

Does the North Staffordshire slot system control demand of orthopaedic referrals from primary care?

A population-based survey in general practice

Stephen Bridgman, Xuefang Li, Gilbert Mackenzie and Peter Dawes

ABSTRACT

Background

Attempts to manage general practice demand for orthopaedic outpatient consultations have been made in several areas of the NHS, with little robust evidence on whether or not they work.

Aim

To evaluate the effect of the North Staffordshire 'orthopaedic slot system' on the demand for general practice referrals to orthopaedic outpatients.

Method

A prospective study of 12 general practices in the slot system, 24 controls, and the 63 other general practices in North Staffordshire. Comparison periods were the baseline year (0); the first calendar year (1); and the first half of the second calendar year (2). A multifactor linear regression model was used.

Results

Mean referral rate decreased 22% in the slot group in period 1, and was maintained in period 2 (9.40, 7.29, 7.31 referrals per 10 000 population per month for periods 0, 1 and 2, respectively). The control and other groups showed a small decrease in period 1, but in period 2 higher referral rates were observed. The reduction in referrals of 20–40% in participating practices compared to other practices equates to 2–4 referrals per 10 000 patients per month.

Conclusions

Our study suggests that practices willing and able to take up an offer of a slot system for managing their orthopaedic referrals will be able to significantly reduce referral rates for their patients when compared to similar practices who do not. Further research on the generalisability, effectiveness and cost-effectiveness of such systems is warranted.

Keywords

health services needs and demand; longitudinal studies, musculoskeletal diseases; orthopaedics, outpatients.

INTRODUCTION

Approximately 15% of patients seen in general practice in England have musculoskeletal disorders.¹ Referral from primary to secondary care doctors in the UK NHS is a feature of the separation of doctors into generalists, those working in the community, and specialists, with access to hospital resources and beds.²

Long outpatient waiting lists for orthopaedic specialist consultations were reported to be a problem two decades ago in North Staffordshire, England,³ with possible negative health and social impacts in some patients.⁴ In England, long waiting lists and times for NHS secondary care consultation and treatment have been intermittently regarded as constituting a crisis, usually of a political nature.⁵ Thus, the reduction of waiting times remains a top government and public priority.^{6,7} Despite the high political profile of attempts to ameliorate them, the problem of long local waits to see a specialist has changed little over the 50-year history of the NHS.⁸

The reasons for waiting lists are complex, and a consequence of many individual decisions.^{9,10} Each decision may or may not be rational in its local context. Overall, we have a system in which an outpatient appointment may not be available when needed.¹⁰ Epidemiological work shows considerable

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variation in referrals from GPs to orthopaedic specialists.^{11,12}

Attempts to manage general practice demand for orthopaedic outpatient consultations have been made in several other areas of the NHS (J Shepherd, unpublished data, 1996; D Beverland, personal communication, 1997).¹³⁻¹⁴ However, in a recent review of demand management systems in the NHS,¹⁵ the authors concluded that while slot systems have the potential to manage the demand from primary care, there is little robust evidence and further research is needed.¹³

We report the effect of the North Staffordshire orthopaedic slot system on GP orthopaedic referral rates.

METHOD

Background epidemiology

Using the North Staffordshire Health Authority database and mid-year practice population estimates from the Exeter database, annual new general practice generated trauma and orthopaedic NHS crude referral rates per 1000 patients were calculated.

Slot system description and selection of practices

A multidisciplinary team from local NHS healthcare organisations developed the North Staffordshire orthopaedic slot system. The team included an orthopaedic surgeon, a GP, a rheumatologist, a public health physician, and health service managers from the hospital and local health authority. The system was designed to allow participating general practices to

appreciate and use their fair share of orthopaedic outpatient capacity, to receive feedback on their use of that capacity, and to receive improved services for their patients, if they managed their referrals within their practice allocation of new orthopaedic consultations.

