Measuring general practitioner referrals: patient, workload and list size effects

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SUMMARY. Individual general practitioners are known to vary widely in the number of patients they refer to hospital outpatient departments; indeed there is increasing concern that the 'high' referrers use a disproportionate quantity of National Health Service resources. Data from a one-week survey of referrals by 122 general practitioners in one health district showed that a different age–sex mix of patients consulting individual general practitioners might account for about one quarter of his or her referrals. The results also showed that different referral rates, calculated by using either workload or list size denominators, identified markedly different groups of high referrers. These different methods of measurement are discussed, and on practical grounds a referral rate based on actual referrals divided by mean practice list size is suggested for future comparisons.

Introduction

THE wide variation in referrals by general practitioners to hospital outpatient departments is well established and has been reviewed recently by Wilkin and Smith.[1] In the recent white paper the government has highlighted this finding, and among its proposals are that family practitioner committees 'should use independent medical advisers to encourage good practice in the referral of patients to hospital. Doctors with *abnormally high or low rates of referral* [our italics] will be invited to take part in an assessment of their approach'.[2]

The government's assumption would appear to be that all general practitioners are seeing roughly similar numbers and types of cases so that variation in referrals reflects characteristics of individual general practitioners. However, there are several other explanations which might account for at least some of the variability in referrals.

First, general practitioners with high numbers of referrals might be attracting referral-prone patients. General practitioner referrals cannot therefore be compared unless the raw figures are corrected for the types of patients consulting each doctor. Secondly, if patients needing referral are randomly distributed among patients consulting a general practitioner, the more patients an individual general practitioner sees the higher his or her number of referrals is likely to be. On these grounds general practitioners should be compared after allowing for workload. Thirdly, the proportion of patients needing referral may be fairly similar in different practices, especially if those practices draw upon a similar population. A general practitioner with a high workload will therefore not necessarily see more referrable patients as the numbers would be limited by the size of the practice population. On this basis general practitioner referrals should be compared after allowing for list size, either a personal list or a mean practice list for practices which share their patients.

Different case mixes, workloads or list sizes might explain some of the variability in referrals between individual general practitioners. But, at a practical level, each of these factors also implies a different way of measuring referrals: will they each identify the same aberrant referrers?

Two hypotheses were tested in this study: (1) that some of the variability in referrals between general practitioners can be explained by the different case mix of the patients consulting; (2) that different groups of high referring general practitioners will be identified by different methods. It was not possible to standardize for case mix as no diagnostic data were collected; besides, for many referral decisions it is not the precise diagnosis but its severity, chronicity or context which leads to a referral. The age–sex mix of patients consulting was therefore used as a proxy indicator for case mix.

Method

As part of an audit in Bromley health district in 1984 all general practitioners were asked to record the sex, age and whether referred to hospital outpatients for all patients consulting over five weekdays. In addition the family practitioner committee provided background data on all general practitioners in the district. Details of the method and overall results have been published elsewhere.[3]

From these data different measures of referrals were calculated for each general practitioner based on two different numerators and three different denominators.

Numerators

1. *Number of referrals.* The actual number of referrals was established by summing the referrals made on each of the five days of the survey.
2. *Number of referrals corrected for age and sex mix.* From an individual general practitioner's age–sex mix of patients consulting, an expected number of referrals for each general practitioner was calculated, which was the number of referrals which would have occurred had the patients in each age–sex category been referred at the same rate as the total referred population in that age and sex group. A correction factor for each general practitioner was calculated by finding the difference between the mean number of referrals in the district and the expected referrals for that general practitioner. This factor was then added to or subtracted from the doctor's actual referrals to establish a figure corrected for age–sex mix.

Denominators

1. *Workload* was calculated by adding all the patients seen by an individual general practitioner during the survey week.
2. *Personal list size* for each general practitioner was obtained from data supplied by the family practitioner committee.
3. *Mean practice list size* was calculated by adding all personal lists within a practice and dividing by the number of partners.

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There were thus eight different measures of referrals — number of referrals, number of referrals per number of patients consulting, number of referrals per personal list size and number of referrals per mean list size, both uncorrected and corrected for the age and sex mix of patients consulting.

For each general practitioner the eight different measures of referrals were converted into ratios by dividing each by its mean for the whole group of doctors and multiplying by 100. In effect this standardized each measure, so enabling the distribution of general practitioners to be compared using the standard deviation of the referral ratios for the whole group.

Spearman's rank order correlation coefficients were then calculated between pairs of measures to see the extent to which the order of general practitioners, from high to low referrers, might vary according to the referral measure chosen.

Finally, to see the practical effects of using these different measures the top 10% of referrers were identified using each of the eight measures and compared to see whether the different measures identified the same general practitioners.

