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ROLE OF STATISTICS IN REGIONAL HOSPITAL PLANNING

WITH SPECIAL REFERENCE TO THE BIRMINGHAM HOSPITAL REGION

BY

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Before the inception of the National Health Service on July 5, 1948, there was no unification of the organization of the hospital services in this country. The main types of hospitals were those supported by voluntary contributions and those maintained by local authorities. Within any one area the development of each type was independent of that of another except so far as both were reliant upon contributions extracted either voluntarily or compulsorily from the residents of the area in which they were situated. The inauguration of the National Health Service led to new methods of financing the hospital service—namely, the collection of funds (in the form of National Health stamps and taxation) by the State from a large proportion of the population. It is now possible, therefore, to plan an overall health service without reference to regional differences in the distribution of the nation's wealth.

Many estimates of the desired ratio of beds to population have been given both by Government-sponsored committees and by independent workers, as cited in Table I, which shows considerable variation with respect to a putatively adequate bed/population ratio. All these estimates are much higher than any actual ratios referable to the Birmingham Region, overall figures for which are included in the same table.

The region encompasses five counties—Herefordshire, Shropshire, Staffordshire, Warwickshire, and Worcestershire. Its total population on December 31, 1947, was

TABLE I.—Estimates of Number of Hospital Beds Required for Each 1,000 Persons

Estimate	Type of Bed				
	General	Chronic Sick	Isolation	Tuberculosis	Maternity
Surrey plan	6.0		0.75	1.0	
Berks, Bucks, and Oxon scheme	5.5	2.5	0.60	0.7	
Scottish survey	4-8	1.5	1.50	1.71	0.96 ^a
Consultant services (M.O.H.)	Approx. 6.5	1.5	0.60	Not shown	1.00 ^a
Hospital survey U.S.A.	4.5-5.5	2.0	Not shown	1.77	
Birmingham Region:					
Total bed complement	2.85	1.44	0.47	0.52	0.39
Available complement	2.53	1.34	0.24	0.24	0.38

Approximate requirements in Birmingham Region based on: ^a 12 beds per death per annum. ^b 2.5 beds per death per annum. ^c 4-5 beds per 100 births. ^d Including antenatal beds.

4,259,500, of which some 60% are resident in the Birmingham-Wolverhampton conurbation, while Herefordshire and Shropshire are rural counties with a low density of population. The distribution of hospital beds within the region varies considerably from district to district, but not necessarily in accordance with their needs (Table II). In one rural area the overall ratio of

TABLE II.—Numbers of Beds per 1,000 Persons in Various Areas in Birmingham Region (June 30, 1949)

Bed	Rural Area		Suburban and Dense Rural Area		Dense Urban Area			
					1		2	
	Total	Available	Total	Available	Total	Available	Total	Available
General	3.66	3.46	2.65	2.57	3.36	2.49	2.76	2.62
Chronic sick	1.90	1.60	2.26	1.87	0.34	0.32	1.26	1.20
Fever	0.66	0.28	0.87	0.44	0.58	0.14	0.52	0.28
Tuberculosis	0.70	0.70	0.55	0.55	0.22	0.17	0.59	0.57
Maternity	0.53	0.53	0.46	0.46	0.42	0.38	0.42	0.42
Total	7.45	6.57	6.79	5.89	4.92	3.50	5.55	5.09

beds (excluding mental) to population is 6.64 per 1,000, while in an area of high population density the ratio is as low as 3.35.

As yet most of the estimates of the requisite bed ratios are but inspired guesses, and until further information is available about the work done in hospitals it is not possible to provide more reliable figures. At present our problem is to remedy gross deficiencies in the hospital service; and a reasonable target for the immediate future is the provision of sufficient beds, so that the bed/population ratio of every locality is at least equal to the present average for the country as a whole. This done, it would be time enough to estimate future requirements on the basis of predicted changes in the age structure of the population (Enid Charles, 1935, 1948).