All North Staffordshire GPs and orthopaedic consultants were invited to attend a meeting to discuss the concept of a slot system, to hear from a general practice about how such a system had been employed in Bristol, and to advise the design team on how it might work in practice. A postal survey of opinions on the orthopaedic service was designed and sent to all GPs. The results demonstrated that chronic long waits for orthopaedic outpatient consultations were the major cause of GP dissatisfaction in the local orthopaedic service. Other aspects of the service were perceived to be of high quality. The majority of GPs supported the concept of a slot system given the absence of any other proposal.

Given the novel nature of the proposal and the uncertainty of whether or not it would control the demand for new orthopaedic referrals, it was pragmatically agreed by local NHS clinicians and managers that 12 of the 100 North Staffordshire practices would be invited to participate in the first instance. A joint management and academic team selected a mix of practices to be offered the opportunity to participate in the first phase of the slot system. The team aimed to achieve a mix of practices that reflected the diversity of practices in North Staffordshire, and therefore they included large and small practices, those that were rural and urban, and likely champions and likely critics. These twelve practices, represented 14% (67 160) of the district population. Practice sizes varied between 1700 and 14 000, and they had from one to six partners. Three general practices had a partner who was a member of the GP commissioning forum, practices within a Potteries multifund group of practices (largely inner-city practices), and the practice of a member of the local medical committee who was a critic of the project. In total 33 GPs were involved in these practices, of which 30 were full-time, three were single-handed, and one had a job-share. One practice was a training practice. Eleven of the practices were average referrers and one was a high referrer.

A health authority commissioning manager then wrote to the 12 practices explaining the proposed slot system and inviting them to participate. This was followed up by a telephone call to the practice principal and practice manager, and if the practice wished, a visit was arranged to discuss the proposal. Although a couple of practices were reluctant to take part initially, because of concerns that the study may inhibit their clinical freedom, all selected participating practices volunteered to participate.

How this fits in

Attempts to manage general practice demand for orthopaedic outpatient consultations have been made in several areas of the NHS, with little robust evidence on whether or not they work. In the North Staffordshire health district (population circa 480 000), we developed and introduced a novel 'slot' system to try to manage demand in general practice. We undertook a prospective study over 2.5 years involving, the 12 general practices in the slot system, 24 control general practices, and the 63 other general practices in North Staffordshire, and found a reduction in referrals of 20–40% in participating practices compared to other practices (equating to 2–4 referrals per 10 000 patients per month). Our study suggests that practices willing and able to take up an offer of a slot system for managing their orthopaedic referrals will be able to significantly reduce waiting times for their patients when compared to similar practices who do not.

The number of slots based on registered practice populations that would enable equilibrium between demand and supply among new GP referrals to orthopaedic outpatients, was calculated for each practice. As new orthopaedic outpatient referrals were evenly spread by age group, the number, or quota, of slots each practice was allocated was not adjusted for age. Quotas of slots for participating practices and their use was fed back on a monthly basis. It was also agreed that, if a practice went beyond their monthly allocations, they might not be allowed to refer any more patients that month.

Incentives for GP participation in this system were not monetary, but GPs were 'guaranteed' rapid orthopaedic appointments for their patients (maximum of 8 weeks), and a promise that their backlog of orthopaedic waiters would be removed. Experience from North-West Anglia found that clearing the backlog was important to get general practices to participate.¹³

Participating GPs were provided with locally developed guidelines on appropriate referrals and routes of referrals for musculoskeletal problems. These guidelines were developed by consultants at the local hospital, in consultation with hospital and general practice colleagues.

