

# An analysis of medical workload— evidence of patient to specialist mismatch

**ABSTRACT**—The National Health Service has employed physicians since its inception, yet 46 years later there are few data on the day-to-day work done by physicians. This paper describes the case mix of general medicine in one region using data for general medical admissions to one specialty (respiratory medicine) as a working example. The pattern of general medical inpatient admissions is consistent across the 10 districts in the Mersey region: 26% have a respiratory diagnosis, 22% cardiac, and 15% gastrointestinal. For medical day cases, 60% are gastrointestinal. The average length of stay for particular conditions varies little between hospitals, and the average consultant 'cares' for 949 consultant inpatient episodes per year. In only half the Mersey districts is the respiratory consultant provision appropriate for the case mix admitted to the hospital. A simple algorithm applied to data collected routinely by regional health authorities can yield much information upon which to plan medical manpower. Applied to a specialty, it has identified mismatches between workload and consultant type. For respiratory medicine, at least six more respiratory physicians (a 30% increase) are needed to correct the underprovision in Mersey region.

Medical manpower needs have been a contentious issue throughout the life of the National Health Service (NHS). In the 1950s and 1960s most physicians were appointed as general physicians. More recently, most appointments have been as 'general physician with a specialty interest'. A recent article on medical manpower started with the statement that 'planning of medical manpower has been practised for decades in the UK', but it is unclear what data have been used in making these plans [1]. Most specialties have experienced cycles of glut and famine in the availability of trained senior registrars to fill consultant posts.

The Joint Planning Advisory Committee has attempted to match the number of senior registrars in training to anticipated vacancies in each specialty to

ensure that all trainees will have a career post in due time. However, anticipating numbers on the basis of likely retirements in each specialty assumes that the present distribution of specialty interests is appropriate to clinical need. A recent study of respiratory workload in Wales [2], which examined Office of Population, Censuses and Surveys (OPCS) mortality statistics [3] and OPCS hospital inpatient analysis [4], concluded that some districts were substantially understaffed by physicians with a respiratory interest. However, data from sources then available could be applied only by district and not by hospital. With improved information technology, hospital activity can be analysed in much more detail and the inpatient workload estimated for each major medical specialty. The number of physicians needed to cope with actual specialty workload can then be calculated. This paper describes how to obtain this information from the regional computer system, and provides a detailed analysis of its value using respiratory medicine as a 'working example'.

## Methods

Data are collected for each patient admitted to hospital and analysed by Mersey regional headquarters on a patient information news system (acronym PINS) (an Ingres-based relational database updated weekly from each hospital). Data obtained include the admitting hospital, the unit or specialty within the hospital, the consultant and the patient's diagnosis. Diagnoses are recorded as international classification of diseases (ICD) codes, but within the scope of general medicine there are too many individual codes to analyse usefully. Fourteen subspecialty headings were defined (see Table 1). From a print-out of all the ICD diagnostic codes used, each code for the primary diagnosis was allocated to a specific subspecialty. (For a few patients the diagnostic code did not fit clearly in one of the subspecialty groups or was equally applicable to more than one: in these cases, the episodes were listed as 'not assigned'.)

This approach identifies admissions by system, (eg gastrointestinal, respiratory, etc), and the most common disease groupings between hospitals and between clinicians can be compared. The computer can list how many patients with a specific diagnosis were treated by individual physicians. Thus, from a knowledge of their specialty interests, it is possible to determine whether or not admissions were seen by a specialist appropriate to the diagnosis.

General medical admissions for this analysis were

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**Table 1.** Comparison of numbers of general medical consultant episodes, interhospital variation, and bed usage for 14 diagnostic groups in 1989–90. Data include all medical cases admitted to Mersey region, but exclude cases admitted to the recognised cardiac, renal and neurology tertiary units.

