EFFICIENCY OF MENTAL HOSPITALS*

BY

BABETTE E. STERN AND E. S. STERN

Battersea College of Technology, London

Civilized communities spend much of their resources on the care of the sick. In present-day Britain nearly half the hospital beds are occupied by the mentally ill, so that even a small improvement in the treatment of these patients will be profitable, both in alleviating suffering and in reducing the burden on the community.

In the work reported here, we have adopted certain criteria by which to judge efficiency of treatment, and then we have analysed the data available in order to determine which factors are important for it.

We have used the statistics published by the Ministry of Health (1955) for the year April 1, 1954, to March 31, 1955, for twelve mental hospitals in the Midlands, which together have some 13,000 beds in daily occupation, and whose patients are drawn from a population of 4,490,000.

We have indicated the hospitals by letters only and have taken a period of some 7 years ago so that invidious comparisons should not be drawn.

A minor discrepancy arises because the hospital patient statistics are always given for the calendar year January 1 to December 31, while the costing returns of the Ministry of Health are published for the financial year April 1 to March 31, but as changes are slow the consequent effect is small and we shall ignore it.

MEAN LENGTH OF STAY

Each of these mental hospitals admits virtually all patients from the area which it serves, so the intake is unselected, and each hospital admits those with similar diseases of comparable severity. As a first step, we have assumed that patients discharged have obtained corresponding measures of relief and that death rates in all the hospitals are similar. These points will be discussed more fully later.

* This paper was read at a meeting of the Medical Section of the Royal Statistical Society on April 24, 1962.

Accepting these assumptions, it follows that one important criterion in judging efficiency of treatment, must be the length of time spent in hospital.

However, the mean length of stay of patients is not directly obtainable from the available annual statistics, which supply, for each sex:

- (i) Number of admissions.
- (ii) Total number under treatment.
- (iii) Total discharged and transferred.
- (iv) Total deaths.
- (v) Total remaining on register on December 31.
- (vi) Mean number on register (during year).
- (vii) Deaths, expressed as a percentage of (vi).

It is possible to calculate an approximate value for the mean length of stay, using the above data, as follows: Let

Average treatment time for all patients = B decades.
 No. of patients at start of decade = e'
 No. of patients at close of decade = e
 No. of deaths and discharges during decade = d
 Mean No. on register = f

Then, it can be shown that:

$$B = \frac{2f}{2d + e - e'} / \frac{f}{d}$$

We have assumed that e' (and e) patients were treated for an average $B/2$ decades during only the preceding (and succeeding) decade. This limitation could be overcome by considering periods much longer than decades, for then all patients would be treated only in adjacent periods, but the results of changes in treatment would not then become evident for many years. On the other hand if very short periods are considered, some patients' treatment will extend over several of these spells and the value of B will be underestimated. It is, however, not unusual

for the maximum stay in mental hospitals to be over 50 years; in one hospital of 1,400 patients, twelve have stayed for longer than this period and one has just died after 63 continuous years in hospital.

In order to determine what period is a useful compromise, the index *B* has been worked out for different periods for Hospital A. The index of stay is not constant, but has been declining steadily (Table I).

TABLE I
MEAN LENGTH OF STAY FOR HOSPITAL A

Year	Mean Length of Stay in Years "B"
1942	2.25
1943	2.09
1944	2.06
1945	2.06
1946	1.81
1947	1.78
1948	1.51
1949	1.46
1950	1.63
1951	1.34
1952	1.33
1953	1.27

We have therefore taken a central period (1947-8) and worked out "B" for one year at each of these 2 years and averaged the result. We have then taken the 2 years 1947-8 and calculated "B" over this period, then the 4 years 1946-9, and so on up to the 10 years 1943-1952. From Table II, it can be seen that "B" is approximately constant when it is based on periods of 6 years or over, and that errors introduced by taking a period as short as one year are small. We have therefore felt justified in taking one year as the period over which we have calculated *B*, the mean length of stay.