It is here pertinent to recall the words of Florence Nightingale, herself one of the early advocates for hospital statistics. Writing in 1860, she remarks: "I am fain to sum up with an urgent appeal for adopting this or some uniform system of publishing the statistical records of hospitals. . . . I have applied everywhere for information, but in scarcely an instance have I been able to obtain hospital records fit for any purpose of comparison." It is chastening to realize that she would find little improvement if she were alive to-day. It should be recognized that regional authorities have far too little available information as a basis for day-to-day administrative decisions. A single example brings this deficiency into focus. There is at present a serious shortage of

hospital nurses, and in the Birmingham Region alone some 8% of hospital beds are closed because of insufficient nursing staff. It is not therefore profitable to lay down plans for large new hospitals without concomitantly making plans for a reorganization of the nursing services by more economical use of trained

TABLE III.—Types of Hospitals and Nurse/Bed Ratios

Type	Definition	No. of Nursing Staff* per 100 Beds
1. Chronic sick	Chronic sick only with the exception of a small proportion (less than 5%) for maternity, V.D., or skin diseases	23.1
2. Convalescent	Recovery and rehabilitation	17.2
3. Cottage	Small general hospitals with fewer than 50 beds	41.0
4. Isolation	Infectious diseases (excluding tuberculosis) only	28.5
5. General	Primarily general medical, surgical, gynaecological cases and children. No specific allocation for chronic sick cases	47.8
6. General and chronic sick	General hospitals as (5) but with a specific allocation of beds for chronic sick cases	31.3
7. Maternity	Obstetrical cases, including in some cases immature baby units	14.7
8. Mental		13.3
9. Mental deficiency	Defined by statute	13.2
10. Special	Hospitals restricting their services to special types of patients—e.g. orthopaedics, E.N.T., etc., excluding tuberculosis (see 11 and 12)	42.1
11. Tuberculosis	Sanatoria admitting tuberculosis patients only	20.4
12. Tuberculosis and fever	Hospitals catering for patients suffering from tuberculosis and other infectious diseases	33.6

* Excluding midwives.

staff, perhaps also by a change in the present system of nurse recruitment and nurse-training. Table III shows differences in nurse/bed ratios (midwives are excluded) in the various types of hospitals. Recently more precise information with regard to work done by them has made possible a more detailed classification (Table IV).

TABLE IV

- General (large).—General hospitals of 100 or more beds having at least 10,000 new out-patients annually.
- General (medium).—General hospitals of 100 or more beds having less than 10,000 new out-patients annually.
- General (small).—Hospitals of less than 100 beds (including cottage hospitals).
- General and Chronic.—Mainly (at least 50%) general, but also having a specific allocation of beds for chronic sick cases.
- Chronic and General.—Mainly (at least 50%) chronic sick, but also having a specific allocation of beds for general cases.
- Chronic.—Chronic sick hospitals, except for a small proportion (about 5%) of beds for other types of patients.
- Convalescent.—As in Table III.
- Maternity.—Ditto.
- Mental.—Ditto.
- Mental Deficiency.—Ditto.
- Isolation.—Ditto.
- Tuberculosis.—Ditto.
- Tuberculosis and Isolation.—Ditto.
- Orthopaedic Hospitals.—Non-acute orthopaedic surgery including short-term and long-term cases.
- Specialist Hospitals.—As in Table III.

Role of a Regional Statistical Department

The example last cited emphasizes the need for factual knowledge of existing facilities as a basis for planning the future of the hospital service. To accumulate, assimilate, and interpret such knowledge a statistical department is essential, its role being to provide information for (a) assessing the current situation; (b) estimating future requirements; and (c) costing of hospital services.

Illustrations of methods used to ascertain the present situation in the Birmingham Region will call for comment at a later stage. It must be stressed in this connexion that considerations of time, money, and

labour have sometimes provoked an empirical approach. The assessment of future requirements depends on knowledge of future trends in population and present-day demands on hospital beds. Enough work has been published on the former to justify confidence in short-range predictions about future populations. Large-scale surveys of hospital practice, such as have been undertaken by the Nuffield Provincial Hospitals Trust (1948), the General Register Office (MacKay, 1951), and the work at present being undertaken by the Department of Medical Statistics, University of Birmingham, in conjunction with the Birmingham Regional Hospital Board, regarding admissions to hospitals in the Birmingham Region, should provide useful relevant information with respect to present-day demands.

The necessity for economy in Government expenditure has recently focused attention on various methods by which the cost of hospitals can be assessed on a comparative basis. A review of financial costing methods lies outside the scope of this paper, but it is relevant to consider here the units by which hospitals will be compared, as they are based on statistical data collected from individual hospitals. A prerequisite of comparative statistics is that like should be compared with like. This, some might say, precludes comparative hospital statistics, for they regard each hospital as unique. However, there are others who believe that some form of comparative costing is inevitable if efficient use is to be made of the restricted budget now available for the hospital service. Since at the present time the second point of view is operationally more useful it is as well to consider here the fallacies which may be encountered.

