Typhus statistics of the Dundee Royal Infirmary : with remarks / by T.J. Maclagan.

TYPHUS STATISTICS

OF THE

DUNDEE ROYAL INFIRMARY.

WITH REMARKS.

BY

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That overcrowding is the strongest predisposing cause of typhus is generally admitted; with it is usually combined a considerable amount of privation and destitution, due either to famine consequent on failure of the crops, or to the same condition artificially induced by strikes and commercial distress.

The epidemic which has furnished the great part of the following statistics is an instance of the connexion existing between typhus and overcrowding, caused, not by famine and destitution, but by exactly the opposite conditions.

The trade of Dundee has for some years back been in a state of unexampled prosperity; labour has been abundant, wages good, and the general state of the community prosperous and comfortable. In consequence of this, great numbers of the inhabitants of the towns and villages of Forfarshire and the neighbouring counties have moved into Dundee, and have found there the work and wages desired. The house accommodation has, however, been quite inadequate for them, and the consequence has been a state of overcrowding, resulting in an epidemic of typhus, which, during the years 1865 and 1866, sent into the Dundee Infirmary 1600 cases of that disease. Had destitution co-existed with this state of overcrowding, the malady would doubtless have been more widespread and fatal; as it is, its occurrence at such a time of prosperity tends to show that overcrowding, however caused, strongly predisposes to typhus, and that for the production of this disease it is not necessary that it should be linked with destitution.

On many occasions, when visiting the typhus haunts, have I found a family composed of father, mother, and several children of all ages, occupying the one room which formed their entire accommodation; and this, not because of poverty, but because they could get no more suitable place of abode. One instance I remember well, of a respectable mechanic, with a wife and four daughters of ages varying from four up to eighteen, who occupied only one room. The

father was making good wages, two of the daughters were working in the mills, and a son (a boy of sixteen) was obliged to live in lodgings away from his parents. The man told me that he had come to town two years previously, and had taken the room in which they then lived only for a short time, until he could find a suitable house, but that he had not yet succeeded in getting one. Typhus attacked one of the children, whom the mother nursed at home, refusing to send it to the hospital. Within a short time afterwards all the members of the family, except the son, were admitted into the Infirmary, suffering from typhus fever. Many very similar cases came under my observation during the course of the epidemic.[1]

A careful examination of the records of the Dundee Infirmary shows that during the last nine years there were treated in that institution 2492 cases of typhus fever.

The following table shows the ages in quinquennial periods, with the mortality in each :—

TABLE I.

Age.	Total.	Recovered.		Died.		Percentage of Deaths in Males.	Percentage of Deaths in Females.	General Percentage.
		M.	F.	M.	F.			
Under 5 .	78	37	39	1	1	2·63	2·5	2·56
5 to 10 .	270	124	138	4	4	3·12	2·81	2·96
10 „ 15 .	430	197	222	5	6	2·47	2·63	2·56
15 „ 20 .	440	178	245	6	11	3·26	4·29	3·86
20 „ 25 .	332	139	168	9	16	6·08	8·69	7·53
25 „ 30 .	257	96	131	17	13	15·04	9·02	11·67
30 „ 35 .	172	61	84	11	16	15·27	16	15·69
35 „ 40 .	157	51	73	21	12	29·16	14·11	21·01
40 „ 45 .	151	57	57	22	15	27·84	20·83	24·5
45 „ 50 .	81	25	29	19	8	43·18	21·62	33·3
50 „ 55 .	55	16	13	17	9	51·51	40·9	47·27
55 „ 60 .	20	6	7	4	3	40	30	35
60 „ 65 .	26	1	10	9	6	90	37·5	57·69
65 „ 70 .	7	...	1	3	3	100	75	85·71
Not noted,	·16	4	6	2	4	33·3	40	37·5
	2492	992	1223	150	127	13·13	9·407	11·11

It will be seen from this, that of the total 2492 cases there died 277, being a mortality of . . . . 11·11 per cent.

[1] It is interesting to note the relation existing between the increase in the population and the prevalence of typhus. The towns in which the fever has been most prevalent within the last few years are Glasgow, Dundee, and Greenock. It will be seen from the following statement that in these three towns the increase in the population was also greatest :—

In Edin. and Leith, between 1851 and 1861 the population increased 5·5 per cent.
„ Aberdeen, „ „ „ „ „ 2·5 „
„ Perth, „ „ „ „ „ 5·9 „
„ Glasgow, „ „ „ „ „ 19·9 „
„ Dundee, „ „ „ „ „ 14·5 „
„ Greenock, „ „ „ „ „ 14·7 „

In all the large towns of Scotland typhus has existed, but only in the three last mentioned has it been widely epidemic.

Amongst males, the mortality was . . . 13·13 per cent.
„ females, the mortality was . . 9·4 „

This higher mortality amongst males has been generally noted by statisticians. The probable explanation seems to me to be that given by Dr Murchison, that men are more apt to be of intemperate habits, and are more liable to expend their muscular force during the early stages of the fever.[1]

The remarkable influence exercised by age over the rate of mortality is well seen in this table, and shows clearly what has so often been insisted on by writers on the subject, that no comparative statement of the results of the treatment of typhus in different localities is of value, unless the comparison be drawn between patients of the same age. Of the 2492 cases, nearly three-fourths are under 30 years of age.

