ECONOMICS

Is it economic to employ general practitioners instead of SHOs when it costs about £390 a year to employ an SHO for half a day a week (10% of full-time salary in middle of range) and £510 a year to employ a general practitioner (in the hospital practitioner grade), which is about 28% more? Other factors considerably reduce that difference.

Promotion prospects—About 75% of the SHOs in England and Wales and about 36% in Scotland (see table I) have no prospect of promotion to registrar, at least at the end of a year (and even after promotion there is also a serious surplus of registrars). Even if a full year as SHO is regarded as essential for the training of an ophthalmologist, any time over that period should probably be regarded as being an exaction from the trainee himself. In terms of money, he loses the difference between an SHO's salary and his expected top rate of pay as consultant (or other permanent grade).

Transfer to other careers must often occur when promotion prospects are poor. Would a year as an SHO in ophthalmology provide useful experience for a career in other subjects? Very rarely, if at all, unless, for example, a neurologist, neurosurgeon, or plastic surgeon intended to take up a special interest in the eye and adnexa, when a much shorter period of selected experience might be valuable. Economically, therefore, a year as an SHO in ophthalmology for someone going into another career is to a large extent wasted (as also is the time of the teachers).

Continuity—A great advantage of a sessional general practitioner is that the eye department and its patients would be spared the recurrent need for training a new SHO with the resulting inefficiency, especially in the first few weeks of his clinical practice. This point has been emphasised in relation to the general practitioner as registrar in paediatrics, obstetrics, and dermatology by Sweetnam *et al.*[13]

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Contemporary Themes

Emergency medical care

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Summary

A survey carried out over five periods between 1973 and 1975 to study the mode of referral of emergency medical patients to a district general hospital showed that, out of a total of 2511 patients, 51% referred themselves, 40·8% were referred by general practitioners, and only 4·7% by doctors employed by the emergency treatment service. Of the 1720 patients admitted to the medical wards, 50·9% were referred by general practitioners and 37·3% were self-referred while the corresponding figures for the 791 not admitted were 19% and 80·7% respectively. Two-thirds of the self-referred patients came from their own homes, usually by ambulance ordered by a "999" emergency call. The figures were similar in each of the five periods.

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Introduction

The pattern of emergency medical care has changed considerably over the past 15 years, during which hospitals have played an increasing part in primary emergency care.[1] Until the early 1960s it was rare for a patient suffering an acute medical illness at home not to be seen by his general practitioner first. Medical emergencies were, therefore, admitted to hospital after consultation with the general practitioner. This was beneficial in that emergency treatment was available before transport to hospital, personal details of the patient were communicated and discussed, and hence continuity of care was guaranteed. A possible disadvantage was inevitable delay in admitting particular patients. Overall this was a good system for the patients but bad for the doctors, who were grossly overworked. Such personal attention in an emergency could not continue indefinitely. The demand on individual general practitioners became intolerable.

About 15 years ago the "999" emergency call for ambulance or police began to be used in this district by patient, relative, or neighbour for a medical emergency occurring in the home, thus bypassing the general practitioner. After the introduction of multiple practices in 1966-7 this tendency increased. There was a change in the old-established relationship between the general practitioner and the hospital in an emergency. Patients reported

that they were unlikely to be able to contact their own general practitioner, especially at an unconventional hour, and many preferred to arrange their own admission. Some years later the advent of the emergency treatment service (ETS) altered this pattern to a limited extent.

This paper describes the present pattern of emergency medical care in a community from a hospital viewpoint. The impetus for the study was the frequent use of emergency calls from the patients' homes and the birth of the ETS. Its justification was a notice on the closed door of a multiple practice surgery over a holiday weekend—"In the event of an emergency consult any doctor."

Survey

The Royal Alexandra Infirmary serves a population, mainly industrial, of about 215 000 people. The medical unit contains 90 acute and 28 second-line beds and receives emergencies continuously. I have studied the mode of referral of emergency medical cases at intervals during the past three years. The first period was eight successive months in 1973, and subsequent studies embraced the months of March 1974, August 1975, November 1975, and December 1975. In each of these five periods I studied two groups of patients—firstly, all emergencies admitted to the wards, and, secondly, all emergencies examined by a member of the staff of the medical division in the accident and emergency department but not admitted. Those patients admitted from home without being seen by a general practitioner were closely scrutinised, and a consultant decided whether their admission was appropriate or unnecessary.