To assess work done for in-patients a unit such as one bed-day may be used. It is clear that the cost of keeping a bed occupied for one day in a hospital for the chronic sick is certainly less than that in a general hospital; but differences of this type can be minimized if care is taken to restrict comparisons to hospitals of the same type (see Table IV). The difficulties in comparative costing arise in those hospitals with an out-patient department and which employ services such as pathological laboratories, x-ray departments, physiotherapy, and so on. A varying proportion (in some cases it is very high) of the hospital budget is expended on these services. At present no satisfactory definitions of units of work in these various departments are available. For example, one attendance at out-patients is equivalent, for costing purposes, to one treatment in the physiotherapy department or to one pathological specimen. (Ministry of Health circular R.H.B. (51) 59, H.M.C. (51) 56, B.G. (51) 57 says: "A single specimen of blood, urine, cerebrospinal fluid, etc., should be counted as one, however many investigations are performed.") Thus a specimen of urine for microscopical examinations counts as equivalent to a 5-ml. specimen of blood which might be used for several haematological and biochemical tests. Moreover, the practice varies from laboratory to laboratory: in one it may be preferred to collect one large sample of blood for several tests and in another to collect separate specimens for different tests. Although 20 pregnant women may attend one gymnastic class supervised by one physiotherapist, for costing purposes *each* counts as a treatment and is thus equivalent to the examination of a specimen of blood involving several tests for which the services of a pathologist, biochemist, and one or more technicians may be required.

Co-operative participation in collecting hospital statistics cannot be expected when the deficiencies in definition

are so apparent. Statistical departments can play an important and useful part in the planning and efficient management of the hospital service; but their credentials will fall into disrepute if they fail to advise caution in interpreting figures and translating them into administrative action without sufficient recognition of their limitations.

Survey of the Facilities for Treatment of Malignant Disease in the Birmingham Region

A survey was undertaken to assess the adequacy of existing facilities for the treatment of malignant disease, with particular reference to the provision of beds for radiotherapy. For this purpose a census of all patients in hospital on one day was taken. They were classified as: (a) suffering from malignant disease, in hospital for investigation on its account, and in hospital for non-malignant conditions; (b) occupying beds allocated to radiotherapy, beds specially reserved for malignant disease, and beds in general surgical, medical, or other wards. Tables V and VI show some of the results.

TABLE V.—*Patients in Hospital on Account of Malignant Disease, November 1, 1950.*

Patients Admitted for	No.	%
Radiotherapy	109	12
Radiotherapy combined with other treatment	53	6
Special medical or surgical treatment only	265	29
Nursing care (no special treatment)	251	28
Investigation	220	25
Total number	898	100

TABLE VI.—*Treatment of Malignant Disease by Type of Hospital.*

Type of Hospital	Total No. of Patients Admitted for Malignant Disease	Percentage of Patients Undergoing Various Treatments				Percentage of Patients Admitted for Investigation
		Rad. Ther. Alone	Combined R.T. and Other	Other	None	
A	340	28.8	7.4	35.3	3.5	25.0
1	56	—	—	45.0	23.0	32.0
2	124	2.4	7.2	30.0	22.5	37.0
3	28	—	—	35.5	39.5	25.0
4	168	1.0	9.0	30.0	37.0	23.0
5	40	—	—	—	72.0	28.0
6	106	2.0	2.0	8.5	79.0	8.5
7	2	—	100.0	—	—	—
9	22	13.5	—	36.5	45.5	4.5
14	1	—	—	100.0	—	—
15	11	9.0	—	36.5	18.0	36.5
Total	898	12.0	6.0	29.5	28.0	24.5

Note.—The types used in this table are the same as those shown in Table IV except that general hospitals of type 1 with a specific allocation of beds for radiotherapy have been classified separately as type A.

Of the confirmed cases, 38% were receiving surgical or medical treatment only, 36% were receiving no special treatment, 18% receiving radiotherapy only, and 8% were being treated by a combination of radiotherapy and surgical or medical measures. On the day of the census there were 172 patients receiving treatment involving radiotherapy. If we assume this number to be the daily average of beds occupied by such patients, the total number of beds required to be allocated to radiotherapy would be about 175.

In view of the fact that 28% of all patients in hospital on account of malignant disease were receiving no special treatment, their cases being presumably too far advanced for effective measures, it might be desirable to check the methods of cancer registration to ensure that such cases are included. Such cases are often seen initially in surgical out-patient departments and are later admitted

to hospital (particularly those of types 5 and 6) for nursing care in the terminal stages.

