The College

Planning for Bed Needs and Resource Requirements in Acute Psychiatry

Key points from the Report of the Royal College of Psychiatrists Working Party[1] on Psychiatric Beds and Resources, 1986[2]

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In 1978 the Section for Social and Community Psychiatry of the Royal College of Psychiatrists set up a working party to reconsider the DHSS guideline of 0.5 beds per 1,000 population for acute psychiatric units and to develop a new approach which would enable planners to adopt an appropriate bed provision figure according to the needs of different district psychiatric services. This followed the realisation that Health Authorities were beginning to set arbitrarily their own norms for bed provision, often based on one or two examples within their region, despite the fact that there is a two to three fold variation between districts in the number of beds provided for acute psychiatry. For example, in 1981 Worcester used 0.19 acute beds per 1,000 population and Camberwell used 0.76.

This paper endeavours to summarise some of the main findings of the working party and serves as an introduction to its Report. We address the issue of how clinicians and planners might approach the question "How many psychiatric beds do we need?" and the larger issue "Is the total resource provided for mental health services in line with demand?". The paper does not deal with the form psychiatric services should take, such as whether there should be more or less day places, community nurses, etc. This often involves questions of style and philosophy, and is affected by current practice and preference. There is little or no evidence to date to suggest that there is any one form of service which is cheaper or more cost effective than any other; trends in the form of services change with time, and what is appropriate in one setting may not be in the next.

Rather, the Working Party's report endeavours to help planners consider whether the overall quantity of beds and other provisions correspond to local needs, and whether the level of the existing provision, taken as a whole, is adequate and can be justified, given widely accepted practice at the time.

Our first report, published in 1983[1], concluded that planning at a national or regional level tends to reflect current practice with a bias toward desired change. Existing provision, e.g. the average number of beds in use per 1,000 population, can only be taken as an indication of the 'met demand'.

To determine current practice one can obtain data from the Mental Health Enquiry (MHE). However, this may not give an accurate picture of the existing situation because beds designated for acute purposes are often occupied by long-stay and psychogeriatric patients, and discharges are not differentiated by length of stay. Furthermore, the low bed per population usage reported by several district general hospitals does not take account of back-up beds for long-stay patients and patients transferred to another ward or hospital not long after admission. For example, when we visited a hospital with one of the shortest lengths of stay reported on Mental Health Enquiry data, we found that it looked after only half the acute patients from the district, transferring patients within three months to an associated mental hospital outside the district, or admitting patients there directly. In order to achieve our aim of identifying the factors which account for the variation between districts in bed provision, it therefore seemed imperative to visit a representative sample of hospitals and examine in detail differences in the facilities and personnel and the way the local service is provided. We visited 20 districts with services based at a district general hospital chosen from the 13 Regional Health Authorities in England. In the course of our work we formulated three main hypotheses.

Hypotheses

(1) After controlling for artefacts there will be real differences between Health Districts in:

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[2]This paper is based on a lecture given to the Section for Social and Community Psychiatry of the College on 29 October 1987, amended to include further results from the Department of Psychiatry, Charing Cross & Westminster Medical School, a study in progress by Dr R. Driscoll and Professor S. R. Hirsch.

(a) the number of acute beds/1,000 population;

(b) the average patient's length of stay (or, inversely, throughout in terms of patients per bed per year).

A *corollary to this hypothesis* is that differences in the in-patient population of patients staying more than three months will contribute considerably to the differences in bed provision observed between districts.

(II) Lower bed usage will be related to higher levels of ancillary support as defined by the extent to which the service is community-based, adequate provision of day care, the number of community psychiatric nurses, the number of domiciliary visits per population, and the extent of support from social workers and the Social Services.

(III) Differences between areas in social and psychiatric morbidity will account for differences in the usage of the psychiatric services as measured by admissions and discharges per year, and this will in part account for differences in bed usage.

Method

In order to test these hypotheses we adopted five strategies. First, we reviewed the literature on the relationship between social and demographic characteristics of a population and two factors: the extent of local psychiatric morbidity as measured by discharges per year, and the use of different aspects of the service. This yielded some interesting new findings which we tested and confirmed in different population samples.

Second, we analysed data from the eight psychiatric case registers in the UK to look at the use of beds and length of stay of target populations, wherever the patients were admitted. These findings support the other results and are contained in the main report.

Third, we analysed the last 400 consecutive discharges from a sample of 20 acute Psychiatric Units in District General Hospitals (DGHs), representing almost all Regional Health Authorities in England. The sample was stratified so as to include districts thought to have little cross-boundary flow, focusing on hospitals with high, medium and low patient throughput—(average number of patients per bed over a year). Mental Health Enquiry (SH3) data was used in order to examine differences between hospitals in average length of stay.

