EPIDEMIOLOGICAL REFLECTIONS ON THE AIR WAR

BY

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There is little doubt that during the winter months a large proportion of those living and working in London and some other cities will spend up to half their lives in shelters under conditions of gross overcrowding. Droplet infections will be favoured; it is of interest to try to foretell what will happen, and of importance to examine possibilities of mitigating dangers.

Every reader will react to the last sentence by ejaculating, "Space people out." Were we fortunate enough to possess not one but half a dozen Winston Churchills it might be possible to enforce a redistribution of the people so drastic that the particular risks in question would be small. We are not so fortunate; we must depend on voluntary movement and persuasion. It does not need much imagination to promote a desire for shelter from bombs, but fear of epidemics is remote. Since 1918 our people have had no experience of a terrifying epidemic: simple fear of disease will not shift many families. Let us try to evaluate such data as we have for epidemiological prognosis. I shall consider only cerebrospinal fever and influenza, not because measles, diphtheria, and scarlet fever are unimportant, but because I have no relevant data.

Epidemiological Prognosis

With respect to cerebrospinal fever, we begin this winter in a less favourable position than a year ago: taking notifications as a rough measure of the volume of infection we should have to put this at about five times the amount at that time. In the first quarter of 1940 the regional distribution showed a strong preference for areas where troops were thickly distributed. London and other great cities had considerably less than their arithmetical share of cases. Can we say that the new conditions will change this.

It is true that our well-defined experience of cerebrospinal fever is short—less than 150 years; but, serious as the toll taken has been, there is no instance, I think, of the disease attaining the kinetic energy of scarlet fever, diphtheria, or, of course, influenza, and generating rapidly widespread epidemics—epidemics which produce panic. Some years ago (*J. Hyg., Camb.*, 1931, **31**, 336) I showed that the intragroup spread of measles, probably influenza, was satisfactorily described by the hypothesis that the time during which an infected person was infective was very short and the disease carried on by a chain of recipients. Although the carrier state in cerebrospinal fever is prolonged infective strains may be infrequent, so that the living chain is easily broken. It seems, then, not wholly wishful thinking to believe that, although cerebrospinal fever may be worse in January–March, 1941, than in 1940, catastrophic figures are unlikely.

The case of influenza is, if possible, more conjectural. It is dangerous to say categorically that an influenza of great killing and/or dispersive power must be a "true" virus influenza, but that is a reasonable hypothesis. The influenza of 1940, accounting for, say, six or seven thousand deaths (the exact figures are not available to me), was a minor epidemiological event and not, according to my information, a virus infection. In a mere statistical sense we have no grounds for associating catastrophic influenzas with banal environmental evils.

Like the English sweats (themselves, in the view of many epidemiologists, influenzas), and unlike plague or tuberculosis, influenza has not been a *morbus pauperum*, a respecter of the well-to-do and well housed. It does not, however, follow that unsavoury environmental conditions have gone for nothing in the genesis of dispersive influenzas. Hamer and Crookshank urged that influenza had a setting, that signs and portents were manifest before each of the great pandemics. The doctrine which Hamer, wholeheartedly, and Crookshank, with perhaps less conviction, supported of epidemic constitutions has few adherents. Sydenham's changes in the bowels of the earth were rather mysterious and Hamer's cosmic phenomena more so. But the facts used in support of the hypothesis were facts—their evidence of strange nervous illnesses, queer localized prevalences of virulent pneumonias, etc. These might point not to the bowels of the earth or the cosmos but to some change in the virulence or dispersiveness of strains of this or that organism due to a disturbed equilibrium consequent upon environmental change. Even before the *Blitzkrieg* we were living in a strange world. The laity, perhaps even our profession, are apt to take short views of epidemiological happenings, to be tacticians rather than strategists.

