

Effect of the remuneration system on the general practitioner's choice between surgery consultations and home visits

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Abstract

Objective—To assess the influence of the remuneration system, municipality, doctor, and patient characteristics on general practitioners' choices between surgery and home visits.

Design—Prospective registration of patient contacts during one week for 116 general practitioners (GPs).

Setting—General practice in rural areas of northern Norway.

Main outcome measure—Type of GP visit (surgery *v* home visit).

Results—The estimated home visit rate was 0.14 per person per year. About 7% (range 0-39%) of consultations were home visits. Using multilevel analysis it was found that doctors paid on a "fee for service" basis tended to choose home visits more often than salaried doctors (adjusted odds ratio 1.90, 99% confidence interval 0.98, 3.69), but this was statistically significant for "scheduled" visits only (adjusted OR 4.50, 99% CI 1.67, 12.08). Patients who were older, male, and who were living in areas well served by doctors were more likely to receive home visits.

Conclusion—In the choice between home visits and surgery consultations, doctors seem to be influenced by the nature of the remuneration when the patient's problem is not acute. Although home visiting is a function of tradition, culture, and organisational characteristics, the study indicates that financial incentives may be used to change behaviour and encourage home visiting.

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The concern about escalating costs of health care has brought about health care reforms in several countries. A crucial objective in these reforms is to change doctors' decision making. Financial incentives *inter alia* have been proposed as a means of doing this. Yet, there are surprisingly few studies of the extent to which doctors change their clinical practice in response to changes in these incentives. A Danish study¹ showed that general practitioners (GPs) reduced the number of patients referred to specialists by a quarter and to hospitals by a third when remuneration was changed from a per capita system to a mixed per capita/fee for service system.

We present a case study of financial incentives designed to meet policy objectives by examining the influence of the system of remuneration on home visiting in northern Norway. In Norway,

and in Sweden too, planned reforms of general practice are aimed at improving the patient-doctor relationship and encourage *inter alia* more home visiting.

All Norwegian GPs used to be remunerated on a fee for service (FFS) basis for curative care. In 1978 an alternative salary system was introduced in some areas. Each municipality had either one system or the other. The salary system was introduced only if all doctors in a municipality agreed. Once it was introduced, a municipality could not revert to an FFS system. This natural experiment offered a rare opportunity to study the influence of two different remuneration systems operating in similar environments.

For a home visit, FFS doctors were paid a consultation fee plus compensation for travel time. The salaried GPs were paid a fixed amount per day for being on call and a small fee per home visit. In principle, the salaried doctor was to have the same income as an FFS colleague for "a notional average number" of consultations on duty. However, the extra (or marginal) income for a visit was much lower under the salary system. For example, an FFS doctor would earn £31.50 for a home visit 30km away (not unusual in Norway), whereas the salaried doctor received only £6.36. Since most home visits were provided out of office hours, the doctor would forego leisure by home visiting. The decision as to whether to provide telephone advice only, a home visit, or a surgery visit may, in addition to professional judgement, be influenced by the "trade off" between income and leisure. We hypothesised that FFS doctors would more readily provide home visits.

The extent to which doctors were influenced by financial incentives could be measured by the degree to which salaried doctors—*ceteris paribus*—would choose a telephone or a surgery consultation more often than FFS doctors when the medical conditions did not clearly indicate a home visit. There are two fairly distinct types of home visits, "acute" and "scheduled". When a patient has an acute problem, a doctor may see the patient in the patients' home (acute home visit) or in the surgery. A scheduled home visit is an alternative to a repeat surgery consultation for an old or a chronically ill patient. Since the medical indications for home visits are less clear cut for scheduled home visits than for acute home visits, the latter are likely to be less influenced by the remuneration system.

Clearly, practice patterns in this respect may also be influenced by other organisational characteristics (doctor density, doctor turnover, etc), geographical characteristics (average travel time from the patient to the doctor and to the nearest

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hospital, population size, etc), provider characteristics (doctor's age, sex, medical training, etc) and patient characteristics (patient's age, sex, diagnosis, etc). The aim was to use multivariate methods to model the influences of incentives after adjusting for these confounding factors.