Fourth, we analysed information about each of the 20 districts extracted from questionnaires sent to the District Medical Officer, the Division of Psychiatry, and the Director of Social Services (only four had time to co-operate!). Subsequently, the hospital was visited on our behalf by a former visitor of the Health Advisory Service. Medical, nursing, administrative and social service staff were interviewed in order to provide first hand information about the characteristics of each service, and the nature of their support services.

Finally, we analysed the relationship between admission rates and social demographic indicators in South Hammersmith and in the North West Thames Regional Health Authority to see whether social characteristics correlate with and predict admission rates.

Results

The results are set out below with reference to the various hypotheses. The conclusions suggest a new approach to the planning process which we believe will provide a more flexible and sensitive approach to local planning. The result turned out not to relate just to bed requirements as such but to the planning of the overall psychiatric service requirements of a district.

Review of the literature: factors affecting morbidity and use of services

It is well established in the literature that the prevalence of certain conditions such as suicide, alcoholism, and schizophrenia are related to such social-demographic characteristics as unemployment, migration, ethnic grouping and ecological setting; and the rates for these conditions are higher in underprivileged areas in city centres. However, a new finding which has emerged only recently is that the social-demographic characteristics of a population correlate with admission rates of psychiatric units. This was a clear finding in five reported studies, two of which are unpublished: Hassall (personal communication) found that admission rates for urban Worcestershire were one to two times higher than from rural areas from 1976 to 1982; this was observed in both under and over 65s, respectively, even though the rates tended to increase with time for all groups over this period.

Buglass and colleagues,[2] found a high correlation of social isolation and deprivation with mental hospital admission rates. The Psychiatric Case Register group found a strong relationship between admission rates and decaying inner city areas such as Camberwell and Salford, as compared to prosperous growth areas such as Worcester and Oxford.[3] Jones, Koutny & Cooper[4] found a strong correlation between indicators of social disadvantage in different population zones in Nottingham and Social Service utilisation rates, with nearly 80% of the zones with higher social services utilisation rates rated severely disadvantaged in comparison to zones with a low use of the social services. Finally, a study carried out by Kangesu and colleagues[5] compared four population areas served by Springfield Hospital. The two with a high percentage of council houses (57% and 82% respectively) and a relatively high unemployment rate (13% and 14%) had much higher admission rates than the other two areas which had a low proportion of council housing (9%) and low unemployment (4%).

All these studies suggest a link between the net demand for services (admission rates) and socio-demographic characteristics of the population (Hypothesis III), but an alternative explanation is that the services for these groups differ in their tendency to admit because of local differences in the way they practise. We therefore conducted a prospective study to test this hypothesis which is discussed under Hypothesis II.

HYPOTHESIS I. ESTIMATING CURRENT ACUTE BED USAGE: THERE ARE REAL DIFFERENCES BETWEEN DISTRICTS

Our first hypothesis was that there is a substantial variation

TABLE I

Adjustments to determine a standardised number for beds per 1,000 population

A Hospital	B 1981 Gen. psy. beds according to MHI, based on SH3 forms	C 1981 Gen. psy. beds (all) determined locally	D ESMI Assessment & ESMI	E Average occupied by new and old LS	F 1981 Net average acute beds	G Inflow adjustment excluding non-catchment area patients	H Outflow adjustment beds in other units than the hospitals visited	I 1981 Census (Population in 1,000s)	J Estimated acute beds provided within the District per 1,000 population
1	189	160	0	17(5)	143	100	100	177.00	0.56
2	154	118	10*	5	103	93	96	192.40	0.50
3	97	96	0	0	96	86	86	178.00	0.48
4	74	74	12	4	58	43	43	94.10	0.46
5	84	84	0	3	81	80	80	190.50	0.42
6	59	59	(8)	0	50	50	80	188.40	0.42
7	92	72	0	3	69	69	69	166.90	0.41
8	62	54	5	0	54	49	49	120.00	0.41
9	78	78	0	6	72	72	94	234.00	0.40
10	60	60	4*	0	56	56	81	201.00	0.40
11	50	50	4*	4*	46	42	51	130.00	0.39
12	89	88	0	12(3)	76	73	73	189.00	0.39
13	124	79	0	5	74	67	67	179.80	0.37
14	95	95	15(5)	13(2)	77	77	141	468.60	0.30
15	81	79	0	0	79	79	79	288.70	0.27
16	102	96	31	(13)	52	52	54	225.70	0.24
17	53	53	12	0	41	41	41	175.90	0.23
18	107	48	0	0	48	48	63	272.30	0.23
19	28	15	13(3)	0	15	15	24	133.10	0.18
20	83	66	29	4	33	33	33	206.50	0.16
Totals		1,761			1,323	1,192	1,371	3,806.40	$x = 0.37 \pm 0.08$

Adapted from Table XIII of the College Report.

