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Primary care access and its relationship with emergency department utilisation:

an observational, cross-sectional, ecological study

Abstract

Background
Recent health service policies in the UK have focused on improving primary care access in order to reduce the use of costly emergency department services, even though the relationship between the two is based on weak or little evidence. Research is required to establish whether improving primary care access can influence emergency department attendance.

Aim
To ascertain whether a relationship exists between the degree of access to GP practices and avoidable emergency department attendances in an inner-London primary care trust (PCT).

Design and setting
Observational, cross-sectional ecological study in 68 general practices in Brent Primary Care Trust, north London, UK.

Method
GP practices were used as the unit of analysis and avoidable emergency department attendance as the dependent variable. Routinely collected data from GP practices, Hospital Episode Statistics, and census data for the period covering 2007–2009 were used across three broad domains: GP access characteristics, population characteristics, and health status aggregated to the level of the GP practice. Multiple linear regression was used to ascertain which variables account for the variation in emergency department attendance experienced by patients registered to each GP practice.

Results
None of the GP access variables accounted for the variation in emergency department attendance. The only variable that explained this variance was the Index of Multiple Deprivation (IMD). For every unit increase in IMD score of the GP practice, there would be an increase of 6.13 (95% CI = 4.56, 7.70) per 1000 patients per year in emergency department attendances. This accounted for 47.9% of the variance in emergency department attendances in Brent.

Conclusion
Avoidable emergency department attendance appears to be mostly driven by underlying deprivation rather than by the degree of access to primary care.

Keywords
access to health care; health services; primary care.

INTRODUCTION

Emergency department utilisation, and developing ways to reduce it, has become a central feature of recent policy initiatives in the UK.[1,2] It is often argued that if GP services were open for longer, or were more generally accessible, this would alleviate the demand for emergency department services and lead to a reduction in hospital admissions.[3–6] Consequently, primary care trusts (PCTs) across the UK have been commissioning more-responsive GP services.[1]

There may be several problems with this policy approach. First, there is conflicting evidence about whether it is primary care service characteristics or patient characteristics that determine emergency department use. In North America, some studies have found that emergency department users are more likely to be non-white, poor, and less educated,[7–9] although other studies have shown that a focus on systems issues may impact on emergency department use.[10,11] Second, much of the research that links primary care supply factors to hospital attendances is based in the North American context and not necessarily applicable to the NHS.[10–13] Third, in the UK there is evidence to suggest that the importance of GP supply factors is with hospital admission for long-term conditions,[6,14,15] not emergency department attendances, although this relationship is only marginal and population characteristics and the local burden of disease are much more strongly predictive of hospital utilisation. 'Patient factors' such as recent migrants, unskilled population, single-parent families, and the chronically ill can account for more of the variation in emergency admission rates than anything else.[16]

A further issue is that there are many aspects to whether a GP practice is considered very or not very accessible. A recent King's Fund report has shown that access has several components, such as physical access, timely access, and patient choice.[17] A policy focus on opening hours does not cover other dimensions of access, nor does it unpack the many aspects to whether a patient consults first with a GP rather than going straight to the emergency department. In order to understand the relationship between access to primary care and the utilisation of emergency departments, it is necessary to include all these elements of access.

This study tests the hypothesis that the variation in emergency department attendance is explained by the variation in access, broadly defined, to GP practices. It explores whether those patients that self-refer to emergency departments do so because of the variation in access to the GP practices where they are registered. Importantly, the study uses detailed local data on a wide variety of GP access parameters as proposed by the King's Fund,[17] in addition to routinely collected data on underlying population characteristics and ill-health, and it examines their association with avoidable emergency

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How this fits in

It is not clear from the literature whether or not poor access to primary care services results in greater use of emergency departments. This study examined whether emergency department attendees that self-referred attend because of inadequacies in access to the primary care services where they are registered. The study used detailed access parameters in an inner-London primary care trust. It found that broader underlying population characteristics rather than access to primary care explains the emergency department attendance patterns in this context.

department attendance rates. Avoidable emergency department attendance is used as the dependent variable, rather than the more commonly used emergency department admission rates, as the latter presupposes legitimate clinical need for hospital care.