TABLE II
VARIATION OF "B" WITH LENGTH OF PERIOD USED IN CALCULATION

No. of Years used in Calculation of "B"	Period used in Calculation	Value of "B" in Years
1	Mean of 1947, 1948	1.63
2	1947-8	1.64
4	1946-9	1.62
6	1945-50	1.67
8	1944-51	1.69
10	1943-52	1.67

In passing, it is perhaps of interest to note that, for this hospital during the decade 1943-1952, the mean length of stay decreased from 2.1 to 1.3 years, and that the decrease was fairly regular. Similar trends are general throughout the country.

RE-ADMISSIONS

It is theoretically possible that the reduction, over the years, of mean length of stay, has been achieved only at the expense of premature discharges and subsequent re-admissions, and does not represent any real therapeutic advance. On the other hand it is also possible that patients are discharged after shorter hospital stays than previously because treatment is more effective, and that the frequency of re-admissions for short term treatment is increasing because patients feel themselves to have benefited from their previous periods in hospital, and so readily seek re-admission for the relief of milder symptoms. There is some evidence that this is happening on an increasing scale.

Certainly the number of admissions and re-admissions to Hospital A has shown a consistent tendency to increase since it was opened over 100 years ago (Fig. 1, and Fig. 2, opposite), until to-day over a third of all admissions are re-admissions (Fig. 3, opposite).

FIG. 1.—Annual admissions to Hospital A, by decennia, 1850-1960.

The number and percentage of re-admissions rise capriciously and are curiously unaffected by legislation, *e.g.* the Mental Treatment Act, 1930. This suggests that the main factor is one of social attitude: an increasing readiness of the patients' doctors and

FIG. 2.—Annual re-admissions of patients previously dealt with under the L.A. or M.T.A., to Hospital A, by decennia, 1850-1960.

friends to send them back to hospital, coupled with a growing willingness of the patients themselves to return. There is a steady diminution of stigma which has become obvious to us all during the last decade or so.

COST OF TREATMENT

Fig. 4 shows the relationship between mean length of stay in hospital and weekly maintenance rate, *i.e.* cost per patient per week, for the twelve mental hospitals A to M. There is a negative correlation, $r = -0.63$, between the two variables ($0.05 > p > 0.02$), so that those hospitals with a high weekly maintenance rate tend to keep their patients for only a short time. This raises the question, to which we shall return shortly, whether hospitals with a low

FIG. 3.—Proportion of patients re-admitted to Hospital A as a percentage of total admissions, by decennia, 1852-1962.

weekly maintenance rate are in fact the most economical.

The most economical hospitals are those with a low weekly maintenance rate and a short length of stay, and would appear in the bottom left hand

FIG. 4.—Relationship between mean length of stay and mean weekly maintenance cost per patient for 12 hospitals A-M.

corner of Fig. 4. Conversely, the most extravagant hospitals would appear in the top right-hand corner of the graph. Now Hospitals A to D appear below and to the left of the regression line and Hospitals E to M appear in the top right-hand corner.

Separate regression lines for each of these two groups are shown in Fig. 5.

We do not wish to press this division into two groups if it is fortuitous, but we cannot neglect it as the grouping appears in a number of our subsequent analyses. Such a division may not be as arbitrary as at first appears, should there be one attribute, of an "all or none" character, which is of paramount importance for efficiency of treatment, and which is present in only some of the hospitals. From Fig. 5, it is evident that both groups have similar extents of weekly maintenance rate, but they differ in that Hospitals A to D have a shorter length of stay. Besides this discontinuous variable shown by the division into these two groups, there is a continuous variable also for efficiency shown in the regression line in Fig. 4 for all hospitals together. This latter variable probably arises from attention to detail and depends on material factors.

To return to the question which are the economical hospitals: Figs 4 and 5 show that an apparent economy in reducing the cost per week by £1 is accompanied by an extravagance in lengthening the

patients' stay in hospital by over 6 months. Therefore as a criterion of efficiency we have taken the cost of treatment, calculated as the product of weekly maintenance rate and length of stay (Table III).