No distinction was available between new and old LS (long-stay); where the same beds are shown for ESMI (elderly severely mentally infirm) and LS in columns D and E, they are counted only once for column F.

The number of ESMI beds is given in brackets.

H Outflow adjustment indicates the observed number of Acute General Psychiatry beds for patients in hospital < 1 year.

I From 1981 Population Census.

SH3 = an NHS census of bed occupancy.

Inflow = admissions from outside the catchment area.

Outflow = admissions dealt with outside the catchment area.

*= no distinction was made between new and old long-stay, so counted once if redundant.

TABLE II

Estimate of current bed provision and usage for acute patients discharged within one year

	Per thousand population			
	Age group	*Bed use*	*Estimated bed provision mean*	*Median*
England & Wales	0–64	0.38	0.45*	
Case Registers	15–64	0.39	0.46*	
20 Hospital Study excluding ESMI				
Bed provision + 10% for cross-boundary outflow	>0.5		0.41	0.44
Omitting extremes	>0.5		0.42	

The "best estimate" of current bed provision is 0.43 to 0.44 beds per 1,000 population.
*Adjusted for 85% bed occupancy.

between health districts in usage of psychiatric beds which stands up after excluding beds used for new long-stay and demented patients who may remain on acute wards, and excluding patients admitted from outside the district, but including acute patients transferred to other units *within* the district. Note that patients treated outside their district of residence are *not* accounted for here, so there is a systematic undercalculation of bed use which does not take account of patients treated outside their health district.

Table I shows how, beginning with the number of beds existing in the district we visited, we arrived at a standardised assessment of the number of acute psychiatric beds available in each district, expressed as a rate per thousand population and rank ordered from those with the most beds (hospital 1, column A) to the least (hospital 20). The number of beds on the acute ward occupied by ESMI (demented) patients (column D) and new and old long-stay patients (column E) were subtracted from the existing beds (column C) to determine the number of acute beds available at each hospital (column F). The number of beds occupied by patients coming from outside the district was then subtracted (column G) and the number of beds in other hospitals which have a formal link to the district were added in (column H). Column H, then, represents the corrected number of acute beds in use by the district but does not include residents in the district treated in hospitals outside the district (cross boundary outflow). Column H is then divided by the population of the district (column I) to determine the number of acute adult beds in use in the district per 1,000 population (column J) at each hospital.

Cross boundary flow and calculation of the number of acute beds in use

The variation between districts is 3.5 fold, confirming Hypothesis I that there is a real variation in bed provision. The mean is 0.37 ± 0.08 beds per 1,000 population. However, this must be corrected for *cross boundary outflow*, if we are to determine the average number of beds a district has in use for its resident population; otherwise there would be a systematic error in determining the number of beds used by the population; the number of in-flow patients from other districts has been deleted but residents from the district

having treatment in facilities outside the district need to be added in.

Each district should be able to obtain inflow and outflow data for its district from the Hospital Activity Analysis.[6] However, it will have to make a policy decision whether to continue to provide for patients coming from other districts, and to plan for the proportion of its population being treated in other districts. Of the 20 hospitals we studied, 12 had virtually no inflow, but the others had an average 20% net inflow (the greatest being 30%). The average cross boundary inflow across all 20 hospitals was 10%. Camberwell and other Case Register data have shown that a 30% cross boundary outflow for some inner city districts is normal. Conservatively correcting for 10% outflow mean average, the bed estimate of the mean number of beds currently in use for the 20 hospitals visited would be 0.41 beds/1,000 population (see Table II).

Current average bed usage in England

It should be noted that our estimate was derived from a stratified sample of 20 hospitals skewed to study slightly more hospitals which reported low bed levels. To compensate for that skew, the *median* for bed use is a better estimate. The medium bed/population level of our sample of 20 beds was 0.39–0.40 beds per thousand; adding in 10% for cross boundary flow, gives 0.44 beds/1,000.

Table II also gives two other estimates of bed provision, from data derived from the Mental Health Enquiry and from the Case Register Study. These estimates of median and mean bed levels are summarised in Table II. Other estimates based on the Case Register study, or Mental Health Enquiry data for England and Wales, which give beds *occupied* per population have to be corrected to allow for an average bed under-occupancy so that beds are free for emergency admissions. Assuming 85% occupancy, the average bed provision in 1982 was 0.43 to 0.44. Our 'best estimate' for the 20 hospitals from these three indicators of current practice is 0.43–0.44 beds in use per 1,000 population but this does not allow for a

percentage of under occupancy. Even if our 20 hospital study is taken as the best estimate, because it is based on the newer units in district general hospitals, the figure from our survey and national figures come in the range of 0.43–0.44/1,000 population in 1982. Note, however, that this is only an indication of average practice witin a 3.5 fold variation.