The census method used in this survey is a speedy and economical way of obtaining an overall picture of the hospital services in the region. But as it is a sample of the hospital population on one day only it may be attended with considerable error. This can be reduced somewhat by suitable selection of the census day—holidays such as Christmas Day, bank holidays, and so on must obviously be avoided. If necessary the census can be repeated in different seasons of the year. In this region it is used as a stop-gap method until the results of the hospital discharge study discussed below are available.

Hospital Discharge Study

Many hospitals in this region are co-operating in a regional hospital discharge study. For this, a small form suitable for punch-card analysis is completed for every patient discharged from hospital. Information relating to age, sex, place of residence, duration of stay in hospital, and diagnosis is collected by this means. The analysis of these cards will provide data for estimating the requisite allocation of beds on the basis of present-day needs. The relative age incidence of diseases necessitating hospital admission is of interest in the prediction of future requirements, which must conform to the needs of a population changing with respect to its age structure. The average duration of stay is of value in determining whether the existing allocation of beds among the specialties is satisfactory.

It should be recognized that differences found between hospitals do not necessarily indicate that one is more or is less efficient than the other. The diversity of work undertaken, special local conditions, and many other factors operate to produce numerical differences, which can, however, be used to point out the need for further investigation.

Estimation of Hospital Catchment Areas

Most general and some special types of hospital commonly serve an area, more or less constant in size but difficult to delimit. We may conveniently speak of such an area as the catchment area of the hospital. Prior to the appointed day municipally administered hospitals had catchment areas clearly defined by the boundaries of the local authority; and in most cases a residential qualification was necessary for admission; but this was not true of voluntary hospitals, which admitted patients irrespective of their home address.

The National Health Service does not recognize any residential qualifications for admission to hospital. Theoretically, a patient may be admitted to any hospital in the country, but in practice patients find it convenient to be admitted to the nearest hospital offering facilities appropriate to their need. Moreover, general practitioners in a district know the staff of their local hospitals and they, too, commonly refer their patients to these.

In determining the population served by a particular hospital the first requisite is a knowledge of the admissions to hospital by their place of residence. At the time when the population survey was made the discharge slips mentioned above were not in use and consequently recourse was had to a census method as a temporary expedient. This entailed the following assumptions:

(1) That the hospital population on the census day gives a representative sample of that on any other day in the year.

Needless to say, this assumption is not legitimate if a substantial proportion of beds are available for treatment of conditions subject to considerable seasonal variation.

(2) That within each local administrative area the density of population is uniform throughout. In urban areas no great errors are likely to arise from this assumption, while in rural areas the number of persons involved is so small that even if there are considerable variations—for example, concentration of population in small towns and villages—the error will not be large.

On October 19, 1949, a census was taken of all patients in every hospital in the Birmingham Region. Each hospital completed a form showing the number of patients by the administrative area of their home; the information was transferred to punch-cards. Special hospitals, including mental and mental deficiency hospitals, were considered separately.

There were 107 local government areas in the region for which official estimates of population were available. The cards were sorted out according to these areas. Thus for each area the number of residents in hospitals on that day was known, and also the names of hospitals to which they were admitted. In most areas these numbers give a good estimate of the total hospital population on that day. Estimates for areas at the boundaries would not be so accurate, as no information was available regarding persons resident in these areas but in hospitals outside the region.

The method of determining the catchment areas from these data is shown in Appendix A.

Nursing Staff Requirements

Valid comparison of staff/bed allocation in different hospital groups must take stock of the fact that the target varies from hospital to hospital, the mean allocation presumably deemed adequate for mental hospitals in particular being far below the general. In the Birmingham Region the composition of the groups with respect to different types of hospitals is highly variable, and therefore a low staff/bed ratio for a particular management group does not necessarily signify that it is understaffed. Crude rates such as the number of nurses per 100 beds may therefore be very misleading, and it is necessary to interpret them in juxtaposition to some yardsticks of adequacy. Differences in the staff situation in hospitals of diverse types are exemplified in Table III. The overall nurse/bed ratio for any particular type of hospital is the number of nurses per 100 available—that is, open and ready for use—beds.