Local experience of a suspected breast cancer slot system had shown that the availability of adequate clerical time was the key to the smooth day-to-day running of the system. Therefore, a clerical officer was appointed to be a central point for queries from general practices, make appointments and collate referral statistics for feedback to practices. Minor modifications were made to the hospital computer software to handle the slot appointments. GPs referred patients into the slot system using a specially designed slot referral pro forma. They were encouraged not to refer to a particular consultant, although they retained the right to do so. New GP referrals from participating practices were triaged to the most appropriate clinic (surgical or non-surgical) by the clinical director (a rheumatologist), guided by a prioritisation score included on the referral pro forma. Trauma and paediatric orthopaedic patients (≤ 16 years of age) were excluded from the system.

Slot system evaluation study design

The study design is a prospective comparison of all general practices in North Staffordshire Health Authority. Comparison groups were the slot practices ($n = 12$), control practices ($n = 24$), and all other practices in North Staffordshire ($n = 63$).

Non-slot control practices were selected by a matching procedure. They were first grouped into high, average, or low referrers. Using a normal

distribution assumption, practices with average referral rates were defined as those within ± 1 standard deviation (SD) of the mean referral rate (r) of the non-slot practices. High and low referring practices were defined as those with rates higher than $r+1$ SD and those with rates lower than $r-1$ SD, respectively. Two control practices were then chosen at random from possible practices in each stratum. Originally, there were 64 other practices. However, one small practice closed down during the study, and was thus excluded from the analysis. Although the original intention had been to simply compare slot and control practices, the remaining 63 practices were included in the study as a third comparison group. Three comparison periods were chosen:

- period 0, the baseline year, prior to the introduction of the slot system (from 1 April 1997–31 March 1998);
- period 1, the first calendar year after the introduction of the slot system (from 1 April 1998–31 March 1999); and
- period 2, the first half year of the second calendar year after the introduction of the slot system (from 1 April 1999–30 September 1999). (A second phase of the slot system was introduced on 1 October 1999, therefore a complete year could not be studied).

The comparison between period 0 and period 1 is an exact calendar year comparison before and after the introduction of the slot system. The comparison of period 1 with period 2 allows us to detect seasonal and longer-term changes in referral rates.

Source of data

The data were obtained from the outpatient warehouse dataset held by North Staffordshire Health Authority. The practice population numbers were acquired from the North Staffordshire Health Authority's Exeter computerised patient information system. The population data comprised the registered population for each GP practice on 1 April 1997, 1 April 1998, and 1 April 1999, respectively.

Main outcome measure

The main outcome measure was the difference in referral rates, per 10 000 population per month between practice groups (slot, control and all other). To compare the referral patterns by practice group, we amalgamated the practice-level monthly referrals into practice-group-level returns and computed the group-level monthly referral rates using the corresponding amalgamated denominators. This amalgamation had the additional benefit of eliminating zero values that occurred in the monthly practice-level referral rates.

Statistical analyses

Inspection of the distribution of the numbers of monthly referrals suggested that the data were over-dispersed. Accordingly, a Poisson model might be inappropriate. Interest was focused on monthly referral rates, rather than on the numbers referred, per se. We investigated the use of rate, log rate and the logistic transform of the observed monthly (practice group level) proportions as dependent variables. The results were similar whichever form of the dependent variable was used. Accordingly, we adopted the simplest measure, the untransformed rate per 10 000 population. A multifactor linear regression model was used to study differences in monthly referral rates by practice group.

The covariates included practice groups, periods, and the available case-mix factors, which included age and sex and referral priority defined by the GP. Since the response variable was the averaged monthly referral rates by practice group, the case-mix covariates were correspondingly monthly-based by practice group; that is, the mean age of patients by month, the proportion of males by month, and similarly for the other categorical covariates.

The effects of period and practice group were measured relative to their natural reference categories. Period 0, the baseline year before the introduction of the slot system, was used as a natural reference category for periods 1 and 2. The control group was used as the natural reference category for the slot and other practice comparisons. Males were used as the reference category for females, and routine priority for urgent priority and missing.

The data were analysed using SPSS (Version 10). A 5% level of statistical significance was adopted.