Results

Table I shows the results of the inpatient survey. About half the patients were referred by general practitioners. Of these 875 patients, 184 (21%) were referred by the practitioner with whom they were registered; 516 (59%) by a partner in the same practice; and the remaining 175 (20%) by a practitioner from another practice. The last circumstance arose because several practices which do not employ the ETS group together to cover emergency duties. The method of referral was by telephone and letter in 84% of the cases, telephone alone in 13%, and letter alone in 3%. Relatively few patients (117) were notified by the ETS and 88% of these admissions were at weekends. Some local practitioners undertake sessional duties for the ETS. This caused confusion if the practitioner used his own notepaper and did not specify that he was employed by the agency.

Between a third and a quarter of the patients were admitted from home without first seeing a general practitioner, most (82%) after an emergency call to the ambulance depot or police department. Of the 489 patients admitted in this way, 342 (70%) made no attempt to contact a general practitioner or no attempt was made on their behalf; 117 (24%) reported failure to get medical help; and the remaining 30 (6%) phoned the emergency service on the general practitioner's advice. All these patients were admitted after examination by the receiving medical registrar in the accident and emergency department. Despite this screening, the admission of 95 patients was later considered unnecessary by the consultant. If help had been available at home reference to hospital would have been unlikely, but after arrival at the hospital it was impossible for various reasons not to accept responsibility for the care of the patient. Occasionally, the use of the emergency call by relatives or neighbours circumvented the geriatric waiting list.

Table II shows the results of the parallel survey of patients who were not admitted to the medical wards. These patients on arrival at the accident and emergency department were considered by the casualty officer to have a medical complaint and were referred to the receiving medical registrar. Of the 354 patients who referred themselves from their homes, 277 (78%) used the emergency call; the others provided their own transport.

The two groups of patients, those admitted and those not admitted to the medical wards, totalled 2511—of which 1026 (40·8%) were referred by general practitioners, 843 (33·6%) referred themselves from home, and 437 (17·4%) became ill in a public place including factory and office. Only 119 (4·7%) used the ETS. Half of all self-referred patients and 42% of those who arrived unannounced from their own homes were not admitted to the medical unit after examination in the accident and emergency department. Most were discharged but a few were detained elsewhere in the hospital such as the casualty ward or transferred to the geriatric, infectious diseases, or psychiatric hospitals.

Discussion

The public in this urban district is concerned about the emergency medical service. Some members of the public accept that their general practitioners are no longer available after 5 pm and at weekends and turn to the ambulance, police, and hospital services for aid. Help is often available from the ETS but perhaps because of difficulty with telecommunications and of the knowledge that an unfamiliar doctor will call many sufferers find the emergency call more convenient. This pattern developed several years ago but emergency calls have not increased in the last three years.

In a similar survey in a teaching hospital in this area carried out from 1968 to 1970 Patel[2] found a referral rate from general practitioners closely approximating to the present 40·8% but a higher incidence of self-referral from home, 47·8% against the present 33·6%. This work was completed before the advent of the ETS and the lower figure for self-referral in our investigation may reflect the activity of that organisation in reducing the number of patients who turn first to the hospital for advice.

TABLE I—*Emergency patients admitted*

Period	No of emergency patients	Referred from general practitioners	Referred from ETS	Self-referrals		Others, domiciliary visits, etc
				From home	From public place	
1	1159	581	78	325	104	71
2	143	64	10	47	13	9
3	154	83	9	44	12	6
4	117	76	8	23	10	0
5	147	71	12	50	14	0
Total (No and percentage)	1720 (100)	875 (50·9)	117 (6·8)	489 (28·4)	153 (8·9)	86 (5)

TABLE II—*Emergency patients not admitted*

Period	No of emergency patients	Referred from general practitioners	Referred from ETS	Self-referrals	
				From home	From public place
1	542	108	1	234	199
2	65	12		33	20
3	63	10	1	28	24
4	55	9		25	21
5	66	12		34	20
Total (No and percentage)	791 (100)	151 (19)	2 (0·3)	354 (44·8)	284 (35·9)

This low number was a surprise and supported the view that its existence encouraged domiciliary care, but in the absence of information about the total work load this conclusion can only be tentative. Another reason for the lower rate of self-referral in our study may be the different nature of medical practice and public attitudes in a large city and a smaller community.

