fpm over the floor, and (*e*) extension of infective areas by air turbulence throughout the ward or hospital. The most important link in this probable infection chain has been demonstrated to be the reintroduction of particles into the air [6].