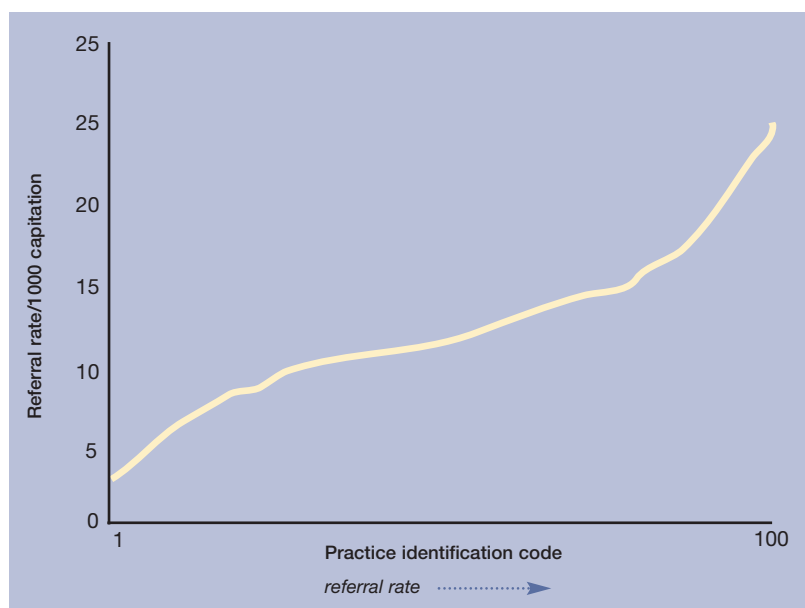
RESULTS

Variation of referral rates by practice

Figure 1 shows the considerable variation of NHS new GP generated attendances by general practice. Attendances were used as proxy for referrals.

Data validation

Completeness of cases. There were 15 439 new GP referral orthopaedic outpatients registered in the 99 local general practices from 1 April 1997 to 30 September 1999. Of these, 14 006 (90.7%) attended their appointments in hospital ('seen' patients). The remaining 1433 patients (9.3%) did not attend their appointments ('unseen' patients). Among the 14 006 seen patients, the majority, 12 620 (90.1%), were referred to North Staffordshire Hospital Trust, while the remainder 1386 (9.9%) were referred to other hospitals. The quality of data among unseen patients was poor, and we excluded these patients from further analysis. The age and sex distribution of



seen and unseen patients was similar between all three groups.

Case-mix

Age. The data on age were complete. The observed age range was different from that prescribed by the design. The protocol for the slot system should have excluded paediatric patients aged ≤ 16 years. However, 9.8% of patients were aged ≤ 16 years in the slot group (Table 1). This figure is similar to the figures observed in the control and other group 7.7% and 8.6%, respectively. Therefore, taking a pragmatic approach, we included these paediatric patients in our analyses of referral rates.

Figure 1. Annual rate of new outpatient attendances from GP referrals per 1000 practice population (capitation) in North Staffordshire general practices ($n=100$), April 1996 March 1997.

Table 1. The age distribution by practice group for the 15 439 orthopaedic outpatients in North Staffordshire from April 1997 to September 1999.

Age group (years)	Intervention <i>n</i> (%)	Control <i>n</i> (%)	Other <i>n</i> (%)	Total <i>n</i> (%)
≤ 16	178 (9.8)	416 (7.7)	707 (8.6)	1301 (8.4)
>16	1640 (90.2)	4954 (92.3)	7544 (91.4)	14 138 (91.6)
Total	1818 (100)	5370 (100)	8.251 (100)	15 439 (100)

Table 2. The observed practice-based means and standard errors for monthly referral rates per 10 000 population by practice group and period for the 14 006 seen patients in North Staffordshire.

Period	Practice Group					
	Intervention		Control		Other	
	Mean	SE	Mean	SE	Mean	SE
0	9.40	0.41	10.99	0.52	9.50	0.29
1	7.29	0.31	9.90	0.39	9.31	0.36
2	7.31	0.21	11.70	0.48	10.33	0.36

SE = standard error.