The mortality was much higher during those years in which few cases occurred than during those in which the disease was epidemic. During the years 1858–62 there were treated 395 cases, being an average for each year of 79; amongst these occurred 61 deaths, being a mortality rate of 15·4 per cent. During the last four years, 1863–66, there were treated 2097 cases, being for each of these years an average of 524; amongst these there occurred 216 deaths, or a mortality of 10·3 per cent. This smaller mortality during an epidemic than in an ordinary season has not unfrequently been noted. Its probable explanation is, that during a year in which the disease is not epidemic a larger number of those attacked have previously been in bad health; their weakened state leading them to contract the disease under circumstances in which a healthy person would resist it.

The following table shows the monthly admissions for nine years:—

Table II.

Month.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	Total.
January, .	...	1	19	5	5	11	19	41	150	251
February, .	...	1	18	7	0	13	22	29	66	156
March, . .	...	0	12	15	2	8	30	55	87	209
April, . .	1	5	1	16	6	15	21	50	89	204
May, . .	2	2	1	5	7	32	17	63	76	205
June, . .	3	6	3	19	3	19	19	40	55	167
July, . .	2	10	1	13	1	22	18	66	45	178
August, .	1	11	0	5	3	27	30	60	29	166
September,	1	13	1	14	6	24	30	71	35	195
October, .	3	13	5	16	7	30	16	116	28	234
November,	1	27	2	7	6	18	17	176	28	282
December,	3	39	4	7	8	17	25	124	18	245
	17	128	67	129	54	236	264	891	706	2492

[1] Of the 2492 cases, 1142 were males, and 1350 females. The preponderance of females is accounted for by the fact that the majority of the millworkers belong to that sex; they preponderate in the town, and naturally do so in the hospital statistics too.

A reference to this will show that November holds priority, and that the winter months furnish a considerably larger number than those of any other season:—

February, March, and April,	furnished	during	nine	years, . 569
May, June, and July,	„	„	„	. 550
August, September, and October,	„	„	„	. 595
November, December, and January,	„	„	„	. 778

The number of admissions during the three winter months being 228 in excess of the admissions during the three summer months.

The epidemic reached its height in November 1865, in which month 176 cases were admitted; in December there were 124 admissions; in January 1866 there were 150; in February only 66; from that date they continued, with occasional slight rises, to fall, until, in December 1866, there were only 18 cases admitted. This greater prevalence of the disease during the winter months, though frequently observed, is by no means invariable. In the absence of any special agent, such as famine or commercial distress, it might, however, be expected to show an increase during the cold season, as it is then that so much care is taken by the lower classes to keep out the fresh air by all possible means. There is thus produced in their dwellings an atmosphere admirably adapted for the propagation and spread of typhus, and one which could not be produced during warm weather when the doors and windows are kept open to admit the fresh air. A badly ventilated room containing two people may be really more overcrowded,—that is to say, afford less breathing space to each occupant,—than a well ventilated room of the same size having twice as many people in it.

Of 1750 cases of typhus treated between the beginning of 1864 and the end of 1866, and of which full and accurate notes were kept, 1557 were uncomplicated and 193 complicated. In no case has the secondary affection been raised to the dignity of a complication, unless its severity were such as to influence more or less the prognosis, course, or treatment of the case.

Of the 1750 cases, 809 were males and 941 females; amongst them there occurred 174 deaths—96 males and 78 females; being—

	For males	a death-rate	of 1 in	8·42,	or 11·86	per cent.;
	„ females	„	„	1 in 12·06,	or 8·28	„
and	„ all cases,	„	„	1 in 10·05,	or 9·94	„

Excluding 10 cases fatal within 24, and 9 within 48 hours of admission, the general death-rate was 1 in 11·29, or 8·85 per cent. Of the 1557 uncomplicated cases, 750 were males and 807 females; of these 119 died—78 males and 41 females; being—

	For males	a death-rate	of 1 in	9·6,	or 10·4	per cent.;
	„ females	„	„	1 in 19·6,	or 5·08	„
and	„ all cases	„	„	1 in 13·08,	or 7·6	„

Of the 193 complicated cases, 59 were males and 134 females; amongst them there occurred 49 deaths—16 males and 33 females; being a mortality rate—

For males, of 1 in 3·6, or 27·1 per cent.;
„ females, of 1 in 4·06, or 24·6 „
and „ all cases, of 1 in 3·9, or 25·38 „

Amongst the 1750 cases, 1 in 9·06, or 11·02 per cent. was complicated;
„ „ males, 1 in 13·71, or 7·28 „ „
„ „ females, 1 in 7·02, or 14·24 „ „

Excluding those cases in which the complicating malady was referable to the uterine organs, the ratio of complicated cases in females was 1 in 7·6, or 13·07 per cent. Excluding those cases in which the complicating malady existed prior to the febrile attack, complications occurred in 1 in 9·8, or in 11·7 per cent. of the whole.

In the following table is given a list of the complications, with the rate of mortality in each:—