Methods

All general practitioners in 68 rural municipalities in northern Norway were asked to register their patient contacts during a specified week in 1982. Of the 148 eligible doctors, 116 (78.4%) in 60 municipalities returned completed registration forms. The response rate was 73.8% among fee for service doctors and 81.9% among those salaried. There was no difference between responders and non-responders with respect to age, sex, place of graduation, or number of years since graduation.

The doctor density (measured as population per doctor) was lower in municipalities in which the doctors received FFS remuneration than in those in which they were paid a salary (1571 *v* 1075, *p*<0.001) and the average population was higher (4748 *v* 2961), *p*=0.01 (table I). In other respects (doctor turnover, patients' travel time to the doctor, and travel time to the nearest hospital) the municipalities were comparable.

Table I Characteristics (mean) of the 60 municipalities

	Remuneration system		<i>p</i>
	Fee for service (n=25)	Salary (n=35)	
Doctor density (population/GP ratio)	1571	1075	<0.001
Doctor turnover (no of months in post)	36	26	0.208
Population	4748	2961	0.013
Proportion population reached within 30 min	75%	71%	0.427
Travel time to hospital (h)	1.7	2.3	0.067

Of the responding doctors (48 FFS and 68 salaried), 14% were female and the average age was 33 years. The respondents graduated on average six years before the study, and 68% of them were from a Norwegian medical school. There were no differences between FFS doctors and the salaried doctors in any of these respects. The methods have been described in more detail elsewhere.^{2,3}

The doctors indicated on the registration form the place of direct contacts (surgery or home visit) using the following categories:

- (1) Surgery consultation for a new illness (initial visit).
- (2) Follow up consultation during office hours (scheduled surgery visit).

Table II Type of consultation* (percentage) by remuneration system

Type of consultation	Remuneration system		
	Fee for service (%) (n=3251)	Salary (%) (n=3574)	Total (%) (n=6825)
(1) Initial surgery visit (office hours)	42.2	44.0	43.1
(2) Return surgery visit (office hours)	42.1	41.5	41.7
(3) Acute surgery visit (out of hours)	8.5	7.9	8.2
(4) Acute home visit (doctor on duty)	4.8	5.3	5.0
(5) Scheduled home visit (doctor off duty)	2.5	1.4	1.9
Total	100.1	100.1	99.9

*433 consultations omitted from the analyses due to lack of information regarding type of consultation

(3) Surgery consultation, out of hours, for doctors on call (acute surgery visit).

(4) Home visit for doctors on call (acute home visit).

(5) Home visit for doctors not on call (scheduled home visit).

Altogether 7258 direct contacts (433 had missing information about the type of consultation (table II) and 3062 telephone contacts were registered. Type 1 visits were excluded from the multivariate analysis as the choice of place of consultation is made by the patient and not by the doctor.

STATISTICAL METHODS

Differences between groups of doctors were tested by *t* test (continuous variables) or χ^2 test (categorical variables). A number of variables associated with home visiting behaviour, in particular doctor density, may confound the hypothesised relationship between the remuneration system and home visiting behaviour. In order to adjust for potential confounding, multivariate analysis was used to estimate the independent effect of the remuneration system. We chose to use the number of years since graduation instead of the doctors' age in the multivariate analyses since the latter describes more precisely the experience as a GP.

To take into account the hierarchical structure of the explanatory variables (that is, the patient, the doctor, and the municipality level), we employed multilevel analyses using the ML3 programme.⁴ These analyses show "the baseline effects" of the explanatory variables (the fixed part of the model) and the variation in each effect depending on the variation of other explanatory variables (interaction effects; the random part of the model).⁵

Because of the high number of significance tests undertaken, 0.01 was chosen as the level of statistical significance.

The estimation of consultation rates (number of visits per person per year) was based on the assumptions that the number of consultations was the same for non-responding as for responding doctors and that the registration week was a typical one.