Results

Of the 145 general practitioners in the district, 122 returned audit sheets for the week, a response rate of 84%. These 122 general practitioners saw 17 445 patients and referred 967 of them, giving a mean number of referrals per general practitioner during the week of 7.9. Figure 1 shows the frequency distribution of actual referrals.

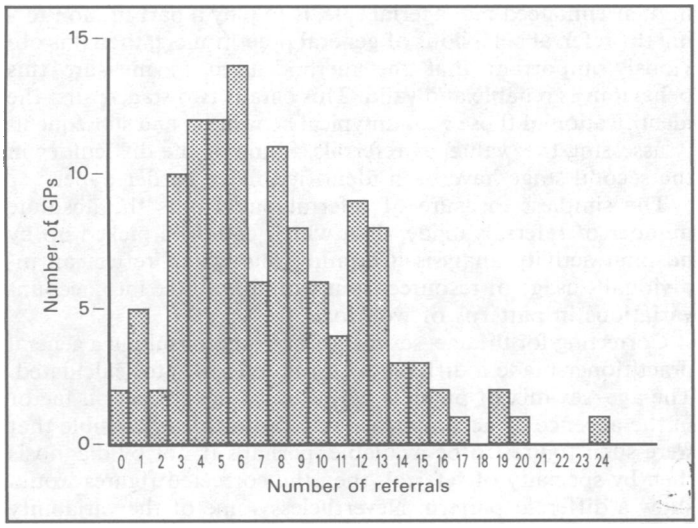

Figure 1. *Frequency distribution of actual referrals.*

The data showed that different general practitioners had markedly different workloads, ranging from 58 to 261 patients consulting in the survey week, and within these, they saw different ages and sexes of patient. Female general practitioners saw more female patients than male general practitioners (68% versus 58%; chi square = 138.5; $P<0.001$) and general practitioners under the age of 45 years, for example, saw 63% of their patients from the under 45-year-olds compared with 56% for older general practitioners (chi square = 88.3; $P<0.001$). The numbers of patients seen during the week in each age and sex group together with their overall referral rates are given in Table 1.

Referral rates varied between age and sex groups by a factor of over three (range 1.9 to 7.3). After allowing for the age–sex mix of individual general practitioners a mean correction factor of 1.9 patients was added or subtracted from each general practitioner's actual number of referrals per week. In other words the corrected number of referrals might differ from the actual referrals by about a quarter on the basis of the age–sex mix consulting (mean of 7.9 plus or minus 1.9).

Table 2 shows the standard deviations of the whole group of 122 general practitioners (all means for the group are 100). The measure giving the widest distribution in referrals was the number of referrals by personal list size.

The Spearman rank correlation coefficients between pairs of

Table 2. Standard deviations of referral ratios for the eight measures of referral, uncorrected and corrected for age and sex of patients consulting.

	Standard deviation of referral ratio (all means = 100)
No. of referrals	
Uncorrected	58
Corrected	49
No. of referrals by workload	
Uncorrected	51
Corrected	56
No. of referrals by personal list	
Uncorrected	134
Corrected	121
No. of referrals by mean list	
Uncorrected	59
Corrected	51

Table 1. Sex and age group referral rates per 100 patients consulting for 122 general practitioners over a five-day period.

	Age group (years)								
	0–5	6–15	16–25	26–35	36–45	46–55	56–65	66–75	76+
Males									
Number of patients consulting	961	958	764	703	646	679	939	734	428
Number of referrals	25	36	43	50	47	41	64	51	27
Referral rate	2.6	3.8	5.6	7.1	7.3	6.0	6.8	6.9	6.3
Females									
Numbers of patients consulting	901	1053	1587	1610	1132	1048	1163	1103	1029
Number of referrals	17	34	91	104	66	61	71	73	66
Referral rate	1.9	3.2	5.7	6.5	5.8	5.8	6.1	6.6	6.9

Age–sex data was missing for seven patients.

Table 3. Spearman rank correlation coefficients for the eight measures of referral, uncorrected and corrected for age and sex of patients consulting.

	No. of referrals		No. of referrals by workload		No. of referrals by personal list		No. of referrals by mean list	
	Uncorrected	Corrected	Uncorrected	Corrected	Uncorrected	Corrected	Uncorrected	Corrected
No. of referrals								
Uncorrected	1.00							
Corrected	0.81	1.00						
No. of referrals by workload								
Uncorrected	0.85	0.97	1.00					
Corrected	0.42	0.85	0.80	1.00				
No. of referrals by personal list								
Uncorrected	0.69	0.67	0.69	0.46	1.00			
Corrected	0.55	0.66	0.61	0.63	0.87	1.00		
No. of referrals by mean list								
Uncorrected	0.93	0.80	0.85	0.46	0.78	0.57	1.00	
Corrected	0.63	0.88	0.86	0.83	0.65	0.74	0.76	1.00

measures for the 122 general practitioners are given in Table 3. All coefficients were, as would be expected, highly correlated and significant at the $P<0.001$ level. The highest correlation (0.97) was between the number of referrals corrected for age and sex and the actual number of referrals by workload.

