A comparison of the referral rates of trainees and trainers in an academic teaching practice

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ABSTRACT

Objective: To compare the referral rates of trainee and trainer family physicians.
Setting: The practice of the Department of Family Medicine at the Medical University of Southern Africa, Pretoria.
Design: Analysis of 43 028 problem encounters selected from one in-service practice database.
Participants: Thirteen junior registrars, seven senior registrars in a Master's programme and seven senior physicians.
Main measure: Referral rates compared by the Generalized Linear Mixed Model to allow for case mix and variation between the three study groups.
Results: Adjusted referral rates per thousand problem encounters were 97.7 for junior registrars (95% CI 79.4 - 120.7), 77.1 for senior registrars (95%CI 59.3 - 99.5) and 73.7 for senior physicians (95% CI 54.4 - 99.2). Differences between the groups were not statistically significant (Wald chi-square = 3.90; df = 2; P = 0.195). There was insufficient evidence to show that the large amount of variation in the referral rates of doctors within study groups was different between the three groups.

Conclusions: Using a performance-oriented database and an advanced method for adjusting for case mix makes a difference to referral rates. There was no significant difference between the mean referral rates of trainees and trainers. There was a large amount of variation within all three groups. Together, these findings support the thesis that factors other than clinical diagnosis in the behaviour of doctors or their interaction with patients are determinants of the referral decision. This points to the value of peer reviewing of referral rates for both trainees *and* trainers during vocational training, as well as in group practices.

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INTRODUCTION

A referral from a general practitioner to a specialist is not always in the patient's best interests. It prolongs the management process, adds to costs and may overburden waiting lists and specialists. The benefits of a purposeful referral should outweigh any disadvantages. Purposeful referrals result from quality assessments. The potential of the general practitioner to control this complex of consequences has been described as the gatekeeper function.

Crude rates of referral do not evaluate that function satisfactorily. The interpretation of high and low rates is ambiguous.[1,2] Methodological issues complicate comparisons. Denominators have included practice size, individual doctor's list sizes, episodes of illness, categories of disease, and numbers of consultations.[1] Adjusting for gender, age or social class has had little effect on the spread of differences.[2] More recent studies have allowed for the effects of random variation and treating referrals as relatively rare events.[3, 4] Adjusting for case mix does affect differences, because speciality-specific referral rates vary widely.[2, 5, 11]

Research to identify single factors or clusters of factors as determinants of variation have largely been unsuccessful or have produced conflicting results.[6] Multiple regression techniques elicit associations that are not persuasive. For example, Christensen et al. found increased referral rates associated with better access to specialists and increased numbers of consultations per year; yet this explained only 16% of the total variation in rates.[7] Powerful techniques that apportion the variation attributable to a range of variables expose the limitations of that explanatory paradigm.

In 1983 Dowie used in-depth interviews to study referrals and proposed a model of the referral decision that incorporates the practitioner's professional attributes, knowledge of the health care system and personal style.[8] In the Foreword to Dowie's book, Morrell wrote that attempts "to relate referrals to hospital to variables which could be easily measured" had been unsuccessful.[8] In 1987, Wilkin and Smith called for a more sophisticated approach.[6] In 1990, Madeley et al. said "failure to explain such complex phenomena in terms of such crude characteristics is not surprising".[9] According to Newton et al., "the decision to refer is rarely, if ever, based on clinical factors alone. A perspective which begins by attempting to understand the meanings and motives of those involved in the process of referral may be more fruitful than the positivist paradigm which has influenced much of the research in this field".[10]

The literature is comprehensively surveyed and fully referenced by O'Donnell.[11] By using train(ees) (truncated) as a title word, with an English language limitation, we found only one previous study – cited by O'Donnell[11] – comparing the referral rates of trainees and trainers.

It might be expected that the referral rate of the more expert family physician trainer, whose clinical behaviour should reflect the principles and practice of the modern discipline of family medicine, would differ from that of the novice trainee.

This study was enabled by the computer-based patient information system, Harvest, which was designed to generate consultation-based performance indicators for the Department of Family Medicine.[13]

METHOD

Setting and practice population

The practice is at the Medunsa Ga-Rankuwa hospital complex near Pretoria. Ninety percent of patients come from within a 40-kilometre radius. The patients are all black people, most of whose mother tongues are seTswana or seSotho. Ten percent of the patients are nine years old or younger. Approximately 11% of first attendees are referred by nurses from peri-urban and urban clinics and 6% by other general practitioners. Approximately 50% of practice attendees have had one episode of illness, 25% two episodes, and 12.5 % three episodes. The prevalence of hypertension is 8%, of non-insulin dependent diabetes is 4% and of epilepsy is 1.5% (unpublished observations).