If by Christmas the public health of London is no worse than now a great many people will laugh at epidemiological forebodings. If we reach Easter without a serious epidemic nearly all will laugh, and a vaguely triumphant and self-laudatory broadcast will be traceable to Whitehall. October, 1918, was a shock to the most experienced officials. In the summer of 1918 I was in charge of the medical statistics of the R.A.F., and in reporting on the summer influenza to my superiors I introduced a sentence (I have forgotten its exact wording, but expect it was vague enough) expressing an opinion that a more serious recrudescence might shortly be expected. I remember that Sir Henry Head, who was chairman of the Medical Advisory Committee, reminded me of this in the dark days of November and asked why I had made the prophecy. My basis was in truth very weak. I was then a more loyal disciple of Sydenham as an epidemiologist than now. I argued that the late summer epidemic was the sign of a new constitution and, having noted that in 1891—a year of pestilence—there was a serious influenza in spring–summer, followed by an almost equally serious influenza within seven months, took this for a precedent. That was quite superficial, but had just the merit of at least trying to link past with present.

Now, in November, 1940, we have behind us a certainly abnormal epidemiological event—namely, the cerebrospinal fever of 1940; but the story of influenza, so far as I know it, has nothing queer in it. Even had I the rashness of twenty-two years ago I should not prophesy disaster.

Evils of Crowd-life

Still, having spent years in watching the epidemiological vicissitudes of herds of mice I am vaguely uneasy. The environmental conditions of those herds, from the point of view of overcrowding, are no longer so grotesque an exaggeration of the evils of human crowd-life as they were a year ago. Our years of study have taught us that in such a herd the epidemiological equilibrium is unstable. Some small change of conditions—perhaps in the rate of recruitment or, in one dramatic instance, a change of temperature—operating upon a community the vital statistics of which have been steady for a long time, is followed by decimation. I hope the analogy may be false, but it seems closer than I could wish.

What can we do, as private medical practitioners—if I may be allowed even in the humblest capacity to include

myself in that honourable company—to mitigate evils but vaguely foreseen? The primary need is to reduce the shelter populations. Wives, mothers, and sisters of indispensable workers are not to be frightened away by vague warnings. Those whose love of family and home triumphs over fear of death in its most melodramatic shape will not heed the warnings of all epidemiologists extant with the illustrious shade of Sydenham at their head. Something might be achieved by telling people the truth or, rather, what each of us holds to be the truth.

What seems to me the truth is that, by staying, the women increase the dangers of life and health which their menfolk run but, as a correspondent of the *Journal* recently pointed out, make the lives of the men more bearable. If it could be arranged to evacuate women and children to districts within easy reach of a city, so near that family reunions were at least weekly possibilities, then spacing out might be psychologically practicable. But many bombs fall upon the outer suburbs, and, presumably, the stronger the inner defences the greater will be the proportion of unloadings upon the outskirts. What is in fact the ratio of bombing risks, how far housing in the out-districts is or might be made safer than the tenements of slums, are questions no private person can answer.

THE BATTLE-SCARRED "LONDON"

In the board-room of the London Hospital there is a large map of the nine and a half acres covered by the hospital buildings on which at various points are coloured circles enclosing a date; these circles indicate the bombs which have fallen on the hospital. Since the bombardment of London began twenty-one bombs have been straddled across the hospital, including incendiary, high-explosive, and small calibre bombs. Ten thousand panes of glass in the hospital have been broken. Notwithstanding this, 300 beds are in use, and nearly forty blind men from a blind school are being cared for in the hospital. A large first-aid post is also accommodated here. The wards and administrative offices are all shored up, and the hospital activities are concentrated on the first, the ground, and the lower-ground floors. The hospital has its own squad of fire fighters, and for this reason the damage, which might have been much more serious, has been limited. Part of the Medical College has been badly damaged, and the top floor of the nurses' home has been struck by an incendiary bomb, but the rest of the building was saved because of the stone floor at the top. There are 200 casualty beds and 100 beds for civilian sick, but the population of the hospital is kept on the move, and as soon as patients can safely be transported they are sent to a sector hospital; this means that there are always beds waiting for those who need them. Captain Davies, of St. Paul's Cathedral fame, also saved the London Hospital. Digging took place for 18 feet, and ropes were tied round the bomb, but it could not be got out. Captain Davies then found the fuse, built 500 sandbags around the bomb, and exploded it, the only casualty being one pane of glass!