Importance of length of stay (Corollary to Hypothesis I)

In our first report[1] we made calculations based on national data which showed that preventing admission of short-stay crises intervention-type patients—for example parasuicides—would have very little effect on bed turnover rates (average length of stay); but that a relatively small number of patients staying more than six or twelve months markedly increases bed requirements.

In the first stage of our investigations of 20 DGH Units we determined the length of stay of the last 400 discharges in 1981 for each hospital. These are shown in Fig. 1. The mean length of stay for each hospital ranges from 15 to 69 days with a median of 36.

The hatched area indicates the length of stay if all patients staying six to twelve months were discharged at six months which would considerably reduce the variation between hospitals. However, note from the asterisk which hospitals transfer acute patients to another hospital or do not take all the acute admissions from the district. This shows that length of stay longer than six months accounts for a higher usage of beds on acute wards. We found that excluding the hospitals with median lengths of stay (J & K), five of nine hospitals who had less than the median number of acute beds per population had alternative facilities for their longer stay acute patients, compared to only two of nine above the median, for length of stay. Seven of the nine hospitals with length of stay above the median have a substantial proportion of patients staying six to twelve months while this can only be said of one, or at the most two, of hospitals below the median.

Although patients staying more than three or six months substantially account for the variation in bed throughput among the *hospitals* we studied, this did not account substantially for the variation between health districts of acute bed use, so the corollary to our first hypothesis was only partially supported. Because we studied acute bed provision we are not able to comment on the need for beds for the new
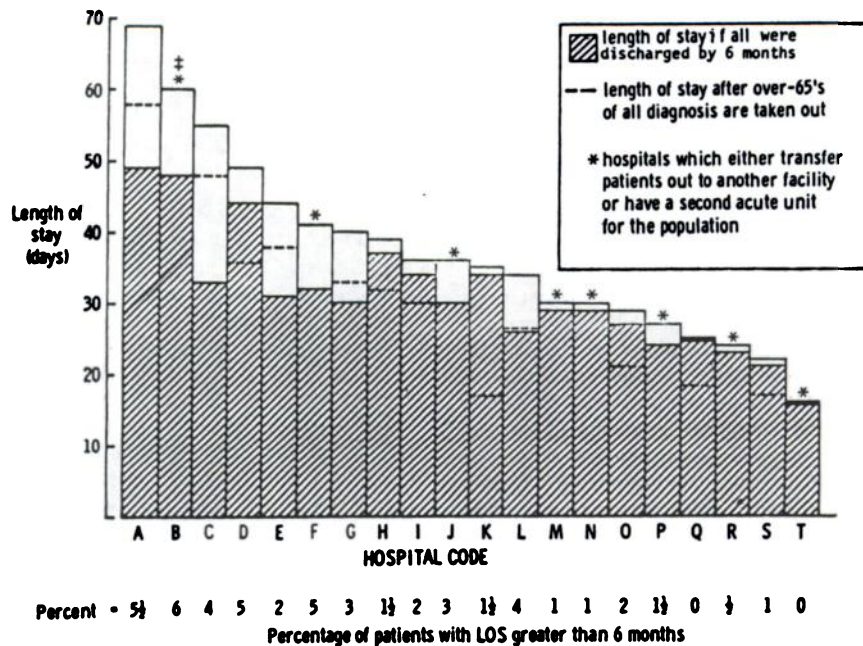

FIG. 1. Average length of stay of last 400 patients discharged from each of 20 DGH units. Proportion of average made up by stays over 6 months shown in white. The order of hospitals A to T does not directly correspond to the ranking of hospitals 1 to 20 according to the mean number of beds per population.

long-stay patient. However, it is worth noting what we pointed out in our first report; that if a district accumulates one long-stay patient a year who stays 40 years they will eventually require 40 additional long-stay beds, and and if they accumulate five per year they will eventually need 200 beds. Thus, over a ten year period, local plans and facilities for the new long-stay may have quite a bearing on the success of small acute units to meet demand. Reducing the proportion of patients staying more than six months would play an important part in some hospitals acute bed requirements.

HYPOTHESIS II: IS THERE A RECIPROCAL RELATIONSHIP BETWEEN PROVISION OF BEDS AND ANCILLARY SUPPORT SERVICES?