TABLE III
LENGTH OF STAY AND COSTS

Hospital	Mean Length of Stay (yrs)	Weekly Maintenance Rate (£)	Mean Total Cost of Treatment per Patient (£)
A	1.24	4.779	310
B	1.32	4.837	330
C	1.82	3.800	360
D	1.96	3.654	370
E	1.59	5.121	420
F	1.84	4.650	440
G	1.82	4.896	460
H	1.92	4.750	480
J	2.27	4.075	480
K	2.14	4.558	510
L	2.79	3.583	540
M	2.40	4.446	550

We have analysed a number of variables, shown in Table IV (opposite), with reference to this cost of treatment in an endeavour to determine which factors are important for it to be low, and have shown correlation coefficients in Table V. Significant correlations, $p \leq 0.05$ are marked by an asterisk; where the

Fig. 5.—Relationship between mean length of stay and mean weekly maintenance cost per patient for hospitals A-D and E-M separately.

EFFICIENCY OF MENTAL HOSPITALS

115

TABLE IV
ANALYSIS OF WEEKLY COST PER PATIENT

Hospital	Size of Hospital (Beds)	Weekly Cost per Patient					
		Provisions (£)	Nursing Salaries (£)	Medical Salaries		Drugs and Dressings (pence)	Medical and Surgical Equipment (pence)
				Paid by HMC (shillings)	Paid by RHB (shillings)		
A	1,364	0.9667	1.3291	0.67	3.83	9	3
B	579	0.8392	1.3791	1.50	3.33	8	1
C	1,034	0.7375	1.1000	0.58	4.42	14	3
D	1,077	0.7583	1.0939	1.58	2.67	10	7
E	709	0.9000	1.5333	1.92	5.58	19	15
F	1,208	0.6459	1.5333	1.00	3.83	13	3
G	1,256	0.8417	1.3125	0.50	3.42	10	14
H	750	0.9375	1.3000	1.00	3.50	17	6
J	1,422	0.7292	1.2583	0.92	3.83	13	7
K	1,220	0.8125	1.3083	0.58	3.75	12	6
L	1,442	0.7041	1.1000	0.75	2.08	14	3
M	922	0.8500	1.3667	0.92	4.58	11	5

analysis is made for Hospitals A-D only, regression has to be close to unity to reach this level.

TABLE V
CORRELATION COEFFICIENTS, r , BETWEEN TOTAL COST OF TREATMENT AND ITEMS OF WEEKLY MAINTENANCE

Item		Hospitals		
		All	A-D	E-M
Weekly Cost	Maintenance (all items)	-0.154	-0.921	-0.750*
	Provisions	-0.448	-0.949*	-0.082
	Nursing Salaries ..	-0.000	-0.897	-0.701
	Medical Salaries Paid by HMC	-0.420	+0.276	-0.743*
	Medical Salaries Paid by RHB	-0.100	-0.409	-0.364
	Drugs and Dressings ..	+0.613*	+0.588	-0.448
	Medical and Surgical Equipment ..	+0.189	+0.648	-0.596
	Size of Hospital	+0.632*		

* $p < 0.05$

ANALYSIS OF DATA

(1) LENGTH OF STAY

Fig. 6 shows that the mean length of stay increases with the cost of treatment and that the cost of treatment increases by about £200 as the stay increases by a year, for the twelve hospitals. Fig. 7 shows that these two variables are correlated also when the hospitals are divided into the two groups A to D and E to M.

(2) WEEKLY MAINTENANCE COST

There is little correlation between weekly maintenance rate and cost of treatment when all the hospitals are considered as a single group. However, when the hospitals are divided into the two groups A to D and E to M, there is, in each group, a high negative correlation between weekly maintenance rate and cost of treatment, significant for the

E to M hospitals (Table V and Fig. 8). This shows once more that the weekly maintenance rate may give no indication of true economy; on the contrary, those hospitals which spend generously on maintenance are those which are able to treat their patients at a low total cost.

It should be noted that the weekly maintenance costs were very low (£3 10s. to £5) compared with those of general hospitals. One might speculate that a more generous policy towards patients in mental hospitals would prove not only humane but also economical.

