ON
SEPTIC DISEASE
IN AND OUT OF HOSPITALS.

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THE large death rate which follows operations in hospitals, and especially in large hospitals, has of late engrossed a great deal of attention. The subject was as it were re-introduced by Mr. Erichsen at the beginning of the year in a series of papers entitled "Hospitalism,"¹ and under another form and with a totally different intention by Mr. Prescott Hewett in his presidential address at a sister Society² with the title "Pyæmia in Private Practice."

It must, however, be in the memory of every Fellow of this Society that several years ago Sir J. Simpson published a series of papers on this subject, whereof Mr. Erichsen's are as it were a continuation, following as he does the same mode of reasoning, method of interpreting statistics, &c.

¹ 'British Medical Journal,' January and February, 1874.

² Address of the President of Clinical Society.

Hence if in the first few pages of this paper I refer only to Sir J. Simpson's views, it is with the idea that the same remarks will apply to the later writer.

Sir J. Simpson published his papers on "hospitalism" chiefly during the year 1869; they created much attention at the time, his numbers were greatly objected to and a good deal of controversy ensued. With characteristic energy he had amassed a large array of figures concerning the results of the four principal amputations; these he sorted into classes according as the operation was performed, in larger or smaller hospitals, or in private practice, and then adding up the number of each class he found, or thought he found, that in larger hospitals the death rate is very much higher than it is in smaller ones, and these higher than in the very smallest; while in isolated cottages, however cramped and ill-kept, the result is best of all. His deduction resulted in the coinage of the word hospitalism, whereby he intended to designate a certain injurious septic influence which is more intense in larger than in smaller institutions and which kills operation-patients in direct ratio with the number of beds in the hospital, by producing septicæmia, or pyæmia, erysipelas, gangrene, tetanus, and to a certain extent exhaustion.

Now, it appears to me that this is the very abuse of statistics. To take one only of a set of circumstances and to ascribe all the augmentation and diminution of death rate, all the favorable or unfavorable returns, to that one circumstance alone seems the very reverse of logical.

It is not my intention to produce other and I think more reliable statistics, as a mere quotation of figures against figures could lead to nothing, but I propose to accept Sir J. Simpson's returns regarding hospitals, and to treat them in a different manner. His three first orders contain four large London hospitals, to which subsequently five others are added. Secondly, four large provincial hospitals containing between 200 and 300 beds. Thirdly, eighteen provincial hospitals with from 100 to 200 beds. Simpson added together the returns from each class and

thus produced his result. But if we take each hospital separately we are driven to a very different conclusion (see Table I), as a glance at the table will show. It is compiled from Simpson's numbers, but the classes are divided according to the death rate, not according to the number of beds, showing each hospital separately.

TABLE I.

Number of beds.	Name of hospital.	Percentage of deaths after operation.
300	Middlesex	75
200	Westminster	53·3
120	Buxton	50
510	London	47·3
100	Royal Free	46·4
250	Newcastle Infirmary	42·5
134	North Liverpool Infirmary	40·2
170	King's College	40
350	St. George's	38·6
580	Guy's	38·2
650	St. Bartholomew's	36·6
223	Birmingham General	31·5
109	Greenock	31
140	Leeds	29
270	Liverpool General Infirmary	28·9
165	Sussex County	27
120	South Liverpool	26·2
120	Bath	25·4
125	North Staffordshire	24·5
150	Norfolk and Norwich	23·5
150	Bristol General	23·4
150	Derbyshire	19·4
140	Shrewsbury	19
150	Chester	18
165	St. Mary's	17·6
149	Radcliffe	16
242	Bristol Infirmary	15·7
142	Nottingham	14·9
108	Rochester	13·3
120	Reading	11·2
120	Kent and Canterbury	5

We find—

Three hospitals with 50 per cent. of deaths and over, containing 300, 200, and 120 beds.

Five hospitals with 40 per cent. of deaths and over, containing 510, 250, 170, 134, and 100 beds.

Five hospitals with over 30 per cent. of deaths containing 650, 580, 350, 223, and 109 beds.

Eight hospitals with over 20 per cent. of deaths containing 270, 165, 150 (twice), 125, 120 (twice).