This was the one hypothesis for which we could not find support. Units best provided with day hospital places in our 20 hospital study tended to be best provided with beds. Out-patient activity tended to be greatest where bed levels were highest, and there was a strong correlation between number of beds and number of consultants per 1,000 population ($r_p = 0.76$). This might be interpreted to mean that the level of service is influenced by the number of consultants, because more consultants and out-patient services would generate more admissions, but day hospitals should relieve the pressure. Alternatively, higher consultant numbers may reflect a local recognition that there is a high demand for psychiatric services, usually because of high psychiatric morbidity, but expansion of consultant numbers tradition-ally is accompanied by expansion of other aspects of the service. This is what our results suggest.

When we looked at the other support services we found the same picture. Where there were more beds, there were more community psychiatric nurses. The presence of multi-disciplinary teams, the frequency of consultant domiciliary visits, the presence of sectorisation, the availability of social service provision of hostels, the number of psychiatric social workers, and the distance from the main population did not provide a basis for discriminating between services with high and low levels of bed provision.

There are two caveats to this conclusion. The first is that the data we had to work with were not highly systematic or accurate, but represent the best estimates we could obtain by questionnaire and interview when visiting the 20 sites. It would not be possible, for example, to submit the data to multi-variate analysis to examine the combined effects of all factors, but inspection of the information does not suggest that by combining these factors in some way a relationship would emerge. The second is that no service was 100% complete—even the best provided teaching hospital based services had a relatively low number of CPNs and day hospital places. These results are disappointing for those who think that community care is about reducing beds rather than providing a better service. It remains possible that with more ample provision of ancillary support, and alternatives to admission, dependence on beds might be reduced, although we could find no support for this in this study.

HYPOTHESIS III. SOCIAL DEMOGRAPHIC FACTORS CORRELATE WITH DEMAND FOR PSYCHIATRIC SERVICES

Having established that there is a 3.5 fold difference in bed usage among the 20 health districts studied which cannot be accounted for by differences in form of the service or alternative facilities, one must ask whether there are differ-ences in the inherent morbidity of different populations which might be related to their social-demographic charac-teristics. This was suggested by our review of the literature (above). To test this hypothesis (III) prospectively, admission rates were examined from each of the 18 electoral districts in South Hammersmith in 1984, and correlated with a measure of social deprivation devised by Professor Jarman called the 'Under Privileged Area Score' (UPA Score).[7,8] This is a weighted index which takes account of the proportion of the population who are single parents, pensioners, unemployed, living alone, living in over-crowded housing, unskilled and immigrants. (We are indebted to Ann Foster, Unit Administrator for this analysis).

The ranked correlation within the sample between the admission rates from each electoral ward in South Hammersmith and the Jarman UPA Score was $r_p = 0.82$ (see Table III). The admission rates varied 3.8 fold within each of three sectors of the health district. Each had its own consultant and social service team, and all these were served by the same hospital facilities, so the differences between electoral wards in admission rates were not influenced by the clinical facilities or Social Service area teams. The ranked

TABLE III

Psychiatric admissions Charing Cross & Banstead Hospitals 1984, by electoral ward in South Hammersmith*

Admissions/ 1,000 population	Rank	Jarman Score	Jarman Rank
10.21	1	34.02	2
7.18	2	30.67	6
6.11	3	32.99	4
5.88	4	26.82	10
5.48	5	33.31	3
4.88	6	39.88	1
4.84	7	32.34	5
4.57	8	18.55	13
4.43	9	26.08	11
4.17	10	29.78	7
3.46	11	27.26	9
3.37	12	20.48	12
3.04	13	29.57	8
3.02	14	17.71	16
2.61	15	18.31	14
2.56	16	12.06	18
2.23	17	13.11	17
1.87	18	17.97	15

$X = (4.42)$ $r_p = 0.82$.
*Abridged from Working Party Report.

correlation, r_p, between the UPA score and admission rates was above 0.70 for each sector taken separately.

Since our previous report we have calculated the ranked correlation of admission rates in 1984 for all districts in the North West Thames Regional Health Authority for patients aged 16–65 years. This takes out the effect of old age which might have accounted for the high correlations of UPA scores and admissions and it spans the gamut from social deprivation to wealth because, as opposed to South Hammersmith, more districts in the region are prosperous (low UPA scores) than under-privileged. However, the correlation of UPA scores with admission rates was again high, $r_p = 0.80$. This shows that it may now be possible to derive from available national socio-demographic census data, scores which correlate with, and therefore are predictive of, admission rates for acute psychiatric services. Socio-demographic factors could thereby be used to create a direct indicator of the potential demand for psychiatric services. This supports *our third hypothesis, that there are differences in the social and psychiatric morbidity of different population areas which in part accounts for differences in demand for services.*