Sex. The data for sex was complete. Of the 15 439, 7364 (47.7%) were male and 8075 (52.3%) were female.

Referral rates by practice group and period

The mean monthly referral rate (per 10 000 population per month) in the slot group declined from period 0 to period 1, and was constant from period 1 to period 2 (9.40, 7.29, 7.31, respectively). The rates for the other two groups from period 0 to period 1 were stable, but increased from period 1 to period 2 (Table 2).

The differences in mean referral rates between the control and the slot groups (slot – control) were -1.59, -2.61, and -4.39 referrals per 10 000 population per month in periods 0, 1, 2 respectively (Table 2). When these differences are divided by the mean rate in the control group in period 0, the relative reductions in mean referral rates were -14.5%, -23.7% and -39.5% for periods 0, 1, 2, respectively.

Within-group changes over time were also computed relative to period 0. For example, in the slot group, the period 1 comparison was defined as (period 1 – period 0) and period 2 comparison was defined as (period 2 – period 0). Relative comparisons were obtained by dividing these figures by the corresponding group mean rates in period 0. In the slot group, the relative changes were -22.4% and -21.7% in periods 1 and 2, respectively. However, in the control group the corresponding figures were -9.9% and 6.5% respectively, and in the other group the figures were -2% and 8.03%, respectively. These trends are shown more clearly in Figure 2, where non-parametric (Loess) trend lines have been computed.

Multifactor linear regression analysis showed that practice group, period and the interaction between

these two factors are statistically significant. The case-mix factors of age and sex did not influence the behaviour of the referral rates over the study period.

DISCUSSION

Summary of the main findings

A greater than 20% reduction in orthopaedic referral rates in slot practices compared to control and other practices was observed. The reduction in referral rates increased with time. We are not aware of a published evaluation on the effect of a slot system on GP demand for orthopaedic outpatients.¹⁵

Limitations of the study

Limitations of the study include the non-random selection of general practices, and that referral data was only available for the first half of the third year. Although the design in this study may not be as robust as a randomised trial, validity issues were addressed by: carefully selecting control practices to match the participating practices; adjusting for available case-mix factors; studying trends in the unmatched non-participating practices; and standardising the longitudinal comparisons.

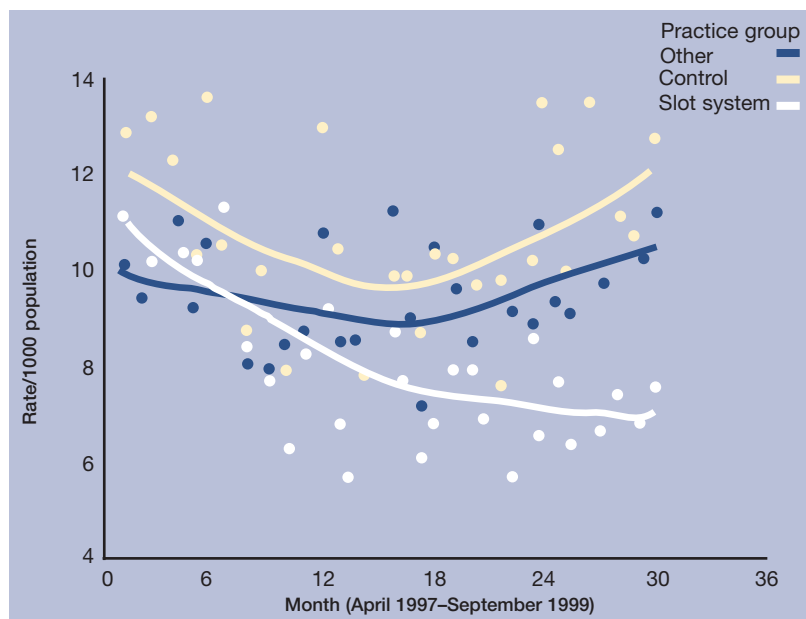
Comparison with the existing literature

The reduction in referrals of 20–40% in participating practices compared to other practices equates to 2–4 referrals per 10 000 patients per month. This is consistent with the proportion of cases found in Liverpool that it was considered could have been dealt with within primary care, without the need to refer to orthopaedic outpatients.¹²