TABLE III.—*Showing the Complicating Maladies, and the Mortality in each.*

Complicating Malady.	Total.	Recov.	Died.	Rate of Mortality.	
				Per cent.	Ratio in cases affected.
Abortion and miscarriage, .	7	7	...	...	...
Abscesses in various parts, .	1	1	...	...	...
Bronchitis, ...	88	66	22	25	1 in 4
Convulsions, . . .	8	4	4	50	1 „ 2
Diarrhœa, ...	12	11	1	8·3	1 „ 12
Diphtheria, ...	2	1	1	50	1 „ 2
Empyema, ...	2	1	1	50	1 „ 2
Epistaxis, ...	6	6	...	...	...
Erysipelas, ...	3	2	1	33·3	1 in 3
Gangrene of parts not subjected to pressure, . .	7	4	3	42·85	1 „ 2·3
Hæmoptysis (profuse), . .	1	...	1	100	1 „ 1
Jaundice, ...	2	...	2	100	1 „ 1
Leucocythemia splenica, .	1	1	...	...	...
Menorrhagia, . . .	3	3	...	...	...
Morbus cordis, . . .	8	6	2	25	1 in 4
Otitis, ...	2	2	...	...	...
Parotid swelling, . . .	18	15	3	16·6	1 in 6
Pharyngitis, . . .	2	...	2	100	1 „ 1
Phthisis, ...	4	2	2	50	1 „ 2
Pneumonia, ...	4	3	1	25	1 „ 4
Pleurisy, ...	9	7	2	22·2	1 „ 4·5
Puerperal hysteritis and peritonitis, ...	1	...	1	100	1 „ 1
Syphilis, ...	2	2	...	...	...
	193	144	49	25·38	1 in 3·9

From this it will be seen that complications referable to the pulmonary organs have been by far the most frequent; they constitute more than half the total number. Excluding the cases complicated with phthisis, and taking only those in which the pulmonary affection sprung up during the course of the fever, we find that 103, or 5·78 per cent. of the total 1750 cases, were so affected. Of the 103 cases, 26 died, being at the rate of 1 in 3·9, or 25·2 per cent. They thus form 14·9 per cent., or 1 in 6·6, of the total number of deaths, and exactly two-thirds of the total number of fatal complicated cases. It should be borne in mind, also, that in the table are given only those cases in which the lung complication was of a grave character. Many others, nay, the majority, of the cases treated, had more or less bronchial affection. The presence of some pulmonary affection has been the rule throughout the epidemic. By far the most common complication was bronchitis,[1] 1 in 2·19, or 45·5 per cent., of the total complications were due to this affection. Of the cases complicated with it, 25 per cent. died.

Of the pulmonary affections, the next in frequency was pleurisy, which (including two cases noted empyema in the table) occurred about once in 160 cases, and formed 5·69 per cent. of the total complicated cases. Pneumonia was rare; it occurred in only four of the 1750 cases, or about once in 440.

Pulmonary hypostasis I have not ranked amongst the complications, not because it has not occurred, but because it is to be regarded, I think, less as a complication than as a concomitant; less as a separate affection appearing during the course of typhus, than as a sign of great prostration indicating the severity of the attack. It has existed to a greater or less extent in most of the severe cases; in every fatal case in which a sectio was obtained, this condition of the lungs was found.

Parotid swelling occurred in 18 cases, or in rather more than 1 per cent. of the total 1750. In 9 of the cases the right parotid was affected, in 7 the left, and in 2 both glands were swollen. In only 2 of the 18 cases did suppuration not take place. In 1 case the swelling did not appear until several days after the establishment of convalescence.

Convulsions occurred in 8 cases, of which 4 recovered,—an unusually large number of recoveries from so fatal a complication; in all of the 8 cases there existed an albuminous state of the urine.

Epistaxis has been put down as a complication only when it occurred to such an extent as to have a bad effect on the patient. In 2 of the 6 cases the nose had to be plugged.

Amongst the 7 cases noted in the table as being complicated with gangrene of parts not subjected to pressure, are 3 worthy of a little more notice. The first was that of a young woman suffering from sores on the labia, and gonorrhœa, in whom the whole

[1] It occurred nearly once in every twenty cases.

of the labia became gangrenous and formed one large fetid slough. Before it showed any signs of separating, she died.

The second was also a young woman afflicted with gonorrhœa. In this case excoriations, and finally a small slough, appeared on the upper and inner part of each thigh; these separated, and she made a good recovery.

The third case was that of a man affected with gonorrhœa. There was a very abundant discharge, and it was impossible to keep him so clean as was desired: a gangrenous patch appeared at the lower part of the prepuce, and spread until fully three-fourths of the prepuce was involved in a slough, which ultimately separated. The patient made a good recovery.

In all the cases of typhus that I have seen, in which gonorrhœa co-existed with the fever, the discharge has been greatly increased in quantity, and the local irritation much more marked during the continuance of the febrile state.

Jaundice, an almost inevitably fatal complication, occurred in 2 cases, both of which died: in 1, the jaundice had existed for sometime previous to the febrile attack. In 8 cases there occurred abortion or miscarriage; 1 of these died from hysteritis and peritonitis coming on after the miscarriage.

In 2 cases, pharyngitis occurred. In 1, the inflammation resulted in the formation of an abscess. Both cases proved fatal.

The 2 cases in which diphtheria was the complicating malady were both boys of 11 and 14 years. In one, in which recovery took place, the complication did not appear till during convalescence; in the other, which proved fatal, the disease sprung up during the course of the typhus.

Of 581 uncomplicated cases which recovered, and in which the date of commencement of the patient's illness was satisfactorily ascertained, the duration of the fever was found in 1 to be 9 days; in 24, 10 days; in 64, 11 days; in 112, 12 days; in 110, 13 days; in 127, 14 days; in 72, 15 days; in 26, 16 days; in 28, 17 days; in 13, 18 days; in 2, 19 days; in 2, 20 days; being an average duration for each case of 13·39 days. I may as well mention that the cases given here were undoubted typhus, and that all had a well-marked commencement.

Of the 581 cases, 249 were males and 332 females. Of the males, 13 had a duration of 10 days; 35, of 11 days; 44, of 12 days; 54, of 13 days; 52, of 14 days; 30, of 15 days; 6, of 16 days; 10, of 17 days; 4, of 18 days; 1, of 19 days; being an average duration for each of 13·17 days.