The problem would be simple if we had firm figures for the requirements of each type of hospital. In the absence of such figures, the calibration of any yardstick of adequacy we adopt must rely on arbitrary assumption; and it is not unreasonable to suppose that the overall figures in the region as a whole for any particular type of hospital listed in Table III are not far short of requirements. In any case, it is instructive to present the relevant information in such a way as to answer the question: "Does the staffing of the hospital exceed or fall short of the overall standard for the region as a whole?" The crude rate as defined above does not answer this question, but we can make an answer explicit by recourse to a Regional Standard Index (R.S.I.) which has the value 100 if the staff situation in the group is equivalent to that in the region as a whole. A value greater than 100 signifies that the current staff allocation is above, and a value less than 100 that it is below, the regional standard so defined. The method of compu-

tation of the R.S.I. is shown in detail in Appendix B. It involves the application of a simple standardization procedure (similar to that for age standardization in vital statistics) to the nurse/bed ratios of different hospital groups.

Summary

The role of statistics in the National Health Service is discussed.

Variations in the hospital needs of different localities are discussed and some estimates of the number of beds required for each 1,000 persons are shown.

The administrative uses of statistics are illustrated by reference to a survey on the hospital treatment of patients with malignant disease.

Future developments in the statistical service of the Birmingham Regional Hospital Board are outlined.

A method of obtaining the population of hospital catchment areas is given.

The use of standardization in administrative statistics is discussed, and an example is given of its use in making comparisons of staff/bed ratios between hospital management groups.

While it is a pleasure to acknowledge the assistance given to me in this work by the Birmingham Regional Hospital Board and its officers, it is necessary to point out that the views expressed are personal and should not therefore be attributed to that Board or any members thereof. I gladly acknowledge the guidance and encouragement which I have received at all times from Professor Lancelot Hogben, F.R.S., without which none of this work could have been done.

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APPENDIX A

Determination of Population of Hospital Catchment Areas

Let the total number of residents of area A who were in hospital on the census day be a ; the number in B be b , etc. The total number of patients in regional hospitals on that day was $(a + b + \dots + r + \dots + x)$.

In Hospital 1 there were a_1 patients from A , b_1 patients from B , r_1 patients from R , etc.

In Hospital 2 there were similarly $a_2, b_2, \dots, r_2$, etc., patients from A, B , etc.

The proportion of in-patients from area A in Hospital I is

$$\frac{a_1}{a_1 + a_2 + \dots + a_r} \quad \dots \quad \frac{a_1}{a}$$

In most instances where area A is close to Hospital 1, a_1 is very nearly equal to a .

Let the total population of A be n_a , of B be n_b , etc. Then the population of A served by Hospital 1 is:

$$\begin{aligned} \frac{a_1}{a} \cdot n_a, \text{ by Hospital 2 is } \frac{a_2}{a} \cdot n_a, \text{ etc., and} \\ n_a = a_1 \cdot n_a \div a + a_2 \cdot n_a \div a + \dots + a_r \cdot n_a \div \\ a + \dots + a_x \cdot n_a \div a \\ = \frac{n_a}{a} \left[a_1 + a_2 + \dots + a_r + \dots + a_x \right] \\ = \frac{n_a}{a} \sum_{r=1}^{r=x} a_r \end{aligned}$$

The population of B served by Hospital 1 is $b_1, n_b \div b$ and of C is $c_1, n_c \div c$, etc.

Therefore the total population served by Hospital 1 is $a_1 \cdot n_a \div a + b_1 \cdot n_b \div b + \dots + r_1 \cdot n_r \div r + \dots + x_1 \cdot n_x \div x$

The splitting-up of the population of an area is arbitrary, and where two or more hospitals are in juxtaposition it is more satisfactory to determine the catchment area for the group rather than the individual hospitals.

The estimates would be more satisfactory if they were based on hospital admissions over a period of time—say six months or a year. In this region, when the discharge slips are received from all hospitals further estimates of the catchment areas will be made on that basis. However, the census method is recommended as a speedy and economical technique when facilities are not available for a more detailed survey.

APPENDIX B

Calculation of Regional Standard Index

The rationale of the R.S.I. is as follows. The overall nurse/bed ratio in the region for any particular type of hospital listed in Table III is obtained thus: if R_n is the total number of nurses employed and R_b the total number of available—that is, beds open and ready for use—beds in any one type, then the overall staff/bed ratio in the region for that type of hospital is $100 R_n \div R_b$. The overall ratios for June 30, 1949, are shown in Table III.