Routine data collection

Consultation information was routinely entered on encounter forms by every doctor. A practice assistant transcribed the data into the practice database. Each patient's problems identified during one consultation were accorded a problem-encounter record consisting of six coded variables. This study used two of these variables: the International Classification of Primary Care (ICPC)[14] problem code and the referral code. To encourage compliance by doctors, the ICPC codes were reduced to 215. As a consequence, the use of the '99' category ('Not elsewhere classified') increased. Illegible or non-existent problem codes were recorded as '000'. The reduced list covered 94.5% of problem encounters (unpublished observations).

Registrar posts in the practice are held by candidates for the degree of Master of Family Medicine. These trainees were divided into two groups: junior, first-year registrars, and senior, second- or third-year registrars. Senior physician-trainers formed the third group. The mean time spent by junior registrars in their groups was 7.5 months (range 2 - 11), by senior registrars 11.6 months (range 7 - 20) and by senior physicians 17.4 months (range 12 - 20). There was no formalised one-to-one supervisory relationship between trainees and trainers. Trainees were free to decide which available trainer to consult. There was no arrangement for controlling the case mix of either trainees or trainers. The study period was January 1991 until September 1992 (20 months). During this time, 51 994 records of separate problem encounters were identified by 41 doctors during consultations.

Exclusion of records (see Figure 1)

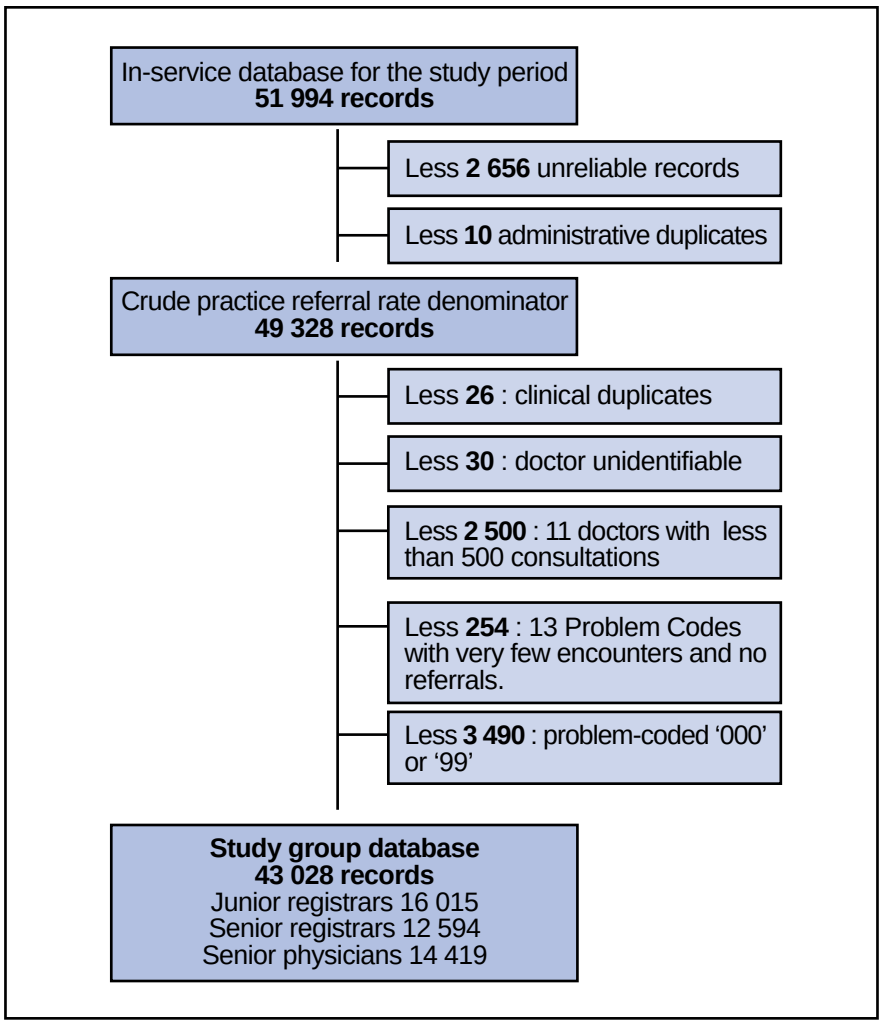
The following records were excluded:

1. A total of 2 656 records of three doctors whose extremely high data-entry error rate showed non-compliance with the protocol (unpublished observations).
2. Ten records of patients who had been referred twice for the same problem within seven days due to failure to attend or be seen at the referral clinic on the day of first referral (administrative duplicates).
   The number of records remaining at this stage (49 328) was used as the denominator for calculating the crude practice referral rate.
3. Twenty-six records of patients who had previously been referred by another doctor for the same problem (clinical duplicates).
4. Thirty records in which the doctor was not identified.
5. A total of 2 500 records of 11 doctors with fewer than 500 encounters each.
6. A total of 254 records reflecting 13 problem codes with fewer than 100 encounters and no referrals.
7. A total of 3 490 records problem-coded '99' or '000'.
   The remaining 43 028 records comprised the study database.

Analysis

The data were analysed to discover

Figure 1: Sequential exclusion of records of problem encounters from the original in-service database to arrive at the study group database.



whether any one of the three groups was more likely to make a referral than another. Using a chi-square test to compare the proportions of problem encounters would have ignored the variation between doctors within the groups and the effect of differing case mix. The method used by McPherson et al. to distinguish between the random variation related to the number of referrals and the systematic variation characteristic of each doctor makes no allowance for the effect of case mix.[4] The calculations of a logistic regression model can take into account the group to which the referring doctor belongs and the category of the problem referred, but not the variation between doctors. The Generalised Linear Mixed Model (GLMM)[15], using the statistical package Genstat 5[16], adjusts for all three factors. The adjusted referral rates obtained from this model predict what would be the referral rate of the group if each doctor had the same mix of problem encounters as the practice as a whole and the same number of encounters for each problem code. This hypothetical problem mix provides an unbiased assessment of the differences between the groups.

RESULTS

Validity and quality of the database

The proportion of encounter forms not entered into the database was 1.3% and that of problem encounters was 5.9% (95% CI 5.1 - 6.9). The transcription error rate for variables was 0.6% (95% CI 0.3 - 1.1) (unpublished observations).

Referral rates

Referral rates are expressed per 1 000 problem encounters. The crude practice referral rate was 69 (95% CI 66 - 71). The unadjusted study group referral rate was 54.7 (N = 43 028).

The referral rates of individual doctors varied considerably (Fig. 2). The inter-quartile range for junior registrars was 33.6 to 78.2, for senior registrars 28.8 to 62.2, and for senior physicians 42.5 to 69.3.

The mean adjusted referral rates for junior registrars were 114.0 (95% CI 91.5 – 141.4), for senior registrars 90.8 (95% CI 69.0 – 118.6), and for senior physicians 86.0 (95% CI 62.4–117.3). The Wald chi-square statistic for differences between the groups was 3.90 (df = 2; P = 0.195). Thus the evidence is not strong enough to conclude that the rates of the three groups differed.

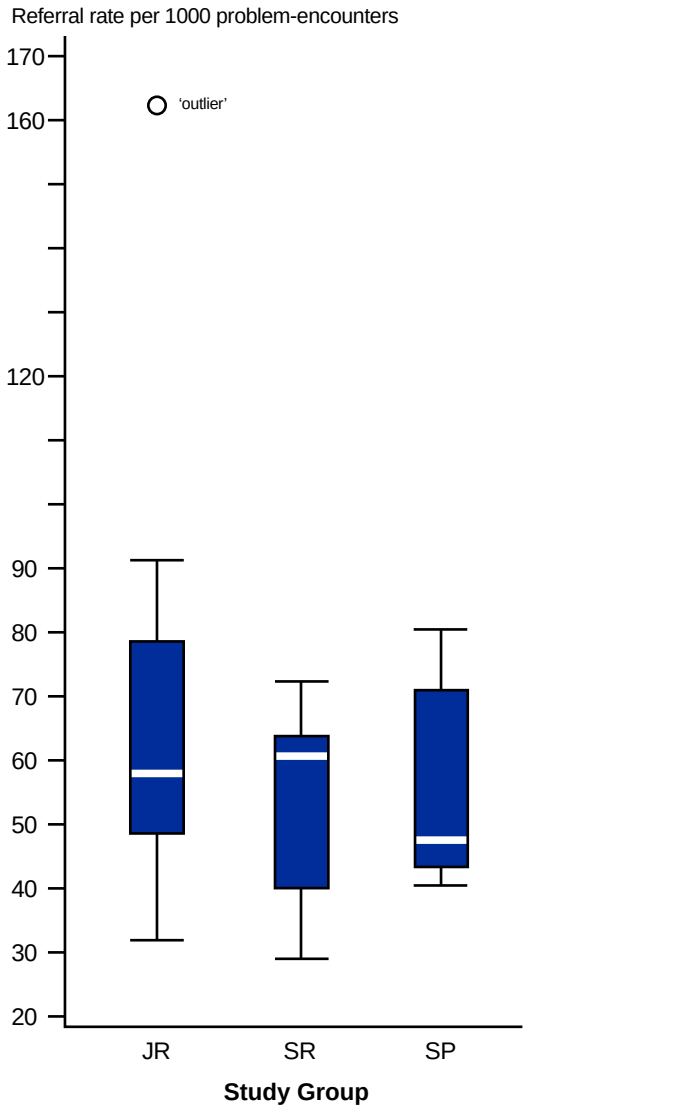
The first GLMM analysis assumed that the variation between individual doctors was the same in each group. An alternative analysis allowed for between-doctor variation to differ in each group, thus testing an expectation that trainees were more variable than trainers. There was insufficient evidence to show that the large amount of variation in the referral rates of doctors within study groups was different between the three groups.