Of the females, 1 had a duration of 9 days; 11 of 10 days; 29 of 11 days; 68 of 12 days; 56 of 13 days; 75 of 14 days; 42 of 15 days; 20 of 16 days; 18 of 17 days; 9 of 18 days; 1 of 19 days; 2 of 20 days; being for each case an average duration of 13·58 days: almost exactly the same as the male average.

Of	2	cases	under 5 years of age,		the average duration was	13 days.
	8	„	from 5 to 10	„	„	12·5 „
	126	„	„ 10 to 15	„	„	12·67 „
	137	„	„ 15 to 20	„	„	13 „
	99	„	„ 20 to 25	„	„	12·87 „
	75	„	„ 25 to 30	„	„	14·02 „
	38	„	„ 30 to 35	„	„	13·81 „
	30	„	„ 35 to 40	„	„	14·53 „
	32	„	„ 40 to 45	„	„	14·34 „
	14	„	„ 45 to 50	„	„	11·42 „
	11	„	„ 50 to 55	„	„	12·36 „
	6	„	„ 55 to 60	„	„	14·5 „
	3	„	„ 60 to 65	„	„	15·3 „

The shortest case was that of a female child aged 12, in whom convalescence began after nine days' illness; the longest were those of two females, aged respectively 18 and 26 years, in whom convalescence was delayed till the twentieth day.

It will be seen that from 35 to 45, and from 55 to 65, are the two decades which show the longest average duration; all below 25, and those from 45 to 55, are below the general average; all the others are above it.

These tabulated statements would seem to indicate that sex does not at all influence the duration of the malady, and that age does so only to a slight and, doubtless, variable extent.

Of 83 complicated cases which recovered, and in which the commencement of the febrile attack was clearly ascertained, 1 had a duration of 10 days; 2 of 11 days; 4 of 12 days; 18 of 13 days; 13 of 14 days; 19 of 15 days; 12 of 16 days; 7 of 17 days; 4 of 18 days; 3 of 19 days; being an average duration for each case of 14·71 days; upwards of a day more than the average of uncomplicated cases.

Of the 83 cases, 21 were males and 62 females. The average duration for males was 14·6 days; for females, 15·17 days.

Of 54 uncomplicated cases which proved fatal, and in which the commencement of the fever was clearly ascertained, death occurred in 2 on the 8th day; in 4 on the 9th day; in 8 on the 10th day; in 5 on the 11th day; in 7 on the 12th day; in 8 on the 13th day; in 8 on the 14th day; in 3 on the 15th day; in 5 on the 16th day; in 2 on the 17th day; in 1 on the 19th day; in 1 on the 20th day; being for each an average duration of 12·68 days.

Of the 54 cases, 36 were males and 18 females. The average duration for males was 12·7 days; for females, 12·5 days,—or as nearly as possible the same.

Of 27 complicated cases which proved fatal, and the day of commencement of which was ascertained, 1 terminated on the 5th day, 1 on the 10th day, 2 on the 11th day, 2 on the 12th day, 4 on the 13th day, 3 on the 14th day, 7 on the 15th day, 2 on the 16th day, 3 on the 17th day, 1 on the 21st day, 1 on the 30th day,

being an average duration of 14·59 days. Of the 27 cases, 6 were males, and 21 females. The average duration for males was 14·5 days, for females, 14·14 days. The longer duration of these cases than of the fatal uncomplicated cases is due to the fact, that several died of the complicating malady after the fever had ceased. The general summary of the foregoing statements is as follows:—

The average mortality of the total number of cases treated during the last nine years (2492) was 11·11 per cent.

The average mortality of 1750 of these treated during the last two and a half years, when the disease may be said to have been epidemic, was 9·94 per cent.

The average mortality of the uncomplicated cases was 7·92 per cent., whilst that of the complicated cases was 25·38 per cent.

The average duration of 581 uncomplicated cases which recovered was 13·39 days. Of 83 complicated cases which recovered, the average duration was 14·71 days. Of 54 uncomplicated cases which proved fatal, the average duration was 12·68 days. Of 27 fatal complicated cases, the average duration was 14·59 days.

From the commencement of the year 1858 up to March 1864, so far as can be made out from the records of the cases, there sprung up in the house 29 cases. Of these, 24 occurred amongst the servants and officials, and 5 amongst the patients. There is considerable difficulty in getting exact information on this point, however; I therefore do not put forward this statement as absolutely correct. All that I am certain of is, that 29 cases at least originated in the house during the above-mentioned space of time. Of the 24 officials, 16 recovered and eight died; the fatal cases were those of 2 resident medical officers, the matron, and 5 nurses and servants. Of the 5 patients, 3 recovered and 2 died.

From March 1864 down to the end of 1866, I have definite and reliable data regarding this point, and find that during that period (nearly three years) 36 cases originated in the hospital. Of these, 23 occurred amongst the officials and servants, and 13 amongst the patients. Of the former, 22 recovered and 1 died; of the latter, all recovered.