Disease group	Consultant episodes	Mean length of stay (days)	All inpatient episodes (%)	Range between hospitals	Day cases	Total bed days used	Beds used (%)
Respiratory disorders	16,616	7.8	26.0	20.2–31.6	774	130,378	25.8
Cardiac disorders	14,065	7.6	22.0	19.3–28.5	78	106,972	21.2
Gastroenterology	9,369	6.4	14.9	7.4–19.0	9,868	69,831	13.8
Neurology	3,055	7.6	4.8	4.3–6.3	–	23,218	4.6
Stroke	2,903	16.3	4.5	3.2–6.9	–	47,319	9.4
Diabetes	1,956	9.0	3.2	2.2–5.4	376	17,960	3.6
Clinical haematology	2,542	6.6	4.0	0.4–10.3	897	17,674	3.5
Anaemias	1,887	6.9	3.0	1.2–3.3	319	13,339	2.6
Circulation	1,198	8.6	1.9	1.5–2.4	198	10,501	2.1
Musculo-skeletal	1,369	6.9	2.1	1.3–4.7	46	9,462	1.9
Infectious diseases	1,237	6.8	1.9	1.5–2.4	326	8,738	1.7
Poisoning	2,525	2.5	4.0	2.2–8.2	–	6,312	1.3
Renal medicine	575	9.9	0.9	0.8–1.1	–	5,692	1.1
*Other	4,550	8.3	7.1	6.4–10.4	505	38,270	7.6

\*Cases not falling into above groups.

defined as any admission to a general medical or specialised medical bed within a district general hospital throughout the region. Admissions to recognised tertiary cardiac, renal and neurology units were excluded as were admissions to geriatric beds. All data refer to the complete year 1989–90. Identification of individual clinicians or hospitals was avoided. Such data exist and are available to staff within the region.

#### Definition of terms

**Consultant episode:** A period of treatment under a specified consultant. Patients transferred between consultants in the same admission count as two or more episodes.

**Day cases:** Patients admitted for day treatment but not staying overnight.

**Total bed days:** Number of episodes multiplied by average stay, plus the number of day cases to give an indicator of bed usage.

#### Results

##### All medical cases

In the year 1989–90 there were 69,867 consultant inpatient episodes with diagnostic data available in 91.4%. There were additionally 14,985 day case admissions (89.3% with diagnostic data) to general medical wards. Respiratory diagnoses were the most frequent cause of

admission in Mersey region, accounting for 26.0% of all consultant episodes, followed by cardiac disorders (22.0%) and gastrointestinal problems (14.9%). These three diagnostic groupings account for 62.9% of all admissions (Table 1). The relative proportions of each diagnostic group varied little between districts except where there were special interests with a substantial elective component, for example, gastroenterology (laser work) and clinical haematology. Despite this, the order of frequency of the major diagnostic groups was the same in eight of the 10 districts. In the other two, cardiac diagnoses narrowly outnumbered respiratory diagnoses. A different pattern emerged for day cases as 62% of these admissions to medical wards had a gastrointestinal diagnosis—mostly for endoscopy.

Expressed in terms of bed usage, the data have a similar distribution except that cerebrovascular accidents (CVAs) occupy a proportionally greater number of beds because of their longer inpatient stay. General physicians cared for 45% of all CVAs admitted to Mersey hospitals, most of the remainder being managed by geriatricians.

The commonest single diagnosis was myocardial infarction (7% of all medical admissions), with a further 4.3% being admitted for angina. The average stay for a patient with a myocardial infarction varied little between hospitals (7.4–9.2 days; mean 7.8 days). For most other conditions there was a similar small interhospital variation in mean stay, the major exception being stroke (mean stay, 12.6–31.1 days). This may reflect different policies of transfer between medical and geriatric departments.



University and part-time consultant contracts made it difficult to calculate consultant numbers working in the Liverpool teaching district. However, in the remaining nine districts where 53,163 consultant episodes were managed by 56 physicians—an average of 949 per physician—there is considerable variation, with some physicians responsible for over 1,300 consultant episodes per year.

### Respiratory medicine

Throughout 1989–90 13 physicians accredited in respiratory medicine were in post in Mersey region. They were responsible for 12,674 consultant episodes (diagnosis unspecified), an average of 975 episodes per consultant.

Table 2 shows the number of patients with a respiratory diagnosis in each district divided by the number of respiratory accredited physicians in post in 1991. Only one of these is full time in respiratory medicine, the rest also cover general medicine. In four districts the number of episodes per consultant was less than 900, suggesting an appropriate consultant provision; in five, each consultant had over 1,000 consultant episodes, indicating an underprovision of respiratory specialists. One district had no accredited respiratory physician. It is clear from Table 2 (column 4) that a further five physicians would be required to bring the provision of physicians with an accredited respiratory interest into line with the actual respiratory workload. However, this makes no allowance for tertiary referral work within the region, which would further increase the number of physicians needed.

