Discussion on the modern control of infectious diseases / R.A. O'Brien.

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DISCUSSION ON THE MODERN CONTROL OF INFECTIOUS DISEASES.

Dr. R. A. O'BRIEN.

In my contribution to this discussion I propose to consider mainly diphtheria and scarlet fever.

Attention has repeatedly been drawn to the fact that after the introduction of diphtheria antitoxin, about the year 1894-1895, a considerable drop in the mortality from diphtheria occurred, but that for many years past the incidence has remained fairly steady.

Can the Schick test and active immunization help in reducing this incidence? Table I records the figures for New York City and Chicago, where testing and immunization have been carried out on a large scale, with the help of a large number of public bodies, private societies interested in public health, and insurance companies.

TABLE I.—DIPHTHERIA INCIDENCE, NEW YORK CITY AND CHICAGO.

	Year	Number of new cases reported	Number of deaths	Number of persons Schick tested	Number of persons immunized by T.A.T.
(*a*) New York City ...	1919	14,014	1,239 [1]	12,000	5,150
,, ...	1920	14,166	1,045	20,000	8,000 (estimate)
,, ...	1921	15,110	891	140,560	42,000
,, ...	1922	10,427	873	146,840	48,496
,, ...	1923	8,050	553	119,493	42,818
,, ...	1924	9,687	714	130,493	58,936
,, ...	1925	9,051	663	83,854	38,191
[1] Average previous ten years 1,337.					
(*b*) Chicago ...	1922	7,367	564 [2]	5,413	8,396
,, ...	1923	5,836	366	18,470	28,378
,, ...	1924	3 672	216	23,296	38,276
,, ..	1925	2,926	239	21,579	45,282
[2] Average previous ten years 797.					

"In twenty-three representative American cities the death-rate since 1918 has fallen an average of 10·3 per cent. per year. This fall in the twenty-three cities studied by the Statistical Bureau of the Metropolitan Life Insurance Company has coincided with the general application of toxin-antitoxin immunization by city departments of health." [1]

The evidence that these measures have not merely been followed by the drop, but have been the main cause of the drop, though it may not even yet satisfy the rigid requirements of the statistician, will, I think, convince any ordinary observer who has followed the campaign throughout its history.

[1] "A Campaign Handbook for Local Tuberculosis and Public Health Associations," State Committee on Tuberculosis and Public Health, New York City, No. 176, 1926, p. 18.

What Evidence is Available in England?

For the past four years we have been in close touch with three institutions in which diphtheria had occurred, and in which testing and active immunization were begun by ourselves and have been carried out for a period of years. During that time there has been no case of undoubted clinical diphtheria amongst any of the children who have been tested and found negative to the Schick test, either naturally or after immunization. It is true that there are no adequate statistical controls; the only evidence that these measures of testing and immunization have caused the drop in incidence is that no infections have occurred amongst the children living in these residential schools but attending outside day schools, whereas amongst the other unprotected children attending these day schools many cases of diphtheria have occurred.

If the practice of Schick testing and active immunization, efficiently applied, is to be justified in the general community, these processes should be able to control diphtheria in a group of people exposed constantly, and in high degree, to the risk of infection; such groups are represented by the nurses in the diphtheria wards of infectious hospitals.

Incidence of Diphtheria amongst Nurses in Diphtheria Wards.

In 1913, in the hospitals of the Metropolitan Asylums Board, there were 5,475 patients with an attack of diphtheria admitted and fifty-one cases amongst the staff, i.e., one staff case for 107 admissions. The corresponding figures for 1914 were 6,591, 108, i.e., one case for sixty-six admissions. Figures kindly supplied by the Clerk to the Board show that there have been somewhat over 280 "staff" cases of diphtheria in the last three years in which the total admissions were 25,000, i.e., one staff case per ninety admissions.

The Medical Officers of Health of a number of the large cities of England have kindly supplied me with a considerable number of figures. In five cities one nurse became infected with diphtheria for between fifty and 100 admissions, in four cities one nurse for between 100 and 150 admissions, in two cities one nurse for between 150 and 240 admissions. I have therefore assumed that one nurse (or member of the ward staff) catches diphtheria for each 100 admissions. The total number of cases of diphtheria during the past four years in England has averaged 50,000 a year; probably annually 500 nurses in diphtheria wards have suffered from diphtheria. From the information placed at my disposal by the medical officers of the above-mentioned cities, we find that in one city fever hospital testing and immunization are, since a very recent date, obligatory on admission, in nine cities these measures are not used, in two they are offered but little used, in six they have been offered and generally used, in one since 1924, in the others since July last, or at a later date; one hospital reports that the measures were used (apparently for a short period), were "unsatisfactory," and were dropped.