The 23 cases which occurred amongst the officials consisted of 1 attending physician, 3 assistant medical officers, and 19 nurses and servants. The fatal case was that of a night-nurse. Of the 23 cases, 15 occurred amongst those whose duties brought them into direct communication with typhus patients, and in whom the attack was, doubtless, due to direct contagion; 3 occurred amongst washerwomen, to whom the poison was probably conveyed by fomites; the other 5 occurred amongst servants whose duties did not all bring them into contact with the disease. The probable explanation of their occurrence is to be found in the free commingling of the servants, and the impossibility of preventing this

in consequence of all their sleeping apartments being close to each other, and away from the wards.[1]

Of the 13 patients who contracted the malady, 5 cases, 2 of which were convalescent from scarlatina, and 3 from enteric fever, were treated in wards adjoining one containing typhus cases; the other cases sprung up in the general wards, situated a floor below the fever wards; at the time of their occurrence, there was a large number of typhus cases in the house. Here it may be well to explain that the Dundee Infirmary consists of 3 floors, the first and second of which are devoted to the treatment of general cases, whilst the third and highest is kept for the reception of contagious diseases—chiefly typhus. By this arrangement, the separation of the fever from the general cases is rendered as complete as it is capable of being in a general hospital.

The above facts have an important bearing on the question of the propriety of having separate establishments for the treatment of fever cases. My own opinion is, that every town which is subject to epidemics of typhus ought to have a fever hospital; at the same time, I am sure that typhus is quite a preventable disease, and that, if our towns were properly constructed and not too densely populated, it would erelong disappear from our midst. The question, therefore, will always arise, "Might not the money required for the construction and maintenance of a fever hospital be better employed in improving and increasing the dwellings of the working classes, and doing away with the conditions which give rise to typhus?" The answer to this would depend entirely on the town in question. A measure of sanitary reform, sufficiently sweeping in character to eradicate typhus, would, in some of our large towns, meet with insurmountable difficulties, whilst in others it would be quite practicable.

The chief argument urged against the establishment of such institutions, that the concentration of the fever poison increases the mortality from the disease, is one which is not supported by fact. The mortality from typhus in the Fever Hospital in London is less than that amongst the typhus cases treated in the general hospitals of that city. The mortality in the City of Glasgow Fever Hospital was (as shown in last year's report) nearly 3 per cent. below that in the Glasgow Royal Infirmary.

A second objection, that the risk to the officials is greatly increased, is one of the accuracy of which I have great doubts. I do not think that the risk to the attendants is greater in a fever hospital than it is in a general hospital with special fever wards; but there is a risk to a greater number of individuals when typhus is introduced into a general hospital; for, besides those who look after the fever cases, the other patients and their attendants are exposed to a risk which, I am sure, is infinitely greater than the

[1] This explanation would also apply to the cases of the three washerwomen.

increase of danger to which the typhus attendants would be exposed by the transference of their patients to a special hospital. We have seen that there sprung up in the Dundee Infirmary during the last nine years, at least 65 cases of typhus—47 amongst officials and servants, and 18 amongst patients; that there died of the former 9, and of the latter 2; and that of 36 of these cases which occurred during the last three years, only 15 occurred amongst those who necessarily came into contact with the typhus patients, whilst 21, or 58·3 per cent., occurred amongst patients and servants who would, in all probability, not have taken the disease had there been a special fever hospital. To my mind, a fact like this far outweighs the objections which have been noted.

In the Report of the London Fever Hospital for 1866, it is stated that "1080 cases admitted into that institution communicated the disease to 27 persons, of whom 8 died: in other words, 1 person took the fever for every 40 admitted, and 1 died for every 135. In six of the general hospitals in London, 272 cases communicated the disease to 71, of whom 21 died; or 1 person caught the disease for every 3·8 cases admitted, and 1 life was lost for every 12·9." Facts all tend to show that fever cases are treated with no greater success in a general hospital than in one specially devoted to their reception; and that the risk of communicating the disease (which cannot be wholly done away with) is less in a fever hospital, where the majority of the inmates are protected by either a prior present attack, than in a general hospital, in which such protection is exceptional.

The method of placing typhus cases in a general ward is, I think, quite unjustifiable; it has always appeared to me a most cruel thing to put a patient suffering from an ordinary ailment into a bed next to a typhus patient, where he not only runs some risk of catching the fever, but suffers also a deal of mental distress and anxiety from his exaggerated idea of the risk which he runs. I have on not a few occasions known patients leave the hospital rather than remain in a ward in which there was a case of enteric fever. So many facts have of late been brought forward in condemnation of this method of distributing typhus cases, that its abandonment is probable.

For the purpose of comparing the above statistics with those of some other hospitals, I shall take the London Fever Hospital, the City of Glasgow Fever Hospital, and the Glasgow Royal Infirmary, as being those regarding whose cases most information is attainable. The statistics of the last mentioned hospital are taken from a paper by Dr Perry, in which that gentleman gives the results of his treatment for 1865; the Report of the Glasgow Infirmary does not give the details necessary for instituting a comparison; those of the other two are taken from their annual reports. In order to equalize as much as possible the number of cases for each hospital, I shall take the Dundee statistics for two years—1865 and 1866.