Ten hospitals with under 20 per cent. of deaths containing 242, 165, 150 (twice), 149, 142, 140, 120 (twice), and 108 beds respectively.

Thus I make five groups, and in considering them it is evidently impossible to find any close connection between the size of the hospital and its mortality. Some of the first and second groups are formed by the smallest hospitals. The two largest hospitals in England are in the middle group. A large hospital with nearly 250 beds is in the lowest class. But we can go further. Omitting the Middlesex and St. Mary's Hospital, which evidently had runs of fortuitous good and evil times in the one and two years during which Sir James gives their statistics, we find that of the nine metropolitan hospitals quoted, the largest has the lowest death rate, while the smallest, with only 100 beds, is among the most lethal. Liverpool maintains three hospitals; the largest and the smallest, with 270 and 120 beds respectively, have an almost equal percentage, while one intermediate in size has a much higher mortality. In Bristol are the infirmary with 242 beds and the general hospital with 140. The large institution has 15·9, the smaller 23·4 per cent. of deaths.

Evidently Sir James Simpson was quite wrong in his idea that the mortality of amputations is regulated by the size of the hospitals in which they are performed.¹

Nevertheless, it must be conceded that metropolitan hos-

¹ In the table and subsequent remarks I have omitted the Scotch hospitals quoted by Sir J. Simpson, for reasons that will presently appear.

pitals (including the Scotch), and indeed, as a rule, institutions with more than 250 beds, have a large death rate; are we, therefore, to jump with Sir J. Simpson straight to the conclusion that the number of deaths is caused by the number of beds, or shall we, more philosophically, take other matters into account? For instance, every large hospital is, by the very force of circumstances, situated in a large town, and in large towns the death rate is higher than in rural districts, at the rate of about 5 per 1000. If this be the additional proclivity to death among the healthy outside, what additional tendency would there be in the wounded inside a hospital? yet this is less unimportant than the following considerations.

Every hospital surgeon must be aware that, quite independently of any injurious influence in his wards, his operations at certain times will not do well, and he postpones as much as possible any interference with the knife. This state of things corresponds with an unusual flux to the hospital of applicants with diffuse phlegmonous inflammations, erysipelas, perhaps even a case or two of pyæmia. Also he will find that any erysipelas admitted from without has a great tendency to spread; in fact the state of atmosphere outside, and, since the building derives its air from without, inside the hospital also, is such as to foster these morbid agencies. The condition, although it will at times be thus accentuated, is not a mere occasional, but is a constant accompaniment of residence in crowded houses and neighbourhoods.

If we examine into the returns of the Registrar-General, we find that the number of deaths from erysipelas increases with the number of persons residing on every square acre, not in absolute proportion, since many other circumstances interfere, but still in very close ratio. We may learn from these returns the varying percentage of deaths from this cause in towns and in country.

In London (the part which lies in Middlesex) the deaths are 18·5 per 100,000, in the rest of the county 10, but the districts here are rather thickly populated and hardly rural.

In Surrey, St. Saviour's, and St. Olave's, the death rate is 17; in the rest of the county 7·6.¹

TOWNS.		RURAL.	
Nine towns in Kent	. . 15·7	Kent	. . . 3
Bristol	} . . . 18·8	Gloucestershire	. . 7
Gloucester			
Clifton			
Birmingham	. . . 14·5	Warwickshire	. . 8
Three towns in Notts	. . 14·4	Nottinghamshire	. . 6
Per 100·000.			

These are sufficient examples (though they might be indefinitely increased in number and minutæ) to show the effect of aggregation, and it need scarcely be pointed out that the effect falls not on the occupiers of large houses in wide streets and squares, but on the dwellers in single rooms of small tenements situated in narrow lanes and courts. This influence I would call "urbism;" it produces, as the returns show, a great receptivity to septic forms of malady. It is impossible to go further than this; we none of us know what erysipelas is, but we see that overcrowding, with its attendant evils, produces a state of body which renders it prone to septic disease, and our town hospitals, especially our metropolitan hospitals, fill their wards with this overcrowded class. If, then, this portion of a town population, unwounded and unhurt, die of septic disease in twice or thrice the proportion in which countrymen die of it, by how much larger a ratio will this people, injured and wounded, succumb to such conditions? This is a simple problem in equations with which the number of beds in hospital has, as we have seen, nothing to do, but for the solution of which certain factors are absent, therefore only a proximate answer can be given, and this I will do by a rearrangement of Simpson's Tables.