(3) COST OF PROVISIONS

When all the hospitals are treated as a single group, the correlation between weekly cost of provisions and cost of treatment is negative but not significant. However, Hospitals A to D show a significant negative correlation between the two variables, while Hospitals E to M show very little correlation at all (Table V). One may conclude that there may be a tendency for the more economical hospitals to spend more on food.

It is striking how low is the cost of provisions in mental hospitals. It is almost incredible that as recently as 1954, a patient was fed at a cost of 2 to 3 shillings per day. This may have serious consequences, for Rees Thomas (1945) showed that death rates in mental hospitals rose as the quality of the feeding fell, and he was unable to correlate the mortality of the patients with any other factor.

(4) COST OF NURSING SALARIES

When all hospitals are considered as a single group, there is no correlation between cost of nursing salaries and cost of treatment. But when the

FIG. 6.—Relationship between mean length of stay and mean total cost per patient for 12 hospitals A-M.

hospitals are considered in the groups A to D and E to M there is a negative correlation between cost of nursing salaries and cost of treatment, in each group (Table V). It is, however, just not significant. As there is a general shortage of nurses, it appears likely that those hospitals which spend little on nursing salaries do so because they cannot fill their vacancies.

One way to improve standards is to ensure that more mental nurses will become available. As the ratio of men to women in the country is increasing, and is greater than one for the younger age groups, the number of unmarried women is rapidly declining and unless energetic steps are taken to attract more men and married women to mental nursing, the situation is likely to deteriorate.

(5) COST OF MEDICAL SALARIES

Junior doctors are paid by the Hospital Management Committee, while senior doctors are paid by

the Regional Hospital Board. Table V shows that, for Hospitals E to M only, there is a significant negative correlation between junior doctors' salaries and cost of treatment. This may well be due to the difficulty in filling posts for junior doctors in some hospitals, although it will be noted that Hospitals A to D do not spend noticeably more on junior doctors' salaries than do Hospitals E to M.

There is little correlation between cost of salaries paid by the R.H.B. and cost of treatment. We need not conclude that the quality of senior medical officers is immaterial. However, we can say that unfilled posts for seniors are not common and that salary scales are fixed.

Quantity rather than quality is measured in the costs of salaries.

(6) DRUGS AND DRESSINGS

For all hospitals considered together, there is a significant positive correlation between cost of drugs

Fig. 7.—Relationship between mean length of stay and mean total cost per patient for hospitals A-D and E-M separately.

and dressings and cost of treatment (Table V). This is perhaps surprising, as it might have been thought that quick recovery was partly due to the use of expensive drugs. It must be repeated, however, that these figures apply to 1954. Incidentally, it is of interest to note that the weekly cost of drugs per patient was surprisingly low, varying from 8d. to 1s. 7d. We estimate that this is not very different from the sums spent by the general so-called "healthy" population in response to high pressure salesmanship from the drug industry. So it is perhaps especially interesting to note that there is no evidence that more extravagant use of drugs and dressings would have benefited the mental hospital patient, and some evidence to the contrary. However, since the date of this review, there has been a considerable increase in the drug bill of mental hospitals owing to the introduction of new remedies.

(7) MEDICAL AND SURGICAL EQUIPMENT

There is no significant correlation between cost of

medical and surgical equipment and cost of treatment (Table V).

(8) OTHER WEEKLY COSTS

We reiterate that both the A to D and the E to M groups of hospitals spend much the same on weekly maintenance, and that the real economy lies in short length of stay. The reason for our analysis of separate items in the weekly maintenance rate is to discover if any of them indicate what is important for effective treatment.

Within either group we have found that economical hospitals tend to have high weekly maintenance rates. So it is likely, though not inevitable, that an "indicator" item will have a higher cost in more economical hospitals. It is also possible that the cost of such an item may be trivial.