The general result is shown in the following table:—

TABLE IV.—*Showing the Death-Rate in Four Hospitals at each Quinquenniad.*

Age.	Dundee Royal Infirmary.			London Fever Hospital.			Glasgow Royal Infirmary.			City of Glasgow Fever Hospital.		
	Total.	Deaths.	Per-centage.	Total.	Deaths.	Per-centage.	Total.	Deaths.	Per-centage.	Total.	Deaths.	Per-centage
Under 5	57	1	1·75	32	2	6·4	12	...	...	48	6	12·5
5 to 10	178	2	1·12	146	5	3·4	83	1	1·2	172	2	1·16
10 „ 15	303	6	1·98	231	4	1·7	150	5	3·3	245	3	1·22
15 „ 20	271	10	3·69	282	13	4·6	255	17	6·2	204	15	7·3
20 „ 25	211	14	6·63	242	25	10·4	192	27	14·06	126	16	12·6
25 „ 30	163	20	12·26	204	25	12·3	116	18	15·51	78	11	14·1
30 „ 35	97	13	13·4	185	38	20·5	79	10	12·65	80	15	18·7
35 „ 40	92	17	18·47	151	45	29·8	82	19	23·17	68	15	22
40 „ 45	96	23	23·95	143	52	36·3	51	20	39·21	55	17	30·9
45 „ 50	50	17	34	126	52	41·2	26	15	57·96	33	7	21·2
50 „ 55	40	18	45	102	53	52	16	7	43·75	17	6	35·2
55 „ 60	13	5	38·46	41	22	53·6	15	9	60	18	9	50
60 „ 65	19	8	42·1	48	30	62·5	8	3	37·5	5	3	60
65 „ 70	7	6	85·71	19	14	74	} 8	5	62·5	4	2	50
70 „ 75	...	...	...	8	6	75				...	...	...
75 „ 80	...	...	...	1	1	100				1	1	100
Total,	1597	160	10·01	1961	387	19·7	1093	156	14·27	1154	128	11·09

It will be seen from this that there is a great difference in the average death-rate of the four hospitals. It is lowest in Dundee, 10·01 per cent.; next comes the City of Glasgow Fever Hospital, 11·09 per cent.; then the Glasgow Royal Infirmary, 14·27 per cent.; and highest is the London Fever Hospital, 19·7 per cent. The total number of cases given in the table is 5805, of which 831 died, being an average mortality of 14·31 per cent. Dundee is thus more than 4 per cent., and the Glasgow Fever Hospital more than 3 per cent. below the average; the Glasgow Royal Infirmary is as close as may be to it, whilst the London Fever Hospital is more than 5 per cent. above it.

On examining this table a little more in detail, it is found that in 7 of the 14 of the quinquennial periods, the Dundee mortality is lower than that of any of the other hospitals: in 4 of these, 20 to 25, 35 to 40, 40 to 45, and 55 to 60, markedly so; the Glasgow Royal Infirmary has the advantage in three periods,—under 5, 30 to 35, and 60 to 65; the Glasgow Fever Hospital has the lowest mortality in four,—10 to 15, 45 to 50, 50 to 55, and in those above 65, in the two middle periods the advantage is marked; in no instance does the London Fever Hospital stand first. Dundee holds the post of honour as having the smallest number of deaths in the largest number of periods.

Let us consider shortly the circumstances which influence the mortality, and cause such a difference as nearly 10 per cent. (as we find between London and Dundee) in the death-rate.

First, undoubtedly, stands age, which alone exercises a greater

influence than all other circumstances combined; the foregoing tables sufficiently indicate this fact. In these has been adopted the usual and most convenient method of dividing the ages into quinquennial periods. This plan gives a good idea of the ages of the cases treated, with the mortality at each period, but still leaves room for error: thus, the sum total of the ages given in any one quinquenniad may be considerably more in one hospital than in another. Take, for example, the period from 20 to 25; in that are included all the patients who have attained their 20th, but have not yet arrived at their 25th birthday. It is just possible that the majority, or even the whole, of those coming under that period in the Dundee statistics may be barely 20 years of age, whilst those in the London statistics may be all within a very little of 25. Of course, it is at the same time highly improbable; and I draw attention to this simply with the object of showing how large an amount of error (this objection to the division of the ages into quinquenniads being applied to all the periods) may get into our statistics, and how impossible it is to draw accurate comparisons between any two hospitals, even with the fullest details before us. It might serve some useful purpose if each statistician were to give, in addition to the usual tables, the average age of his cases; by contrasting this, as well as the average mortality, a better general idea could be formed of the extent to which age had influenced the death-rate, it being always borne in mind that, as years advance, the death-rate rises with a rapidity out of all proportion to the increase in age. By adding together the ages of the 1750 cases of which I have notes by me, and dividing the sum-total by the number of patients, I find that the average age was for all cases 22·4 years; of the cases recovered, it was 20·5 years, and of fatal cases 37·5. The averages of the 1597 of these cases given in the last table is, as nearly as possible, the same.

Dr Murchison found the mean age of 3456 cases admitted into the London Fever Hospital during 10 years to be 29·33 years; supposing the mean age of the 1961 cases given in Table IV. to be the same, we should at once have a fact which would go a long way to account for the difference in the death-rate in London and Dundee.

The mode of life of the patient affects the death-rate in a minor but not unimportant degree; that hospital which admits the largest number of badly nourished or intemperate people is *cæteris paribus* likely to have the highest mortality; this is a circumstance which cannot be shown in statistics, and is probably one cause of the high mortality from typhus in London, where a greater amount of wretchedness and poverty are to be found than in any other town.

The extent to which complications occur must influence greatly the death-rate, and ought, if possible, to be taken into account in any comparative statement; unfortunately, however, most hospital

reports are quite silent on this matter; the only ones which I have containing information on this point are those of the Dundee Infirmary and the London Fever Hospital; a general comparison is therefore impossible. It has already been shown in a former part of this paper, that of 1750 cases treated in the Dundee Infirmary, in which the fact was noted, complications existed in 1 in 9·06 or 11·02 per cent.; that the death-rate among the uncomplicated cases was 1 in 13·08 or 7·6 per cent., whilst among the complicated cases (as shown in Table III.) it was 1 in 3·9 or 25·38 per cent.; the average mortality being 1 in 10·05 or 9·94 per cent. These facts speak for themselves; a mere statement of them is all that is required to show the important part played by complications in raising the death-rate in typhus, and how unfair it is to compare the death-rate of a hospital having a large number of complicated cases with that of one having few.