DISCUSSION

Crude practice referral rates are only useful for practice management. We report a rate of 6.9%. Studies of single practices since 1981 report consultation-based rates ranging between 2.8 and 20.8%.[2, 5, 17, 18]

Marinker et al. described the use of consultations as a denominator for referral rates as simple but reliable.[1] They considered using epi-

Figure 2: Box plot of individual unadjusted referral rates by group.



Individual referral rates by group

Group	Minimum	25%	Mean	75%	Maximum
Junior Registrars	33.6	48.8	56.5	78.2	165.5
Senior Registrars	28.8	40.9	58.4	62.2	73.3
Senior Physicians	42.5	43.6	47.5	69.3	82.0

sodes of illness to be "attractive, but the search for the end of an episode often unfruitful". Episodes are defined by a clinical diagnosis, but other determinants of a referral decision can vary from one consultation to another during an episode. Thus, we believe that encounter-based analyses are better measures of referral behaviour than episode-based analyses. For example, suppose a patient attends with uncontrolled diabetes mellitus and an unsightly lipoma. It would be better to defer referral for removal of the lipoma until the diabetic condition improved. A referral rate for lipoma using encounters as the denominator instead of episode would be lower and would reflect that judgement. Such *timeliness* is one of the properties of an appropriate referral suggested by Coulter.[19]

Classification of clinical problems by system or speciality is a crude basis for comparing referral decisions and adjusting for case mix, because the complexity of problems within any 'speciality' at primary care level varies. However, even the 43 028 problem encounters studied were, with few exceptions, insufficient for significant comparisons by problem code.

Seniority in the Department of Family Medicine was a proxy for increased application of the practice of skilful gatekeeping. The years of postgraduate experience of the trainees were not taken into account, because vocational training in family medicine is relatively new in South Africa. Most trainees joined the Department within one to three years after graduation.

This study has three important strengths. Firstly, the data were collected prospectively. Each referral was directly linked to a doctor, a patient, a problem and a consultation, whereas the referral rates in some published studies have been calculated indirectly – referrals counted at hospitals and denominators at practices. Secondly, the doctors were practising in the same practice and among the same patient population. The age and sex distribution of patients seen by the groups of doctors was similar (unpublished observations). Thirdly, the GLMM statistical procedure allowed adjustments for the effects of case mix and doctor variation at the same time.

A weakness of the study is the small number of doctors in each group. Rashid and Jagger studied only six trainee-trainer pairs.[12] This study involved 20 trainees who worked with one or more of seven trainers. Recruiting more general practitioners is likely to introduce differences in practice context and population as confounding factors.

CONCLUSION

The use of a performance-oriented database and an advanced method

for adjusting for case mix made a difference in studying referral rates.

The precision of group comparisons depends more on the number of doctors than the number of records.

That there was no significant difference between the mean referral rates of trainees and trainers might be seen as a negative and uninformative result. However, this, together with the additional finding that there was a large amount of variation within all three groups, supports the hypothesis that factors other than clinical diagnosis in the behaviour of doctors or their interaction with patients are determinants of the referral decision. This points to the value of peer-reviewing of referral rates for both trainees *and* trainers during vocational training and in group practices.

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Competing interests

None declared.

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