Therefore it is not on grounds of cost that we have selected items for analysis and, in fact, those already considered account only for rather more than half of the weekly maintenance rate. The rest cover

FIG. 8.—Relationship between mean total cost and mean weekly maintenance cost per patient for hospitals A-D and E-M separately.

expenses which, by their nature, are more remotely concerned with the patients' welfare. They are given

TABLE VI
OTHER WEEKLY COSTS

Mean Costs per Patient per Week				Hospitals	
				A-D	E-M
Patients' Clothing				s. d. 1 10½	s. d. 1 9½
Hardware and Crockery				6½	5½
Bedding and Linen				1 4½	1 4½
Cleaning and Chandlery				6½	7
Other Running Charges				1 10½	2 0½
Non-medical Gross Salaries and Wages	Ward Orderlies			10½	1 3½
	Works and Maintenance			5 8½	5 3½
	Laundry			1 4½	1 3
	Farm and Garden			3 2½	1 6½
	Administrative and Clerical			2 4½	2 5½
	Professional and Technical			1 7	1 7
	Catering			2 6½	2 1½
Others				4 0	5 5½
Staff Uniforms				6½	6½
Fuel, Light, Power, and Water				7 5½	7 1½
Maintenance of Buildings, Plant, and Grounds				4 3½	5 2½
Furniture and Furnishings				1 3½	1 3½
Rent and Rates				2 5½	2 3½
Printing, Stationery, Postage, Advertising, and Telephones				8½	8
Transport (including Medical Staff Travelling Expenses paid by RHB)				8	3½
Trading Services				6 8	6 8½
Total				49 0½	49 6

Costs under two other headings are omitted since each averaged under threepence.

Figures for direct credits not given, but there are no large differences between the two sets of hospitals.

in Table VI, which also gives the mean weekly cost of each item for either set of hospitals.

Two of these items call for comment. Both show higher expenditure in the A to D than in the E to M group, and examination of the individual hospital costs suggests a similar tendency within the A to D group, the more economical hospitals showing higher expenditure. The first of these items is "Farm and Garden Staff Salaries and Wages". It should give the Minister grounds to pause and reflect before continuing his policy of drastically reducing acreages. The second item is "Transport"; its significance is more difficult to assess, but it may show the wisdom of being generous in taking patients and staff on educational and recreational excursions.

(9) SIZE OF HOSPITALS

To-day there is much discussion on the optimum size of hospitals in general and of mental hospitals in particular. The Ministry of Health and the General Register Office (1961) have stated that in non-teaching hospitals for acute cases the average length of stay is shortest for medium-sized hospitals, and that this is true at all ages, in both sexes, and for many specific diseases. Baker, Davies, and Sivadon (1960), in a W.H.O. Report, have arrived at a figure of about 300 beds as the optimum for mental hospitals, and the French have been building nineteen new mental hospitals of this size.

Our survey includes hospitals ranging from 580 to 1,440 beds and we have found a positive correlation between number of beds and cost of treatment (Table V). We have no evidence to submit on the optimum size of mental hospitals, except that it appears to be smaller than those included in our survey.

Within the limits of size of hospital examined, we found that an increase in size of two hundred beds increased the cost of treatment by about £90. However, an examination of the figures for Hospitals A to D indicates that, within this group, costs can be low in spite of large size, so that the adverse effects of large size were obviated in the most efficient hospitals.

(10) DEATH RATE

In our analysis, deaths and discharges have been considered together. We have already discussed discharges and concluded that the condition of the patients on discharge is unlikely to vary much from hospital to hospital. But a low mean length of stay can be obtained by a short but efficacious treatment time or by a high death rate, or by a combination of the two. Table VII shows that, in fact, death rates vary little with cost of treatment, in marked contrast to discharge rates. They also are numerically small compared with discharge rates, particularly for the economical hospitals. The regression line has not been included for the discharge rates, as this graph is merely another way of expressing the mean length of stay. Only exceptionally are death rates high enough to affect this.