The great obstetrician took most of his hospital returns from the year 1862 to 1868 inclusive, and I have compiled

¹ The numbers are for the year 1871.

Table II by extracting the death rates from erysipelas during those years for the districts in which the hospitals are situated, and constructing their average. The returns from the metropolitan hospitals are combined, omitting the Middlesex and St. Mary's, which are, as above stated, hardly reliable. Certain other hospitals are of necessity omitted, as the Scotch and some in subdistricts for which I have no annual reports. The table is arranged from above downwards in the order of the erysipelas death rate.

TABLE II.

District in which hospital is situated.	Deaths from erysipelas per 100,000.	Percentage of deaths in hospital after operation.
Metropolitan	17	42·8
Liverpool	14·8	26·2—28·9—40·2
Leeds	14·7	29
Stafford	13·5	24·5
<i>Birmingham</i>	12·4	31·5
Rochester (Medway)	11·2	11
Derby	10·5	19·4
Chester	9·5	18
Oxford	9·5	16
<i>Newcastle</i>	9	42·5
Reading	8·8	11·2
Canterbury	8·5	5
<i>Norwich</i>	8·3	23·4
Bristol	7·7	15·7
Shrewsbury	7·7	19
<i>Bath</i>	7·7	25·4
<i>Brighton</i>	6·6	27
Nottingham	6	14·9

At first glance it appears from this table that the proportions between the percentage of erysipelas deaths in the districts, and of operation deaths in the hospitals, are very irregular. A second look will show that the irregularity is almost entirely produced by five hospitals (in italics in the table), *Birmingham*, *Newcastle*, *Bath*, *Brighton*, and

Norwich; the first four of these are referred to by Dr. Bristowe and Mr. Holmes, in the Government Reports on Hospitals, as much infected by pyæmia; the fifth is now in such condition that it has become a question with the governors whether it may not be necessary to pull it down entirely or in part. The other hospitals which may be assumed to be normal have a death ratio, which in some is rather above, in others rather below, double the erysipelas death rate of the locality (two are much under this ratio, and are peculiar in manners not necessary to discuss here). The general outcome of this Table, therefore, is that the mortality of amputations in hospitals, which are well ventilated, drained, cleaned, and otherwise well managed, declines with the local death rate from erysipelas or other septic disease, not in any strict ratio, since other matters interfere, but in a much closer proportion than has been I think hitherto suspected.

I have not the means of following this same comparison into the minute hospitals quoted by Sir J. Simpson, nor is there any necessity for doing so, as it is evident the same mode of reasoning carried into subdistricts and mountain villages would only bring like results further developed. Moreover, many statements in "*Hospitalism*" might be controverted were my intention merely to criticise that work. But I have desired to use that book only to show that in some sense—in the sense in which the word was coined—"hospitalism" does not exist. Bad construction, poisoning of wards by the dead-house, bad ventilation, overcrowding, &c., do exist, but these are no more essential to hospitals than hanging an innocent man—an event which has sometimes occurred—is an inherent portion of criminal legislation.

On the other hand "urbism" is a condition placed beyond any possibility of doubt by the Registrar-General's Tables, and by the calculations to be made upon their basis. It has, I believe, a large influence on the result of operations, and the knowledge of its existence may, I venture to hope, conduce to lessen the death rates from septic disease in our town hospitals.

To this part of my subject I shall in future revert, but I must

first limit the denial which I have given to the existence of hospitalism so carefully as not to be misunderstood. That a certain influence pervades surgical wards in which several suppurating wounds are collected is evident from the fact that we may not ovariectomise in such locality. That occasionally a ward may be infected with erysipelas and pyæmia—that some hospitals are habitually in a septic condition—is only too evident. But that a hospital properly tended and kept must of necessity be in a state to destroy a large proportion of operated patients is, I am sure, a fallacy, and a very mischievous one; since it would tend to make the surgeon acquiesce in a mortality which he ought with all his strength to combat.