Estimating resource needs

How then can planners decide whether a particular service should be provided with more or less beds and other resources than the average? Although we were disappointed not to find a relationship between the components of a psychiatric service and bed requirements, we have established that real differences between services do exist—differences in *resource provision*. Furthermore these differences did not correspond closely to the throughput-per-bed—which is one measure of the *activity* of the services. We also showed (Hypothesis III) that a social-demographic index, the UPA score devised by Jarman[7,8] correlates closely (about 0.8) with admission and discharge rates of health districts in the NW Thames Regional Health Authority for the under-65s, and with discharge rate by electoral ward in South Hammersmith. Assuming that discharge rates provide a good indication of the morbidity which would require admission in a district running a traditional hospital-based service—a good indication of 'met demand'—then the social demographic index could be developed as an indicator of 'potential demand' if other hospitals were provided with similar resources and practice. The term 'potential' is chosen because actual demand may be affected by local circumstances such as inadequate facilities which curtails demand, or special services which might create unusual demand. The social demographic characteristics of the population are independent of these, and should therefore provide a standard which applies equally to *all* populations, predicting the expected demand by a uniform technique applied equally to all populations. We are currently extending studies of the method to test its reliability in different populations.

Perhaps these three factors, *resource* provision, the *activity* generated with the resources and an index of *potential demand* can be used by planners to analyse a particular psychiatric service whether, compared to other

services and in the light of the potential demand, the level of activity is adequate; whether the resources are adequate given local needs (as measured by potential demand) or, indeed, whether the service is over-provided. The concept of efficiency can be introduced here in terms of use of the provided resources, defined as the activity of the unit relative to its resources (efficiency = activity/resources, expressed in standard scores). High activity relative to other centres, with modest resources would be efficient, but low activity with rich resources would indicate inefficient use of the resources. Effectiveness is a more difficult concept, difficult to measure across the total span of a service activity. Conventionally this is evaluated for specific conditions in clinical trials.

How, then, does one decide how many beds? We now realised that what is at issue is the level of mental health resources *in toto* required by a population, not just the number of beds. Beds are a focal point of a service because they require the highest concentration of resources—a building, laboratories, doctors, three shifts of nurses, occupational therapists, etc; but each district must make its own value judgement as to how its psychiatric services should be provided. Bringing nurses to the patient's home instead of the patient to hospital would probably require a similar level of resources as an in-patient service but the decision to do so should be decided locally, on the basis of other criteria. It could be argued that the basis of resource planning at the Regional Health Authority level should be to provide a financial allocation to health districts based on the population size and a morbidity weighting along the lines taken by the Resource Allocation Working Party (RAWP). Such a weighting could be made using a social demographic indicator such as the Jarman UPA score.

Activity analysis
Standardised scores

Taking all the data we had for each element of the service—admissions, discharges, out-patients, domiciliary visits, CPN visits, etc. as a rate per 1,000 population, it is possible to determine how far the provision of that element in one district differs from the mean of all other districts. This should become possible for all districts as Körner data sets are implemented performance indicators are developed. Meanwhile districts could compare their activity and resources to the mean of the 20 hospital sample in the Working Party's report. Any given element of a service can be expressed as a 'standard score' in terms of the number of standard deviations from the mean for the sample. The standard score expresses how much greater or lesser an element of the service is than the mean. A district with a standard score of +2 for out-patient visits is two standard deviations above the mean, which would put it in the upper 96 percentile of all districts in our survey for the size of its outpatient activity, while a score of −2 is at the very bottom. Standard scores are used because one can combine the standard score of different elements of a service but one can not combine (add or multiply, etc) the raw scores themselves.

Combining standard scores

In order to devise a model which would demonstrate how this could be done, we made an aribitrary judgement, giving different weightings to the elements of the service according to their assumed contributions to the overall activity of psychiatric services. For example, Charing Cross Hospital has 12,000 out-patient visits per year and 450 admissions but one might be judged to be equal to the others in the importance they play in meeting public demand for services. In analysing the 20 hospital study our formula arbitrarily weights the standard score for out-patient services as equal to the score for admission rates when considering the activity of the service, and each of these was given four times the weighting of the number of domiciliary visits by consultants. This approach, especially the right algorithm, requires more thought and investigation. It serves as a model which tries to estimate the relative cost-effectiveness of a service taking into account the many combined activities staff engage in.

