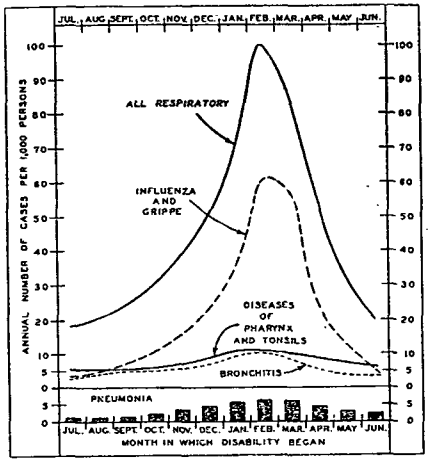
tion) is a major intrinsic factor. Apart from the seasonal picture of airborne contagion are such extrinsic factors as rate of turnover of personnel and the marked susceptibility of the recruit in comparison with permanent personnel[1] as shown in Fig. 2 by studies of military personnel housed in barracks. 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 micro-organisms 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



Occurrence of diseases causing disability for 8 consecutive days or longer in a group of 100,000 wage earners (10 per cent women) in different industries.
[a] Graph obtained from Dean K. Brundage, U. S. Public Health Service.

FIG. 1. STUDY OF AVERAGE MONTHLY FREQUENCY (1921–1926 INCLUSIVE) OF SPECIFIED RESPIRATORY DISEASES[a]

in actually reducing the incidence of airborne disease. On the other hand, recent studies suggest that inhalation of dust-borne bacteria is more important than direct inhalation of infectious droplets or droplet nuclei in the spread of respiratory tract infections.[2]

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.[3]

Intensive studies on air disinfection have indicated two distinct control measures, (*a*) suppression of dust and lint, and (*b*) disinfection of droplet-nuclei. A third measure, control of relative humidity is important. It has been shown that the viability of certain organisms sprayed into the atmosphere from a liquid suspension is dependent on relative humidity. The mortality rate of the organisms is very high at a relative humidity of 50 per cent,[4] and decreases at humidities above and below this figure. It has also been reported that the influenza virus loses much of its virulence when the relative humidity is 50 per cent.[5]

Well controlled, large scale tests of the various methods of air sterilization conducted in barracks[6, 7] have confirmed the importance of dust control in minimizing the spread of airborne disease, a consideration which has

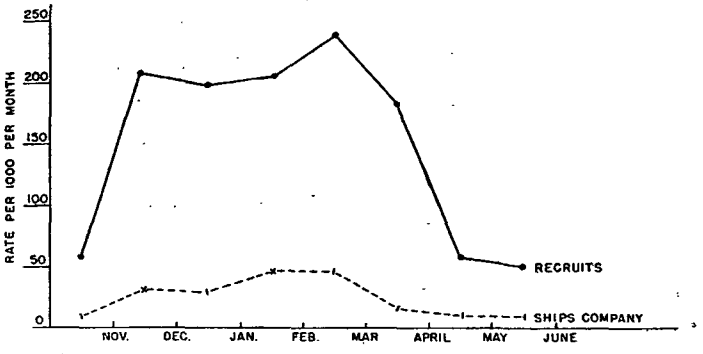


FIG. 2. MONTHLY INCIDENCE OF ACUTE RESPIRATORY ILLNESS AMONG NAVAL RECRUITS AND SHIP'S COMPANY (PERMANENT PERSONNEL)[1]

guided the practices of ventilating engineers for a number of years. The importance of the dust factor has been emphasized by many engineers and has been convincingly demonstrated by subsequent bacteriologic studies aboard ships.

Treatment of floors and bedclothes with oil emulsions has proved effective in reducing bacterial dispersion by as much as 90 per cent in Army barracks and station hospitals.[7] The incidence of acute respiratory infections was from 10 to 30 per cent lower in barracks with oiled floors and bedclothes than it was in control barracks which received no special treatment. More recent studies, however, have yielded inconsistent results.

An emulsifying mixture, *Fixanol C* containing cetyl pyridinium bromide, when incorporated in the oil-in-water emulsion imparted a bactericidal action to the emulsion. Blankets treated with this substance and oil