Alternatively, appropriateness of workload can be assessed by establishing which consultant was treating a specified diagnosis. In Mersey region, 795/1,963 (40%) of asthmatic patients, for whom the consultant in charge of the case was known, were treated by a res-

piratory specialist. Two districts treated 208 asthma episodes without a respiratory physician for all or part of the year. In four districts with adequate provision, 331/572 (59%) of asthmatics were under the direct care of a respiratory physician compared with 464/1,181 (39%) in the four districts with an underprovision of respiratory specialists (defined as more than 1,000 respiratory episodes per accredited physician ( $p < 0.01$ )). A similar analysis for diabetes in the nine districts with a diabetes specialist shows that 641/1,001 (64%) of patients with a primary diagnosis of diabetes were looked after by the appropriate specialist.

### Discussion

Disorders of respiratory (26%), cardiac (22%) and gastrointestinal (14.9%) systems account for nearly two-thirds of all medical admissions to Mersey region (other than day cases). This pattern is similar across 10 districts of the region. Average stay varied little across the diagnostic categories (with the exception of CVAs), so the percentage of total beds used was similar to the percentage of admission by diagnostic category (Table 1) (respiratory, 25.8%; cardiac, 21.2%; and gastrointestinal diagnoses, 13.8%). This analysis therefore provides useful information both about staff requirements and for bed and ward planning.

Modern computerised data collection facilitates rapid analysis of large numbers of cases across whole regions. Although recording of ICD codes by medical records staff is known to be subject to error, such individual inaccuracies are unlikely to affect the overall conclusions based upon nearly 70,000 medical admissions. In particular, it is reassuring that there are small interhospital variations in diagnostic groups. Moreover, two other recent studies of workloads of gastroenterologists [5] and of general physicians [6] have

**Table 2.** Comparison of numbers of respiratory episodes in each district in 1989–90 and current numbers of respiratory consultants, with an estimation of the extra consultants required to match consultant expertise to the workload.

District	Episodes admitted per year per consultant	Number respiratory consultants 1992	Extra consultants required	Revised respiratory workload per accredited consultant
H	691	1	–	691
D	766	1	–	766
G	830	2	–	830
C	834	1	–	834
B	1,012	1	–	1,012
A	1,169	1	0.33	879
J	1,172	2	0.66	878
I	1,198	3.5	1	932
F	1,752	2.5	2	973
E	Infinity	0	1	1,073
MERSEY	1,215	15	5	911



both produced figures of similar magnitude, but neither study took the important further step of breaking down workload into diagnostic categories.

The debate about the relationship between general and specialist medicine continues. Increasing complexity of diagnosis and treatment encourages specialisation and there is evidence to suggest that specialist care is both more efficient and effective. Thus, asthmatics admitted under a respiratory specialist are more likely to get appropriate care [7] and less likely to be readmitted shortly after discharge [8]. Expensive treatments, such as long term oxygen therapy in chronic obstructive pulmonary disease, are often prescribed inappropriately by non-specialists [9]. Diabetic patients under general physicians have unnecessarily prolonged hospital stays [10], while general practitioners screening for diabetic retinopathy miss up to 25% of cases [11]. Perhaps the largest study in this area is the surgeons' confidential enquiry into perioperative deaths (CEPOD) [12] which showed that there is a greater likelihood of surgical success in the hands of fully trained surgeons who perform the operation frequently. Even if these arguments are not convincing, the trend may well be accelerated by the public's expectation of specialist care, as shown in a recent opinion poll of asthmatics after hospital discharge in which 86% felt their care should be from a chest specialist [13].

Most of the medical specialty groups have made recommendations about the number of consultants needed to service their specialty, usually based on population (eg 1:125,000) but ignoring any relationships to other specialties. Since 90% of medical admissions are emergencies, the data in the Mersey region study are a reflection more of the 'needs' than of the size of the population, and hence may be a better basis upon which to plan provision of specialty care. The approach described for respiratory disorders is also applicable to others. We have shown that the average physician looks after about 900 cases per year, which equates to 20-25 beds per consultant. However, some physicians are managing 50% more consultant episodes than the average. This supports other data [6] which suggested that such consultants may be overstretched. The question whether the average case load of 900 episodes per year per consultant is the appropriate workload for a physician cannot be answered here. A separate study of individual work practices and consultant timetables is needed to establish the optimum balance between the increased consultant episodes per year and the difficulty in maintaining a high quality of care for large numbers of patients.