Activity algorithms

The weighted formula for activity which we used for the purpose of our model, expressed in standardised scores for each element, is:

$$\text{Activity} = (2 \times \text{discharge score}) + (2 \times \text{OPD Score}) + (0.5 \times \text{domiciliary score})$$

The weighed formula given here was meant to be arbitrarily arrived at to provide a model but it can be defended. A rationale can be conceived as follows: suppose that three hospitals all with the same spending on mental health and all with the same size and type of populations are compared to 10 others. Hospital A has the same number of DVs and admissions as the mean for the sample but is the highest for out-patient visits, 2 standard deviations above the mean. Hospital B has the highest admission rate, 2 SDs above the mean, but average admission and DVs as the mean. Hospital C has the same admission rate and out-patients as the mean but the highest number of DVs, 2 SDs above the mean. Their weighted scores are 8, 8, 2 respectively. The reader must judge if this is reasonable expression of the relative activity of the units in terms of patient services provided from similar size budgets?

Unfortunately, the 20 hospital study did not have adequate data on the number of CPN visits, the number of day hospital visits, or other aspects of the service to be included in the formula but we think this calculation still tells an interesting story as a way of comparing the 20 services.

Resource algorithms

Similarly we devised a weighted score for resources provided by the service, as follows:

$$\text{Resources} = 2 \times \text{beds and } 2 \times \text{consultants per population} + 0.5 \times \text{CPN plus } 0.5 \times \text{day hospital places.}$$

This implies a judgement that the relative number of beds or consultants per population provided by the service is four times as important as such indicators of the overall resources of the psychiatric service as the relative provision of CPNs or day hospital places. We accept that many people will think

that a different set of weightings would be more appropriate. Though this did not generate much discussion in our working party, this also requires much more research.

Comparison by activity and resource scores:

Table IV is a shortened version of Table XXIII from our report. It illustrates the range of standardised scores from our 20 hospitals ranked from highest to lowest in bed provision: hospitals 1, 2 & 3 in column A are ranked the highest, 11, 12 & 13 are in the middle, and 18, 19 & 20 have the lowest beds per population. A standardised unit (SU) of measurement was taken as 2/3 of a standard deviation from the mean. Column B shows the standardised score expressed as number of standardised units (SUs). Each district service stands away from the mean of bed provision. Column C shows the same for discharges, etc. Using the weighted formula the weighted sum of the standard units was calculated for each hospital. This appears in column F as the activity weighting. A clear picture emerges. The hospital with the highest number of beds has the highest activity. But hospitals 11 and 13 also have a relatively high activity rating, despite only having an average number of beds; while hospitals 18, 19 & 20 lie well below the mean level of activity for the sample. Hospital 1 (column 4) which has the most beds and the highest activity rating also has far and away the greatest overall resources of all kinds. Hospital 2, also with high resources, had an activity rating of 3, which was fifth for all 20 hospitals, while its resources rank easily second (column J). In other words, relative to their high level of resources, hospital number 2 is not so efficient. Hospital 11, on the other hand, and 13 even more so, have a high activity with slightly and markedly below average resources (column J), (respectively -1.5 and -6.5). In fact, hospital 13 ranked 18th on resources but 6th on activity (see Table V). Hospital 13 therefore seems to make more efficient use of its resources.

But how do the districts look in relation to their potential demand for psychiatric services, as measured by the UPA score? Table V shows the relative ranking of each district on beds (column C), activity (column D), resources (column E), and the Jarman UPA index which measures potential demand (column G). Though hospital 1 is the most active and best provided, its ranking on the index of potential demand (column G) suggests that the resources may be disproportionately large in relation to demand as compared to the other districts. Indeed, this turns out to be so because hospital 1 is a large provincial teaching hospital which provides a service to its region and has been resourced to do so, but this is not reflected in the social indices which only indicate the level of use by the local catchment area's demand which is far less than the services the hospital provides on a regional basis.

Note that hospital 13 ranks second in its UPA score (35.8, column H) suggesting it should have a very high level of demand for psychiatric services. However, resource-wise it is one of the worst, 18th of 20, mainly because it had so few consultants. It was average for other resources, and it was high on activity—6th of 20—so it runs an efficient service,

TABLE IV

Standard Scores: Activity Weighting and Resource Weighting*

A Hospital	B Beds per 1,000 population	C Discharges per 1,000 population	D Out-patients per 1,000 population	E Domiciliary visits per 1,000 population	F Activity weighting	G Consultant per population	H CPN per population	I Day Hospital places per 1,000 population	J Resource weighting
1	3	1	5	0	12	3	0	0	12
2	2	1	1	−2	3	1	1	3	8
3	1	2	0	2	5	1	1	0	4.5
11	0	1	0	2	3	−1	1	0	−1.5
12	0	−1	−1	0	−4	−1	1	−2	−2.5
13	0	0	1	0	2	−3	0	−1	−6.5
18	−2	−1	−1	−1	−4.5	−3	−3	−2	−12.5
19	−2	−1	−1	0	−4	0	1	0	−3.5
20	−3	−2	0	0	−4	−1	0	0	−8

Table shows number of standardised units (0.666 × S.D.).
Abbreviated from Table XXIII, Royal College Report.

though probably not providing the level of resource and activity commensurate with potential demand. Hospital 20 is 16th on the UPA score (column G), 19th on resources (column E), and 16th on activity—a service with few resources and a low level of activity, but in an area with low demand.