For each type of hospital in Table III we have the overall nurse/bed ratio, which may be denoted thus: $n_1, n_2, \dots, n_{12}$. For any particular management group our returns cite $b_1, b_2, \dots, b_{12}$ beds in one or other type of hospital, and $N_1, N_2, \dots, N_{12}$ nurses. If the staff situation tallies with that of the region there would be $n_x \cdot b_x \div 100$ nurses in the x th type of hospital, and the total (standard) number of nurses would be:

$$N_s = \frac{1}{100} (n_1 b_1 + n_2 b_2 + n_3 b_3 + \dots + n_{12} b_{12})$$

Actually it is

$$N_t = N_1 + N_2 + N_3 + \dots + N_{12}$$

If N_t exceeds N_s the hospital allocation is above par, and if N_t falls short of N_s it is below par. We may use $N_t \div N_s$ expressed as a percentage to convey this information. Thus we define the Regional Standard Index as:

$$\text{R.S.I.} = 100 N_t \div N_s$$

Computation of Regional Standard Index

In the Tables below two part-time nurses are counted as equivalent to one full-time nurse.

Type of Hospital	Overall Ratio for that Type (100 n_x)	No. of Available Beds	Estimated No. of Nurses Required $n_x \cdot b_x \div 100$	Actual No. of Nurses Employed N_x
Hospital Management Committee A				
5. General ..	47.8	235	112	119.5
12. Tuberculosis and fever ..	33.6	59	20	25.5
7. Maternity ..	14.7	22	3	7.0
3. Cottage ..	41.0	9	4	4.0
3. Cottage ..	41.0	10	4	3.5
8. Mental ..	13.3	1,183	157	189.5
1. Chronic sick ..	23.1	290	67	48.5
Total ..		$B_t = 1,808$	$N_t = 367$	$N_t = 397.5$
Hospital Management Committee B				
5. General ..	47.8	159	77	80.0
5. General ..	47.8	287	136	120.0
1. Chronic sick ..	23.1	176	41	40.5
7. Maternity ..	14.7	14	2	5.0
11. Tuberculosis ..	20.4	19	4	10.0
4. Isolation ..	28.5	12	3	2.0
11. Tuberculosis ..	20.4	22	4	4.5
Total ..		$B_t = 689$	$N_t = 267$	$N_t = 262.0$

$$\text{Crude rates} = 100 N_t \div B_t$$

$$\text{Regional Standard Index} = 100 N_t \div N_s$$

	H.M.C. (A)	H.M.C. (B)
Crude rate ..	$\frac{100 \times 397.5}{1,808} = 22$	$\frac{100 \times 262}{689} = 38.8$
R.S.I.	$\frac{100 \times 397.5}{367} = 108$	$\frac{100 \times 262}{267} = 98$

Thus from the crude rates it would appear that B has almost twice as many nurses as A, but when due allowance is taken for the differences in composition of the groups A is somewhat higher and B lower than the regional average.

PRIMARY TUBERCULOUS PLEURAL EFFUSION IN OLDER AGE GROUPS

BY

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The primary serous pleural effusion in children and young adults no longer presents an aetiological problem. Many series of cases, carefully investigated and laboriously followed up, have been reported in the literature, leaving no doubt that, with few exceptions, the tubercle bacillus, although seldom declaring its presence in the fluid, is lurking in the background, prepared in later years to exact a further toll on the health of the victim.

A similar effusion in adults over 40 years of age presents a much greater problem in diagnosis, because of the lessening incidence of tuberculosis and the increasing incidence of malignant disease. From the statistical point of view it is clear that, unless care is taken at the outset to exclude malignant cases from consideration, morbidity and mortality occurring during a follow-up period, especially if the investigator is dependent on a postal questionnaire without necropsy control, may be wrongly attributed to tuberculosis. It is of interest in this connexion that Fauvet (1945), as a result of a follow-up of 731 cases of serous pleural effusion, believes that tuberculosis morbidity and mortality increase with advancing years. On the other hand, Maclean (1948) fears that such a deduction may be erroneous, and that it is almost certainly due to the inclusion of a number of cases in which malignant disease is the real cause. The *British Medical Journal* (1946) points out that the prognosis with respect to the development of tuberculosis is much better in children than in young adults, but does not venture an opinion on adults over 40, in whom it states that "carcinoma of the lung is common."

Another statistical error may occur in all age groups, but more so in the older groups, if cases with the adult type of pulmonary tuberculosis complicated by effusion are included. As Thompson (1947) has pointed out, the prognosis in this type of case is that of pulmonary tuberculosis in general, and is therefore much worse than that of effusion occurring in the period after a primary infection. Radiology may fail to reveal an adult type of lesion until considerable absorption of the effusion has taken place; such a case may be wrongly included as a primary effusion.