When these data were compiled, the ratio of consultant episodes to admissions for general medicine in Mersey was 1.04:1 (ie 4% of patients changed consultant during the admission). Consultant episodes have now become the 'currency' of purchaser/provider contracts and the relationship has changed: in 1991-92 the ratio in one hospital reached 1.16:1. This

almost certainly reflects altered recording methodology rather than changed clinical practice, but it means that for future planning both consultant episodes and admissions will need to be recorded.

There are as yet no regularly collected data by outpatient diagnosis either nationally or regionally. An analysis of outpatient activity for Mersey region in the same year showed that physicians with a respiratory or a gastrointestinal interest were seeing the largest number of new referrals.

In this analysis it has been assumed that 'respiratory physicians' and 'general physicians with a respiratory interest' are both counted as respiratory physicians.

The gap between the availability of respiratory consultants and the incidence of respiratory disease is substantial and may be getting worse. Asthma prevalence, admission rates and deaths are all higher than 10 years ago. Emphysema, bronchitis and lung cancer are not expected to fall in incidence for another decade. 'New' problems such as sleep apnoea, cystic fibrosis and the respiratory complications of acquired immune deficiency syndrome have more than replaced the decline in the tuberculosis workload over the last 10 years. Our data support an immediate increase of 33% in respiratory consultant numbers. We believe that matching the provision of respiratory specialists to the demonstrable respiratory need would have two benefits, in that it would both improve the quality of patient care and be a more cost-effective use of resources. The methods used in this analysis can be applied to provide similar information for other specialties and other regions. According to our data, the first priority for any district hospital should be to have consultants with special interests in respiratory, cardiac and gastrointestinal medicine. In larger hospitals, these specialties should be the first to be 'doubled up'.

In making these suggestions we do not advocate that all cases should always be under the appropriate specialist physician. The need for a 'general on-call rota' is likely to continue. However, since 90% of general medical admissions are emergencies which tend to go to the local hospital (there are very small cross-catchment area flows), it would be sensible as far as possible to employ consultant staff in proportion to the workload type. It is also probable that the incidence and type of disease will change with time. Anticipating patterns of disease, health care or government policy 10 years on is nigh impossible, but recording data like these on a regular basis is not difficult and would allow earlier detection of changes and trends, and thus a more logical approach to be taken when vacancies arise. The reduced central power of regional authorities and the increasing independence of NHS trusts make it even more necessary to have firm data upon which to plan rather than relying on local 'whims' and biases.

We have shown that data are readily available upon which to plan both the number and type of hospital consultants. Such planning will need to be guided and



led centrally by the Department of Health and the regional health authorities. It is time for planning of consultant provision in all specialties to be based upon objectively measured needs of the community rather than simply replacing retiring consultants appointed 30 years previously or on other even more subjective criteria.

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# Regulation of the market in the National Health Service

## Competition and the common good

*Edited by Anthony Hopkins*

The reforms of the National Health Service enacted in 1990 separated the purchasing of health services from their provision. The subsequent review of management of the Health Service, *Managing the new NHS* published in October 1993, will result in the abolition of the old regional health authorities and the introduction of eight regional offices of the NHS Management Executive. The provision of care is now the function of the independent trusts, and its purchase the responsibility of a number of different organisations varying in size from fund-holding general practitioners to large scale purchasing consortia. In the light of all these changes the question is how best to integrate a health service that truly fulfils national need.

The purpose of the workshop on which this book is based was to explore what 'higher level' regulation is necessary to manage the total market place in order to ensure that the appropriate health care needs of the population are met, and that adequate programmes for health promotion and for the prevention of disease are in place.

The publication of this book is timely and it explores the concept and practice of market regulation. Clinicians, health service managers, health economists and health policy analysts all contribute to the chapters and the discussion. The introduction is by Alan Langlands, Chief Executive designate of the National Health Service, and Anthony Hopkins, Director of the Research Unit of the Royal College of Physicians.

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