The Report of the London Fever Hospital for last year shows that 1447 of the 1961 cases, or 73·7 per cent., were complicated; the mortality amongst the complicated cases being 38·4 per cent.; the general death-rate being only 19·7. It must be remarked, however, that in that report pulmonary congestion (a very frequent occurrence) is given amongst the complicating maladies, whilst in the Dundee statistics, as already explained, it is excluded. It is probable, also, that diarrhœa (with which 302 cases were complicated in London) has been ranked in the list of complications with less reserve. A slight amount of looseness of the bowels I regard as rather favourable than otherwise; it was only in those cases in which it went so far as to materially weaken the patient, and call for the intervention of remedies to check it, that a place was given to it amongst the complications; to a slight extent it occurred very frequently. In making the above calculation from the London Fever Hospital statistics, I have excluded the cases noted as complicated with pregnancy, and have taken into account only those in which abortion occurred. Making allowance for these differences in the list of complications, it is probable that the ratio of complicated to uncomplicated cases is considerably higher in the London Fever Hospital than in the Dundee Infirmary. If this be the case, we have another fact which contributes largely to account for the difference in the death-rates of the two institutions. It would be well if every hospital report gave a statement of the various maladies with which the fever was complicated, and this on a definite plan, it being understood that only those cases should be considered complicated in which the secondary affection existed to so grave an extent as to influence unfavourably the prognosis or course of the case.

The time at which the patient first comes under treatment is likely to have some slight influence on the result of the case. It is natural to suppose that a case which is subjected to the care and

attention incidental to hospital treatment at an early stage of the illness is more likely to have a favourable termination than one, in other respects similar, which has been neglected or mismanaged in a miserable hovel for a week or ten days, and then sent, when not in a state fit for removal, to be treated in a hospital. Such cases must affect for the worse the general death-rate. The mode of house-to-house visitation adopted by the Police Commissioners of Dundee during the late epidemic, and so diligently and effectively carried out by their officials, brought the fever cases under the notice of the Medical Officer of Health at an early stage of their illness, and not only benefited the individual cases by ensuring their early transmission to hospital, but tended also to check the spread of the disease amongst those in the neighbourhood in which the cases occurred. Of 745 cases in which the fact was noted, the average period of illness before admission into hospital was 5·5 days; that for recoveries and fatal cases being nearly the same. It must be borne in mind, however, that the proportion of fatal cases regarding which information on this point could be got was very small, the majority not being in a state to give any account of themselves.

When due allowance has been made for the influence on the death-rate likely to be exercised by each of the circumstances noted above, and each hospital accredited with its own share, it will probably be found that the differences in the mortality are very much reduced, and that there remains but a small margin to be influenced by treatment. The question of stimulation is that which has excited most interest, and regarding which the greatest difference of opinion exists at present. To that question, therefore, my remarks on treatment shall be chiefly confined. Before entering on this, I would give a short statement of the general regimen to which the cases were subjected. Every case on admission had a bath, if in a fit state for it; if not, sponging was substituted, and was repeated frequently during the course of the case. Up to the period of crisis, diet consisted almost entirely of milk and beef-tea, the former being the main-stay, and, in many cases, the only thing taken by the patient up to the commencement of convalescence. The treatment of most of the young patients consisted only in giving them milk and water, separately or together. For some considerable period, dilute nitro-muriatic acid, or some other acidulated drink, was given, partly as medicine and partly as a drink; but, as a general rule, nothing is so agreeable to the patient as cold water, and, latterly, no other drink was given unless specially requested. The hyposulphites got a fair and impartial trial on an extensive scale, and were found wanting. No effect was produced by them on the course or duration of the cases. They formed an exceedingly unpalatable mixture for the patient to take, and increased to a considerable extent the duties of the attendants. Occasionally, and especially amongst females, they produced sick-

ness and a tendency to diarrhœa. They were finally abandoned as useless and disagreeable.

The question of stimulation is one which should be inquired into less in the spirit of an economist than in that of a physician. The rule which should guide us in the administration of stimulants should be to increase as much as possible, by every available means, the patient's chance of recovery. If, by the free administration of wine or spirits, we think that this (however hopeless the case may seem) is increased by one iota, the benefit of that chance we are bound to give him. The real question at issue is the quantity which it is proper to administer. To give on paper an exact or even fair account of the extent to which stimulants have been used in a given number of cases is exceedingly difficult. To say simply that a case was stimulated, or that so many out of every hundred were stimulated, is to convey the idea that the writer has been in the habit of using stimulants in the treatment of his cases, but conveys no information regarding the extent to which they may have been employed. Stimulation may mean two ounces of wine or twenty ounces of brandy. Neither does it serve any useful purpose to say that so many patients were treated, and that such and such a quantity of wine was consumed, being an average for each of so many ounces, when in the calculation are included those who were not, as well as those who were, stimulated. The ages of the cases treated must also be taken into account, old people requiring a much larger quantity of wine and spirits than young. It seemed to me, also, that to take the total quantity of stimulants consumed by each patient was a method likely to lead to inaccuracy, as many cases might have the period of stimulation much prolonged in consequence of the existence of some other weakening cause. To take the average daily allowance seemed also open to objection, as being likely to lead to an understatement of the extent to which stimulation was carried, besides being more difficult of application than the plan which has been adopted of taking the largest quantity taken continuously for twenty-four hours by each of the cases, adding these together, and dividing the sum total by the number of cases stimulated, and so getting the average of the maximum daily allowance. Of course, in making such a calculation, the cases not stimulated are entirely left out. This method possesses the advantage of showing better than any other, I think, the extent to which stimulation has been carried; at all events, the average is not understated. The result will be more readily seen by dividing the ages into fewer periods than by adopting the division into quinquenniads. I shall, therefore, divide them into three classes, those under 25, those from 25 to 50, and those from 50 upwards. The result is seen in the following table, into which has also been introduced a statement of the average death-rate. The 16 cases whose ages were not noted have been left out.