This investigation supports the contention of Patel[2] that the hospital plays a major part in primary emergency care. In these circumstances the public might benefit from an entirely hospital-based emergency medical service in urban areas. The ETS would then be unnecessary and the ambulance service and police relieved of much responsibility. An experienced doctor would receive all emergency calls (replacing the 999 call) from the public after 5 pm and at weekends. His staff would consist of hospital registrars and local general practitioners serving in rotation. On his assessment either an ambulance would be dispatched with or without a doctor in attendance or a general practitioner would make a home call. This system would ensure prompt attention in an emergency and at the same time prevent unnecessary admissions. It would also be an interesting experiment in hospital-general practice integration; a similar system has operated in The Hague since the second world war.[3]

I thank the junior staff members and medical students who assisted in this survey—in particular, Drs J Drury, A Lochrie, and I Fogelman and Mr J Gooden.

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Statistics at Square One

XV—The χ^2 tests (continued)

T D V SWINSCOW

British Medical Journal, 1976, **2**, 513-514

Fourfold tables

A special form of the χ^2 test is particularly common in practice and quick to calculate. It is applicable when the results of an investigation can be set out in a so-called "fourfold table" or "2 × 2 contingency table."

For example, Dr White, who had been inquiring into the blood pressures of the printers and sheep farmers in her general practice (Part VIII), believed that their wives should be encouraged to breast-feed their babies. She has records for her practice going back over 10 years in which she has noted whether the mother breast-fed the baby for at least three months or not, and these records show whether the husband was a printer or sheep farmer (or some other occupation less well represented in her practice). The figures from her records are set out in table 15.1. The disparity seems considerable, for, while 28% of the printers' wives breast-fed their babies for three months or more, as many as 45% of the farmers' wives did so. What is its significance?

Again the null hypothesis is set up that there is no difference between printers' wives and farmers' wives in the period for which they breast-fed their babies. The χ^2 test on a fourfold table may be carried out by a formula that provides a short-cut to the conclusion. If a, b, c, and d are the numbers in the cells of the fourfold table as shown,

			Total
	a c	b d	$a+b$ $c+d$
Total	$a+c$	$b+d$	$a+b+c+d$

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χ^2 is calculated from the following formula:

$$\frac{(a\,d-b\,c)^2\,(a+b+c+d)}{(a+b)\,(c+d)\,(b+d)\,(a+c)}.$$

With a fourfold table there is 1 degree of freedom in accordance with the rule given last week, (number of columns minus 1) × (number of rows minus 1).

Since many electronic calculators have a capacity limited to eight digits, it is advisable not to do all the multiplication or all the division in one series of operations, lest the number become too big for the display. A suitable method is as follows:

Multiply a by d and store in memory

Multiply b by c and subtract from memory

Extract difference from memory to display .. .. $a\,d-b\,c$

Square the difference .. .. .. $(a\,d-b\,c)^2$

Divide by $a+b$ .. .. .. $\dfrac{(a\,d-b\,c)^2}{a+b}$

Divide by $c+d$ .. .. .. $\dfrac{(a\,d-b\,c)^2}{(a+b)\,(c+d)}$

Multiply by $a+b+c+d$ .. .. $\dfrac{(a\,d-b\,c)^2\,(a+b+c+d)}{(a+b)\,(c+d)}$

Divide by $b+d$ .. .. .. $\dfrac{(a\,d-b\,c)^2\,(a+b+c+d)}{(a+b)\,(c+d)\,(b+d)}$

Divide by $a+c$ .. .. .. $\dfrac{(a\,d-b\,c)^2\,(a+b+c+d)}{(a+b)\,(c+d)\,(b+d)\,(a+c)}$

With Dr White's figures we have

$$\frac{\{(36\times25)-(30\times14)\}^2\times105}{66\times39\times55\times50}=3{\cdot}418.$$

Entering the χ^2 table with 1 degree of freedom we read along the row and find that 3·418 lies between 2·706 and 3·841.