When each measure was used to identify the 13 highest referring general practitioners (that is approximately the top 10%), overall 38 different general practitioners were picked out by one or more method because each separate measure identified a different set of 13. The number of different general practitioners identified by the measures were as follows: 10 general practitioners (identified once), 11 (twice), six (three times), five (four times), four (five times), one (six times), one (seven times) and none of the doctors were identified eight times. In other words 31% of all the general practitioners in the sample were identified by at least one measure as being in the top 10% of high referrers. Of the 13 general practitioners who were identified as the highest referrers using the actual number of referrals only eight were also identified as the highest referrers using the age–sex mix corrected figure.

The 11 general practitioners who were high referrers according to four or more of the measures were identified. How many of these 11 general practitioners each of the eight measures had picked out was then calculated (Table 4). The measure which identified the largest number of high referrers (10 out of 11) was referrals corrected for age and sex of patients; actual referrals by personal list size identified the smallest number (two out of 11).

Table 4. Number of the 11 highest referrers identified for the eight measures of referral, uncorrected and corrected for age and sex of patients consulting.

	Number of the 11 highest referrers identified
No. of referrals	
Uncorrected	6
Corrected	10
No. of referrals by workload	
Uncorrected	9
Corrected	6
No. of referrals by personal list	
Uncorrected	2
Corrected	3
No. of referrals by mean list	
Uncorrected	8
Corrected	9

Discussion

If the government, through the family practitioner committees in their enhanced managerial role, is to play a part in monitoring the referral behaviour of general practitioners, then it is obviously important that the method used to measure this behaviour is reliable and valid. This entails two stages; first the identification of those with untypical behaviour, and subsequently assessing the 'value' of referrals. Some of the difficulties in the second stage have been identified in an earlier paper.[4]

The simplest measure of referral patterns is the absolute number of referrals made, data which could be picked up by hospital activity analysis. Certainly this would reflect an individual's usage of resources, but would not take into account variations in patterns of workload.

Correcting for the age–sex mix of patients consulting a general practitioner made a difference to the referral rates calculated. The age–sex mix of patients was used as the correction factor in the absence of accurate case-mix figures. It is possible that were such figures to be available, perhaps if not by diagnosis then by specialty of referral, then the corrected figures would show a different pattern. Nevertheless some of the variability between general practitioners could be accounted for by the age and sex distribution of patients consulting, and it affected which general practitioners were identified as high referrers. Yet while the age–sex corrected referrals would seem a fairer indicator of general practitioner behaviour than the actual numbers, these data are not going to be routinely available to an enquiring family practitioner committee. Which of the measures based on the available figures would therefore be best?

The measure with the highest correlation with actual referrals corrected for age and sex was the actual referral rate based on workload. The main difficulty, however, with this measure of referrals is that it would entail family practitioner committees mounting some form of auditing exercise on a regular basis, and response rates and reliability and validity are likely to be poor.

The use of personal list size as a denominator would appear to be limited. In many practices personal lists are only notional as patients consult either any doctor available or their preferred doctor. Besides, new general practitioners in a partnership

may carry a full workload without building up a large personal list for many years. These problems are reflected in the above data. Referral rates based on personal list size proved to be very widely distributed, were correlated poorly with age–sex corrected referrals, and picked out by far the fewest of the overall high referrers, only two out of 11.

Referral rates based on average list size would seem to overcome many of the disadvantages of using personal list size especially as they would seem to offer a better indication of potential workload. Their range is less extreme, they correlate better with actual and corrected referrals, and they offer one of the more accurate ways of identifying the overall high referrers, identifying eight out of the 11 highest referrers. We would suggest that on currently available information this is probably the simplest and most appropriate measure to use when comparing general practitioners.

However, there are two important qualifications to this conclusion. First, as the variability in 'high referrers' identified by different measures has shown, there are serious limitations in judging an individual general practitioner on the basis of the application of any of these measures. Secondly, the evaluations in this paper have been based on population norms and no account has been taken of the appropriateness or efficiency of any level of referral. Ultimately the goal must be cost-effective referral behaviour, but in the meantime existing referral measures, whatever their basis, need to be treated with caution.

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