TABLE V.—*Showing the amount of Stimulant given.*

Year.	Age.	Percentage of Cases Stimulated.	Average Maximum Daily Quantity.		Average Mortality.
			Wine.	Spirits.	
1858	Under 25 . .	37·5	2·6	.	12·5
	25 to 50 . .	50	3·5	.	25
	Above 50 . .	50	2	3	50
1859	Under 25 . .	43·05	5·3	·5	8·3
	25 to 50 . .	82·5	5·03	1·1	27·5
	Above 50 . .	100	7·7	2·5	14·2
1860	Under 25 . .	36·8	4·4	·4	5·2
	25 to 50 . .	57·6	5	1·5	19·2
	Above 50 . .	100	2·3	2	33·3
1861	Under 25 . .	38·4	2·7	·6	10·2
	25 to 50 . .	93·4	2·5	1·8	21·7
	Above 50 . .	100	6	1·6	100
1862	Under 25 . .	70	3·7	·38	3·3
	25 to 50 . .	90	4·1	1·05	5
	Above 50 . .	100	5·3	3·3	66·6
1863	Under 25 . .	50·7	3·2	·6	3·5
	25 to 50 . .	82·4	3·4	1·6	23·06
	Above 50 . .	80	2·7	3·6	80
1864	Under 25 . .	24·3	4·2	·7	4·2
	25 to 50 . .	64·5	5·3	·5	15·05
	Above 50 . .	100	6·6	3·3	83·3
1865	Under 25 . .	17·5	3·8	1·5	4·07
	25 to 50 . .	70·7	3·1	3·8	17·2
	Above 50 . .	100	1·28	5·9	45·2
1866	Under 25 . .	20·2	3·1	1·8	2·19
	25 to 50 . .	72·8	1·7	4·8	19·1
	Above 50 . .	91·8	·9	8·5	48·6
Total	Under 25 . .	25·8	3·5	1·09	4·06
	25 to 50 . .	73·7	3·2	3·07	18·8
	Above 50 . .	95·3	2·1	5·7	50
	General Averages	44·7	3·19	2·6	10·9

It thus seems that of 2476 cases, 1107, or 44·7 per cent., were stimulated; the average of the maximum quantity given to each case *per diem* being 3·19 ounces of wine, and 2·6 ounces of spirits. Of those under 25 years of age, 25·8 per cent. were stimulated, the average for each being 3·5 ounces of wine, and 1·09 ounce of spirits; of those from 25 to 50, 73·7 per cent. got an average of 3·2 ounces of wine, and 3·07 ounces of spirits; whilst of those above 50, 95·3 per cent. were stimulated, the average maximum quantity being 2·1 ounces of wine, and 5·7 ounces of spirits.

It will be observed that during the last three years, but more markedly during the last two, the percentage of cases stimulated under 25 years of age is considerably less than during any of the years which precede; the quantity of stimulant given is, at the same time, just about the average; the death-rate being slightly below it. It will also be seen that in the other two periods of those years, there is a considerable increase in the quantity of spirits administered, whilst the amount of wine given is below the general

average for the same periods; both the percentage of cases stimulated and the death-rate being very near it.

These two facts indicate the principles on which treatment has been conducted. In young people, as a rule, stimulation is not called for to any great extent; whilst, in old people, the contrary holds good. In the young, the danger is not so much from failure of the cardiac action as from the head-symptoms; death in them is due less to asthenia than to coma. It is comparatively rare to find in a young patient the almost imperceptible cardiac impulse and inaudible systole which form so frequent and anxious a feature in the cases of old people, into the mode of production of whose death asthenia enters largely. True it is that every now and then a case occurs in a young person demanding a pretty liberal administration of stimulants, just as one occasionally meets cases advanced in life characterized by unusual mildness; these are exceptional, but serve well to show the fallacy of laying down any general rule of treatment founded on the ages of the patients, and making no allowance for individual peculiarities. When free stimulation is required, spirits are more convenient than wine; an ounce of spirits represents a greater amount of real stimulant than double the quantity of wine. It was not a very uncommon thing, in treating the above cases, to order 12 ounces of spirits *per diem*, half-an-ounce every hour; seldom has stimulation been carried beyond this for more than a few hours at a time. The mode of treatment to which the cases included in these statistics, at least those admitted during the last three years, were subjected, may be characterized as mainly dietetic in the early periods of life, and freely stimulant in the more advanced periods. The success which attended it may be, and very likely is due in part to some of the agencies noted in an earlier part of this paper; but the fact remains that, with this treatment, there is a death-rate considerably below that of most other hospitals. A good deal has of late been said about the harm likely to accrue from over-stimulation in typhus. My own very strong impression is, that whilst a deal of harm may result to young people from the indiscriminate adoption of this method of treatment in all cases, a great deal more injury would result to elderly patients from its abandonment, and the substitution of a non-stimulant plan. The only truly rational plan is to do with typhus as with every other disease,—treat each case on its own merits, but have constantly before us the lessons taught by experience and observation, that age increases immensely the fatality of the disease, and that in elderly persons death is threatened by failure of the heart's action to a much greater extent than in young people, in whom the head-symptoms must be looked to as the chief source of danger.

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