Results

During one week, the GPs registered 476 home visits (6.9%) and 6349 surgery consultations plus the 433 visits not specified (table II). The average numbers of consultations per week were 71.6 for FFS doctors and 56.2 for salaried doctors (*p*=0.003), corresponding to consultation rates of 2.2 and 2.4 per person per year, respectively. The proportion of home visits was about the same in FFS and salaried doctors (7.3% *v* 6.7%; *p*=0.34) as was the weekly number of home visits per doctor (5.1 *v* 3.8; *p*=0.17), with home visit rates of 0.14 per person per year for both groups of doctors. The proportion of home visits ranged from 0% to 39% for individual doctors, and 28 doctors had no home visits during the specified week (26% of FFS doctors *v* 21% of salaried, *p*=0.63). Most of the home visits (72%) were house calls by doctors on duty (acute home visits) (table II). The salaried doctors provided more of their home visits while on duty (79%) than did the

FFS doctors (66%) ($p=0.03$). There was a tendency that doctors who provided many home visits also had many telephone consultations ($r=0.20$, $p=0.06$). The proportion of home visits was highest for children and elderly people of both sexes for acute and scheduled home visits.

Of 901 acute visits, 344 (38%) were home visits, with similar proportions for FFS and salaried GPs. Of 2981 scheduled visits, 132 (4.4%) were home visits, the proportion was higher among FFS doctors (5.6%) than among salaried doctors (3.3%) ($p=0.003$).

MULTILEVEL ANALYSES

The choice between all surgery visits (type 2 and 3) and all home visits (type 4 and 5) was first analysed in a three level model with the patient as level one ($n=3813$), the doctor as level two ($n=116$), and the municipality (organisational and geographical characteristics) as level three ($n=60$). Because there was no significant variation at level three in any of the models, only two level models were analysed (doctor and municipality characteristics were assumed to be at the same level).

In univariate analysis, doctor density and the sex of the patient were the only statistically significant predictors (table III). When all explanatory variables were used in a multivariate model (our proposed model), doctor density was still significant (OR 0.42, 99% CI 0.19, 0.92), indicating that a home visit was more than twice as likely for each 1000 population per doctor increase in density. Patient sex was also significant (OR 0.76; 99% CI 0.58, 0.99; women had a 75% probability of a home visit compared with men). A home visit was nearly twice more likely to have been carried out by FFS doctors than salaried ones (OR 1.90, 99% CI 0.98, 3.69); this was borderline statistical significant.

No random variation of the coefficients was detected (that is, there were no interactions), and only the intercept was retained in the random part of the model.

Most coefficients did not change significantly when analysed together suggesting there was little confounding between them. Only the remuneration system was not "robust"—but that was to be expected since the remuneration method was largely determined by doctor density and population size. The full model shows the independent

effect of remuneration, adjusted for the other factors which differ between the areas.

Repeating the multivariate analysis for acute visits only (type 3 versus type 4 visit), home visiting was associated with smaller populations (OR 0.85; 99% CI 0.72, 0.99), short travel times to the nearest hospital (OR 0.66; 99% CI 0.45, 0.98), and older patients (OR 1.13; 99% CI 1.05, 1.23). There was no association between the remuneration system and home visiting (OR 1.20, 99% CI 0.37, 3.95).

On the other hand, for scheduled visits (type 2 versus type 5) home visiting was associated with FFS remuneration (OR 4.50; 99% CI 1.67, 12.08), high doctor density (OR 0.19; 99% CI 0.05, 0.66), and older patient age (OR 1.18; 99% CI 1.04, 1.33).

Discussion

The remuneration system emerges as a predictor of scheduled home visiting. For scheduled visits, the doctor has more freedom to choose the preferred place of consultation than when the problem is acute. The total consultation rates were higher in municipalities with salaried doctors (and higher doctor density). Assuming that the "medical need" is about the same in both types of municipalities, FFS doctors could have provided more consultations if they had wished. This may indicate that FFS doctors aimed at a target income rather than a maximum income.^{1 6}

The doctors in one municipality may serve different patient groups with different needs for home visits. Consequently, some of the observed associations may be attributable to medical factors which are not accounted for in the analyses. However, "medical need factors" are associated with age and sex of the patient, and these were adjusted for in the analyses.

A potential for bias arises because doctors may have chosen the municipality with their preferred remuneration system. Bias may also be introduced if selective dropout from the study was systematically different between doctors with different forms of remuneration.⁷ It is difficult to judge the net effect of these potential biases. However, it should be noted that the higher doctor density (smaller population per doctor) in salaried municipalities was due to governmental decisions, not to doctors' preferences.