TABLE VII

Hospital	Mean Total Cost of Treatment per Patient (£)	Discharges During the Year per Bed Occupied	Deaths During the Year per Bed Occupied
A	310	0.702	0.103
B	330	0.659	0.095
C	360	0.457	0.088
D	370	0.420	0.086
E	420	0.509	0.118
F	440	0.401	0.148
G	460	0.470	0.077
H	480	0.435	0.087
J	480	0.368	0.073
K	510	0.415	0.051
L	540	0.286	0.072
M	550	0.316	0.098

We may conclude that differences in the death rates in the various hospitals in our survey are negligible, so that mean length of stay is a measure of hospital treatments which are terminated by discharge.

DISCUSSION

Parsey (1855), whose work is the earliest we have found on this subject, compared the results of treatment in the 22 English county asylums for the quinquennium 1849-53. He showed that, although they admitted similar patients, recovery and death rates were respectively twice and three times as high in some asylums as in others. He was unable to account for this.

Recently Brown (1959) found that there were wide differences in results at two neighbouring mental hospitals, and that patients who were visited often by friends did better than others. This last finding does not appear to be relevant to our results, as Hospitals A to D were all difficult of access, but at least four of Hospitals E to M were easily reached by patients' visitors.

Wadsworth, Tonge, and Barber (1957) compared costs of treatment for short-stay recovered cases of affective psychosis aged 26 to 65 years in three diverse types of mental hospital. They limited their study to the costs of doctors, nurses, and drugs, and added a hypothetical figure for wages lost, on the assumption that time not spent in hospital will all be occupied in full employment or useful domestic duties. They concluded that those hospitals with the highest weekly maintenance cost had also the lowest cost per patient treated.

Jones, Sidebotham, Wadsworth, Tonge, and Price (1961), in a somewhat similar study, but omitting the estimates for wages lost, also showed that there was an inverse relationship between cost per week and cost per patient treated. However, their comparisons were between three hospitals under different authorities, each apparently admitting a different sort of patient.

We may conclude that it is generally true that a high weekly maintenance rate is positively correlated with economical treatment, but not that these are necessarily cause and effect. Both may be the result of an energetic and sympathetic management, willing to make the necessary effort and sacrifice to improve conditions and treatment. This may result in success in attracting nursing and junior medical staff, as well as in providing better food and amenities for the patients. A part of the cost of drugs is spent on sedatives and tranquillizers, and the call for these is likely to be less the better the patient is managed. This view is supported by Cook (1958), who remarked that tranquillizers have their most striking effects in backward mental hospitals, and it is consistent with our findings that the most economical hospitals are those which spend least on drugs.

There is general agreement to-day that, other things being equal, large hospitals have a detrimental effect on the patient's progress. We suspect that this is true particularly for mental hospitals where "atmosphere" is of paramount importance, both because of the nature of the patient's illness and because the patient's stay is comparatively long.

In a large hospital a patient is apt to feel that he is insignificant and lost to notice. Such a feeling must delay the formation of empathy between him and those who treat him, which gives him the will to recover.

Stanton and Schwartz (1954) showed that a harmonious mental hospital was necessary for the patients' well-being. In numerous visits to mental hospitals in Great Britain and overseas, one of us (E.S.S.) has found that he automatically classifies nearly all of them as "good" or "bad". Examining this, it appears that the "good" hospitals are those in which there is particular care for the individual. This care is lacking in the "bad" hospitals, sometimes in spite of high expenditure on materials or on research. It is largely a question of warmth of atmosphere, and a perspicacious visitor will sense to what extent this is present. Perhaps it is an answer to the thoughtful question of Meares (1961), "What makes the patient better?"

We suggest that some such quality may be responsible for the division of the hospitals into two groups. In this context staff attitudes are, in the last analysis, important only in that they contribute to the state of the patients, for it is the latter who do or do not recover.

In conclusion, therefore, we argue that material factors, such as good food and nursing, may help to speed the patient's recovery. These can be present to any degree and they result in the continuous variation in cost of treatment shown in the regression lines. A will to recover can, on the other hand, be either present or absent, and is perhaps the "all or none" attribute we are seeking. Such a feeling is infectious and in favourable circumstances may be present throughout an institution. If it spreads among the patients in particular hospitals, their length of stay will be shortened and efficiency will be raised.