A referral depends on both clinical and social criteria.¹⁰ In some instances the persistence of waiting lists may be viewed as a solution to other problems.¹⁰ These include: waiting lists blur the issue of healthcare rationing; they may protect individuals from facing the triviality or intractability of particular conditions; they may help departments demonstrate the need for additional resources, or to help feed private practice; they may increase efficiency by minimising idle time, and maximising throughput; and, the capitation fee for GPs does not provide an incentive for managing more complex cases that could be reasonably managed in general practice.

In one study of the referral process, GPs were found to wish to have their patients seen as quickly as possible in the most geographically convenient location.¹⁶ The North Staffordshire system provided GPs with the incentive to improve waiting times for their own patients by giving them responsibility and information with which to manage the capacity available to them. Support for this concept comes from an unpublished survey of GP opinion which was undertaken 2 years after the introduction of the

Figure 2. Observed and fitted monthly referral (attendance) rates by practice group (other, control, and slot or intervention group) for orthopaedic patients from April 1997–September 1999 in North Staffordshire.



system (M Kalsi and S Bridgman, unpublished data, 2000). An opinion from one GP that illustrates this theme in the comments received was:

'Having a slot system made me think carefully before referring.'

Implications for clinical practice and future research

Hospital clinicians supported the scheme because they recognised that their time was better targeted on people likely to benefit surgically rather than with disorders that could be treated conservatively in primary care or elsewhere in secondary care. Primary care management brought considerable practical experience into the design of the system of managing demand in other aspects of primary care, for instance pharmaceuticals. Without the joint leadership, commitment, and work between primary and secondary care colleagues, this system would not have worked satisfactorily. We also reinforce the observation from North-West Anglia that clearing the backlog for GPs was an important incentive to GPs to be involved.¹³ It took more than 6 months to clear the backlog in North Staffordshire, and this led to some GPs threatening to withdraw from the system.

The slot system defined that if a practice exceeded their quota then it might not be allowed to refer any more patients that month. There was considerable debate among the project team on how this situation would be handled if it occurred. We agreed on a flexible approach to managing the situation with a practice, which would depend on the use of slots across all practices, knowledge of the practice, and using the health authorities' considerable experience of managing demand for pharmaceuticals with GPs. While evidence suggest that the number of slots should be more than sufficient for the number of patients needing to be seen in secondary care,^{11,12} it is theoretically possible that limiting referrals might restrict access to appropriate care for some patients. As no practice exceeded its quota of referrals we gained no practical experience on managing practices that exceeded their quotas.

It is argued that unacceptable waiting is likely to be reduced only by policy changes directed at the more intimate decisions of patient management; that is, they require micro- rather than macro-management.¹⁰ We believe that our study adds weight to this assertion.

Our study suggests that practices willing and able to respond to an offer of a slot system for managing their orthopaedic referrals will be able to reduce waiting times for their patients significantly when compared to similar practices who were not offered participation. We must be cautious as to whether the

advantages of the slot system would apply generally to practices if it were introduced by primary care trusts as the norm, rather than just to those who responded voluntarily as in our study. However, our study has provided some evidence to give to practices about the potential for the system to influence wait times. Further systematic research in the NHS is warranted on the effectiveness and cost-effectiveness of such systems.

Funding body

North Staffordshire Health Authority and Newcastle-under-Lyme Primary Care NHS Trust

Ethics committee

Not required

Competing interests

None

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