The explanatory variables describe the individual patient, the doctor, or the municipality. This hierarchical structure presents an analytical problem since the 3813 observations are not independent.^{8 10} We chose to use a multilevel programme which is designed specifically to handle such hierarchical structures.⁴

Patient age had an effect on the choice between home and surgery visit (5–18% more likely per 10 year increase in age), but this was statistically significant only in the separate analyses of acute and scheduled visits. Since severity and immobility increase with age, the study indicates that the patient's need has a strong influence on doctors' decisions.

Male patients had more home visits than female ones (but not in the separate analyses of acute and scheduled visits). We do not have a clear explanation of this finding.

Table III Multilevel analysis of the choice between surgery consultation (=0) and home visit (=1) for 3813 visits (odds ratio (OR) and 99% confidence interval)

	Unadjusted: explanatory variables introduced one at a time			Adjusted for all explanatory variables		
	OR	(99% CI)	t	OR	(99% CI)	t
Intercept				0.24	(0.04, 1.58)	-1.94
Remuneration system (0=salary, 1=fee for service)	1.13	(0.63, 2.01)	0.54	1.90	(0.98, 3.69)	2.48
Doctor density (1000 population/doctor)	0.51	(0.27, 0.97)	-2.66	0.42	(0.19, 0.92)	-2.82
Doctor turnover (no of years in post)	0.97	(0.86, 1.11)	-0.51	0.92	(0.79, 1.06)	-1.54
Population of municipality (in 1000s)	0.95	(0.87, 1.02)	-1.84	0.95	(0.87, 1.03)	-1.61
Proportion of population reached within ¼ h	1.00	(0.99, 1.02)	0.32	1.00	(0.99, 1.02)	0.85
Travel time to nearest hospital (h)	0.94	(0.77, 1.16)	-0.72	1.00	(0.82, 1.23)	0.03
Sex of physician (0=male, 1=female)	0.47	(0.20, 1.11)	-2.25	0.54	(0.23, 1.24)	-1.90
No of years since graduation	1.03	(0.97, 1.10)	1.35	1.05	(0.98, 1.13)	1.78
Medical school (0=foreign, 1=domestic)	0.66	(0.38, 1.14)	-1.92	0.79	(0.44, 1.41)	-1.05
Job satisfaction (1=low, 7=high)	1.09	(0.86, 1.37)	0.90	1.06	(0.84, 1.33)	0.64
Age of patient (in 10 y intervals)	1.05	(0.99, 1.11)	2.18	1.05	(0.99, 1.11)	2.07
Sex of patient (0=male, 1=female)	0.75	(0.58, 0.98)	-2.79	0.76	(0.58, 0.99)	-2.67

$p < 0.5$ if $t > 1.96$

$p < 0.01$ if $t > 2.56$

The study confirms the commonly held view that home visiting is greater where the doctor density is higher. It may be worthwhile to note, however, that 40 years ago home visit rates were higher than now despite a lower doctor density.

Not surprisingly, the rate of acute home visits was lower in municipalities with larger populations. Usually, only one doctor is on duty at a time for acute problems. With a larger population to serve, the doctor may be forced to choose surgery consultations in order to see all the acutely ill patients in need of consultation.

Provision of home visits is essential to establish and maintain the public's trust in primary health care,^{11 12} and we believe that home visiting should be at least as frequent as that found in this study for a "high quality family practice". Many doctors claim that seeing the patient in her own social context results in a better understanding of her psychosocial problems,¹³ and may also yield important insights into diagnosis, drug safety and compliance, functional capacity, and social network in elderly patients.¹⁴ Despite this, various reports indicate a decline in home visiting in the UK^{15 16} and Norway.^{17 20} A dramatic decline has taken place in the USA and Sweden, where home visiting is now negligible in some areas.^{21 24} The wide variation in home visiting between countries may be explained by differences in tradition, culture, and the organisation of general practice.^{25 27}

If encouragement of home visiting is to be a feature of health policy, a variety of measures may be relevant. A relatively high doctor density seems to be a factor favouring the provision of home visits. Clearly, professional consensus is important, but organisational factors may also be changed to encourage home visiting. Other studies have indicated that remuneration systems affect clinical behaviour.^{1 28 30} Our study supports these findings suggesting that financial incentives can be successful in encouraging home visiting.

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