A tool for planning

This approach needs to be developed and refined but we think it points the way to a more flexible, responsive and responsible approach to planning. The development of the Körner data sets is a first step which will help districts to

provide more complete and accurate data on the activity and resources of their services. By the sort of analysis we have suggested planners will be able to analyse whether their district is in an area of high or low potential demand for psychiatric services. They can see whether the resources they provide are, relative to other districts, appropriately high or low, and whether there is an efficient output of activity relative to the resources and the demand. With this knowledge in hand, they must then decide what should be done, both in terms of how the service is provided, and whether more or less resources, including beds, are required.

TABLE V

20-Hospital Study: Ranking of service indicators and Jarman UPA scores

A Hospital	C Ranks of beddage	D Ranks of activity	E Ranks of resources	G Jarman UPA ranked	H Jarman UPA scores*
1	1	1	1	3	(17.60)
2	2	4	2	1	(48.62)
9	9	6	9	8	(8.21)
10	10	8	13	10	(−1.99)
11	11	4	10	4	(17.25)
13	13	6	18	2	(35.75)
18	18	19	20	5	(15.94)
19	19	16	14	17	(−12.32)
20	20	16	19	16	(−9.08)

Abbreviated from Table IV of the Royal College report.
*This column shows the actual UPA score taken from tables provided by B. Jarman and included in the Working Party's report. The UPA (Under Privileged Index Score) ranges from +54.89 (Tower Hamlets, most underprivileged) to −32.79 (Mid Surrey, least underprivileged); thus low rankings (on G) represent greater underprivilege.

Summary of planning steps

We can summarise in seven stages the steps one should take to decide how many beds and resources a district requires. These are set out in detail in the College report, and are only summarised in this paper. They are:

A. ASSESSMENT OF CURRENT WORKING PATTERNS

(1) Analyse current practices—compare resources per population to other districts. For beds, account for:

    Acute vs ESMI & longer stay

    District inflow and outflow.

(2) Calculate local discharge rate.

(3) Look at proportions of patients staying 2 weeks, 3 months, 6 months and 6–12 months and more than 12 months. (See main report for discussion of length of stay).

B. COMPARE YOUR DISTRICT WITH OTHERS

Calculate activity rating, resource rating, social indices rating (or Jarman Score) and beds/population ratio and compare with other districts, or our report.*

C. EVALUATIVE PLANNING DECISIONS

(1) Decide whether, in the view of your potential demand relative to other districts, you are high or low on resources and activity.

(2) Decide policy on accepting inflow (in view of your own outflow) and how your resources will be used—more on community, long-stay, in-patients, etc.

(3) Plan for consequences of change in the shape of your service—e.g. moving long-stay into community homes will increase your need for acute beds when these patients relapse.

Conclusions

It is no longer acceptable for regional, district or other planners to state a "norm" for psychiatric beds or resources. We have shown that the need for psychiatric services varies many fold from district to district within the region, and this can be predicted from the social morbidity indices of the

*An appendix of the Working Party report sets out how each district can calculate a weighting which should be added or subtracted from the regional average or target for beds per population, or the target for spending on Mental Health per head of population. The district can then adjust the provision for its district according to the district UPA scores indicating potential demand of the population for services.

population. The amount of resources—the number of consultants, beds, day places, etc, should be planned for each district in response to its social and psychiatric morbidity by means such as we have suggested in this report. As far as beds are concerned, using current DGH models, we found that most districts currently require 0.3 to 0.75 acute beds per 1,000 population, 0.44/1,000 being our best estimate of current practice but a variation on regional or national target levels for beds or financial allocations for mental health can be calculated which takes account of potential demand predicted from social demographic factors. Details are summarised in an appendix to the main working party report. It is appropriate that in this era of new management we should have a new approach to planning and a broader and more functional concept of "norms".

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Psychiatric Beds and Resources: Factors Influencing Bed Use and Service Planning, which is currently in press, under the Gaskell imprint, is a report of a working party of the Section for Social and Community Psychiatry of the Royal College of Psychiatrists. Chaired by S. R. Hirsch, the working party was established in 1978 to make recommendations to planners in district psychiatric services. The book will provide valuable information for estimating the resources needed (mainly for acute-case patients) and for their allocation to beds and services in hospitals and to community services.

The College now has a fax machine: the number is 01 245 1231.