Is it possible or practicable to control the incidence of diphtheria amongst nurses? In three fever hospitals in Great Britain, thorough testing and immunization have been in use during the past few years. Sir John Robertson has told us that in Birmingham from 1916 to 1922 an average of eighteen cases occurred each year amongst the staff; that since active immunization had been applied by Dr. E. H. R. Harries the incidence has dropped and is now non-existent amongst nurses tested and found to be negative to the Schick test. Dr. Kinloch, of Aberdeen, and Dr. Benson, of Edinburgh, very kindly have permitted me to publish the following figures, indicating a large drop in incidence immediately following the use of testing and immunization.

TABLE II.—DIPHTHERIA INCIDENCE AMONGST NURSING STAFFS, EDINBURGH AND ABERDEEN.

	Year	Total nursing staff	Total diphtheria admissions to hospital	Diphtheria in staff	
(*a*) Edinburgh ...	1919 ...	—	—	17	
,, ...	1920 ...	148	1,201	10	
,, ...	1921 ...	146	1,111	14	
,, ...	1922 ...	147	914	13	(September, 1922)
,, ...	1923 ...	137	854	5[1]	
,, ...	1924 ...	128	821	4[1]	
,, ...	1925 ...	161	1,050 ?	4[1]	

[1] All in Schick positive nurses shortly after admission or before immunization.

(*b*) Aberdeen ...	1912 ...	125	—	6	
,, ...	1913 ...	125	—	15	
,, ...	1914 ...	125	—	15	
,, ...	1915 ...	125	—	8	
,, ...	1916 ...	125	—	10	
,, ...	1917 ...	125	—	10	
,, ...	1918 ...	125	—	7	
,, ...	1919 ...	125	—	5	
,, ...	1920 ...	125	—	18	
,, ...	1921 ...	125	—	18	
,, ...	1922 ...	125	—	2	January, 1922 [2]
,, ...	1923 ...	125	—	0	
,, ...	1924 ...	125	—	3	
,, ...	1925 ...	125	—	1	

[2] Active immunization commenced.

With regard to "reactions," local or general, amongst the nurses after testing and immunization where these measures are in operation, the general reports are "reactions negligible" and "no nurse off duty," or that, at the worst, they cause no administrative difficulty.

It would appear, now that it is practicable greatly to reduce or to abolish diphtheria among nurses, that serious consideration throughout large fever hospitals in England should be given as to the advisability of attempting to prevent the occurrence of the annual 500 cases of diphtheria amongst nurses in fever hospitals. If diphtheria could be abolished a considerable amount of dislocation of hospital routine, time and money would be saved, to say nothing of the personal inconvenience and risk to which the affected nurses are subjected.

SCARLET FEVER.

Incidence.—In 1913 in the Metropolitan Asylums Board hospitals 117 cases of scarlet fever occurred amongst the staff, 15,010 cases were admitted, i.e., one staff case per 130 admissions; for 1914 the figures were 236, 22,000 = 1 per 93. The figures for two large cities from 1920-5 were 1 per 160 and 220. I have therefore assumed that one staff infection occurs for each 200 scarlet fever patients admitted. The average notification for the past four years in Britain has been 103,000: presumably 500 cases occurred amongst ward staffs. In the scarlet fever wards of one hospital, amongst 429 nurses employed during nine years forty-seven caught scarlet fever, i.e., 9 per cent.

From our very meagre English experience we cannot yet say that Dick testing and active immunization have proved their ability to abolish scarlet fever from the ward staffs, but American experience seems to enable one to predict with some confidence that these measures will be successful in greatly diminishing or abolishing the occurrence of scarlet fever.

Though a negative response to the Dick test as at present carried out does not apparently indicate the practically complete immunity to scarlet fever that a negative response to the Schick test does in connexion with diphtheria, it is reasonable to conclude on the evidence available that a negative Dick response does indicate a

considerable degree of protection. Thus, in one hospital in Great Britain in a certain period fourteen children were admitted as certified scarlet fever, but were, in the opinion of the admitting officer, not, or probably not, suffering from scarlet fever. It was necessary to send them all to the same wards; eight of the children were positive to the Dick test; of these six developed scarlet fever in the hospital; of the six children with Dick negative response none developed scarlet fever.

Dr. Mussen kindly gave me the following figures relating to Fazakerley: During a certain period Dr. Rundle records that of forty-four nursing entrants who had suffered before entry from scarlet fever none developed the disease during their hospital career; of 108 with no previous history eleven contracted the disease and one died; of another group of thirty-three with no previous history of infection five became infected with the disease. Since July, 1925, forty nurses have been immunized with Dick toxin; up to the present no cases of scarlet fever have occurred amongst them.

Conclusions.

(1) Probably 500 cases of diphtheria and 500 of scarlet fever occur annually in England amongst nursing and ward staffs of infectious fever hospitals.

(2) Where Schick testing and active immunization have been adequately carried out the incidence of diphtheria amongst the staff has dropped practically to nothing.

(3) There is ground for hoping that similar testing and immunization will greatly reduce or abolish scarlet fever from amongst hospital staffs.

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