A psychiatric patient enters hospital with fear and hatred, and he can recover only through developing confidence and love, so that ultimately the efficiency of mental hospitals is a matter of morale.

SUMMARY

A formula is deduced for calculating the mean

length of stay of patients in mental hospitals. The product of this time and the weekly maintenance rate gives the cost per patient treated. This index has been used as a criterion for assessing efficiency of treatment.

Hospitals with a low patient treatment cost, and so a high efficiency rate, are found to have a short period of stay per patient but a high weekly maintenance rate, and this latter therefore leads to true economy.

Weekly maintenance rates have been divided into their components and the following are negatively correlated with cost per patient treated: cost of provisions, cost of nursing salaries, and cost of junior medical officers' salaries. On the other hand the cost of drugs is positively correlated with the cost of treatment.

The hospitals analysed vary in size from 580 to 1,440 beds and, within these limits, the smaller are generally more efficient.

It is suggested that patients benefit most in those hospitals where there is extra care for the individual and that such hospitals also attract nurses and junior doctors, both of whom are scarce. Inefficient mental hospitals rely more on the use of drugs. In excessively large hospitals it is particularly difficult to show concern for every patient.

In many of the analyses the twelve hospitals divided themselves into two groups: A to D and E to M. This suggests that the former group possesses an attribute missing from the latter; this attribute is considered to be a high morale which materially reduces the patient's stay in hospital.

REFERENCES

- Baker, A. A., Davies, R. L., and Sivadon, P. (1959). "Psychiatric Services and Architecture". Public Health Papers No. 1, W.H.O., Geneva.
- Brown, G. W. (1959). *Brit. med. J.*, **2**, 1300.
- Cook, L. C. (1958). *J. ment. Sci.*, **104**, p. 933.
- Jones, K., Sidebotham, R., Wadsworth, W. V., Tonge, W. L., and Price, H. M. (1961). *Hospital*, **57**, 23.
- Meares, A. (1961). *Lancet*, **1**, 1280.
- Ministry of Health and General Register Office (1961). "Report of a Hospital In-Patient Enquiry for the Two Years 1956-7". H.M.S.O., London.
- Ministry of Health (1955). "National Health Service. Hospital Costing Returns, Year ended 31 March, 1955". H.M.S.O., London.
- Parsey, W. (1855). *Asylum J.*, **1**, 149.
- Stanton, A. H., and Schwartz, M. S. (1954). "The Mental Hospital". London.
- Thomas, W. Rees (1945). *Proc. roy. Soc. Med.*, **39**, 142.
- Wadsworth, W. V., Tonge, W. L., and Barber, L. E. D. (1957). *Lancet*, **2**, 533.

- Twinning, sex ratio, birthweight, and parity among Bantu in a Tanganyika sample, 209
- Ulcer, duodenal, survey of, using N.H.S. general practice records, 177
- , peptic, epidemiology of, *46
- Unemployment in males with psychiatric symptoms, 191
- United Kingdom, human brucellosis in, 90
- United States of America, geographical variations in mortality from congenital malformations in, 13
- — —, mortality from arteriosclerotic heart disease in, compared with South Africa, 33
- Vital registration records, automatic linkage of, with medical records, 185
- Wales, South, coronary disease, in 1953
- *WATERHOUSE, J. A. H., and CROSS, K. W.: Cancer prevalence in the Midland region, 45
- *WING, J. K., and BROWN, G. W.: Relationships between social and clinical change in a mental hospital, 47
- Worker, psychiatric social, role of, in employment of psychiatric cases, 193
- WYLLIE, J. M.: *see* PIKE, M. C., etc., 172

CORRIGENDUM

EFFICIENCY OF MENTAL HOSPITALS

Dr. E. S. Stern, co-author of the above (*Brit. J. prev. soc. Med.*, (1963), 17, 111), should have been described as Medical Superintendent, the Central Hospital, Warwick.

On p. 111, col. 2, the formula should read

$$B = \frac{2f}{2d + e - e'} \simeq \frac{f}{d}$$

On p. 112, col. 2, in the caption to Fig. 1, the dates should be 1853–1960.