MUSEUM OF ROYAL COLLEGE OF SURGEONS

It has been found necessary to close the Museum of the Royal College of Surgeons until further notice. As a considerable number of the staff are in the Services new specimens cannot be mounted and placed in the Collection. It is also undesirable that valuable material, insufficiently protected, should be allowed to accumulate in the limited storage space at the College. It is hoped, therefore, that those who wish to present specimens to the Museum will retain them in their possession, but notify the Conservator of their intention to present them at a later date. He will be glad to give advice on preservation and storage. To ensure that the colour of the specimen may be retained preservation in Kaiserling I solution is recommended. The colour of specimens preserved in formalin solutions alone cannot be restored before mounting.

GOVERNMENT SHELTER POLICY

Criticism by Professor Haldane's Committee

Following upon the broadcast of the Minister of Home Security on November 3, in which he rejected the idea of universal provision of deep shelters and appeared to take no account of other forms of bomb-proof shelter, a letter has been sent to him by the A.R.P. Co-ordinating Committee, a body of architects, medical men, engineers, and scientists, of which Prof. J. B. S. Haldane is chairman, protesting against the Government's attitude. The alternative policy of scattering the people in a large number of small shelters of the Anderson type, strutted basements, and modified forms of brick surface shelter, supplemented by the strengthening of the lower floors of certain strong buildings, is described by the signatories as totally inadequate. The safety of each individual, they say, is determined not by whether he happens to be with two other people, or with two thousand, but by the construction of the shelter in which he takes refuge—that is, by the thickness of its roof, walls, and floor. Dispersal in small shelters, far from resulting in greater safety, will militate against it. A shelter for five people will, for a given expenditure per head, be far less safe than a shelter for five thousand.

In the view of the committee a realistic policy of bomb-proof shelters will include the use both of tunnel (or deep) shelters and of shelters depending not on depth but on concrete and steel for their bomb-proof qualities. Each of the following forms of shelter must play a part: reinforced concrete shelters, above or below ground, holding from 100 to 1,000 people each (the Haldane shelter); large multi-story reinforced concrete shelters for densely populated areas, an outstanding example of which is the Finsbury scheme submitted to the Home Office before the war; the utmost possible adaptation and extension of existing tunnels, including the driving of tunnels from the most favourable parts of the London tube system; and the construction of new tunnels in parts of the country where soil conditions are favourable. As immediate measures pending such construction the committee urges the conversion of parts of steel or reinforced concrete framed buildings into shelters and the taking over for public use of large and relatively safe private shelters; also the improvement of facilities in existing shelters by the provision of properly designed bunks, mechanical ventilation, adequate sanitation, including the installation of water closets (in place of chemical closets), canteens, drinking-water, first-aid and isolation rooms, adequate lighting, and provision for disinfection. Every possible measure should be taken to make available the adequate production of cement, together with modifications in the priority system, with regard to steel, for example, in order to assure a share of materials proportionate to the importance of A.R.P.

Describing investigations into the properties of glass variously protected, in a recent issue of the *Journal of Scientific Instruments*, Dr. H. Moore states that a sheet of glass of 1/8 in. thickness, if protected by millboard of good quality of 1/16 in., requires before it is fractured two and a half times the force it would require if it was uncovered. In most cases glass bursts outwards. It breaks as a result of being bent inwards during the high-pressure wave, but the segments do not appreciably separate until the pressure excess has given place to the subsequent rarefaction, which occupies a much longer period, and during this period the pieces of glass are sucked forward and fall outwards. Short of blocking up a window with brickwork or enclosing it in shutters of heavy timber or stout steel it is impossible to safeguard glass from fracture. The simplest method of reducing personal injury from flying fragments, and one available for most domestic windows, is the drawing of heavy curtains, which should hang freely so that they can swing inwards. By "lengthening the time of blow" in this way the risk of fragments cutting through the fabric is reduced, and there is a reasonable chance that they may be stopped harmlessly as the curtain swings away from the window. The same applies to wire netting stretched on window frames inside the window some 3 or 6 in. from the glass.