METHOD

Context

Brent PCT is an inner-London borough with a population of 280 000 that is characterised by its ethnic diversity and high levels of deprivation. Fifty-five per cent of the population are from minority ethnic groups and there is a 10-year differential in life expectancy from the north to the south of the borough.[18] Brent's Commissioning Strategic Plan (2009–2014) has identified the 8% year-on-year increase in emergency department attendance from 2009 to 2014 as an 'unsustainable alternative to primary care'. It is estimated that approximately 76% of emergency department attendances could be avoided and potentially dealt with at the primary care level.[19] There are two principal emergency department providers in Brent — Northwick Park Hospital and the Central Middlesex Hospital, although Brent residents can attend emergency departments from a number of hospitals in neighbouring PCTs. There are 71 Brent GP practices (180 whole-time equivalents), and the average list size is just above 5000 per practice. The GP practices are located in five clusters, and single-handed practices represent between 13% and 40% of practices, depending on the cluster. Since 2009, out-of-hours services have been used by all GP practices.

Study design and dependent variable

This is an observational ecological study taking the GP practice as the unit of analysis, and avoidable self-referred emergency department attendance as other dependent variable. 'Avoidable' was considered as meaning a visit to an emergency department that could have been feasibly handled at the level of primary care. By this, the study included all emergency department visits coded as 'self-referrals' in Secondary Uses Service data across all hospital providers serving Brent PCT. Attendances that resulted in an admission, death, or transfer to another healthcare provider were excluded from this dataset, as this presupposed that primary care would not have been the appropriate level to resolve the health concern. Data for the years 2007–2008 and 2008–2009 were included, and over 170 000 emergency department visits were included for analysis; 60.9% of avoidable attendances resulted in discharge without follow-up and 54.2% required no diagnostic investigation (or none was recorded). The avoidable emergency department attendances were not all separate, independent events because some individuals utilised tertiary services on more than one occasion. Given that the dataset had no patient-identifiable information, so-called frequent attenders were identified by cross-tabulating emergency department data points against four characteristics — date of birth, sex, GP practice, and the patient's own postcode.

Independent variables

Several independent variables were used across three broad domains: GP access characteristics, population characteristics, and health status. Each of these was aggregated to the level of the individual GP practice, to build a profile of how accessible it is to its registered population, but also to build a profile of that registered population and its underlying characteristics in terms of age, sex, ethnicity, and deprivation. With the exception of one or two independent

Box 1. Index of Multiple Deprivation (IMD) and standardised mortality ratios (SMR).

- IMD characterises deprivation in lower super output areas according to seven domains: income, employment, health and disability, education, housing, the environment, and crime.
- SMR is defined as follows: SMR = (observed number of deaths per year)/(expected number of deaths per year).

variables, complete data were obtained for 68 GP practices. The study drew on the King's Fund report[17] to guide the selection of access variables, the Brent PCT Balanced scorecard,[20] and the London Health Observatory Practice profiles[21] for the other independent variables. Patient data based on postcode are derived from the census and linked to GP practice registers by the London Health Observatory. For example, Index of Multiple Deprivation (IMD; Box 1) scores aggregated to the GP practice reflect the profile of its registrants and not its location. The all-cause standardised mortality ratios (SMRs; Box 1) for each GP practice were based on the ward where the practice is located, as these are not available at the individual level.

Analysis

The dependent variable was converted into a continuous crude rate, that is, the number of avoidable emergency department attendances by registrants of each GP practice divided by the practice list size, and multilinear regression analysis was used to determine the degree of covariance with the independent variables aggregated to each GP practice. Simple regression analysis was carried out first and then analysed together in a combined fixed-effects stepwise multilinear regression model. Post-hoc analysis was carried out on all independent variables, to determine deviations from the normal distribution, degree of skewness, and covariance with other independent variables. The analysis was carried out over three time periods, 2007–2008, 2008–2009, and 2007–2009, in order to identify time-specific differences in correlations. The post-hoc analysis showed that none of the independent variables required further transformation. SPSS (version 16) was used to conduct the analysis.

RESULTS

There were 222 957 emergency department attendances during the two financial years 2007–2009. Compared to the other London PCTs, this was the third highest number of attendances over the same period. Of these attendances, 173 980 could be attributed as potentially avoidable attendances, with 94 739 occurring in 2007–2008 and 78 351 occurring in 2008–2009. The drop in avoidable emergency department attendances in 2008–2009 may be attributed to the opening of a major walk-in centre during that year. The mean rate of emergency department visits per practice was 205.3 per 1000 registrants for the year 2007–2008 (standard deviation [SD] = 67.9),

Table 1. Distribution of access, population and underlying ill-health characteristics in GP patient populations in Brent

Characteristic	Mean	SD	*n*
List size	5349.8	3098.96	68
Emergency department attendances per thousand GP-registered patients (2007–2008)	205.3	67.91	68
Emergency department attendances per thousand GP-registered patients (2008–2009)	184.1	70.18	68
Emergency department attendances per thousand GP-registered patients (2007–2009)	194.7	67.49	68
Total opening hours per week per 1000 patients	9.0	5.00	66
Total whole-time equivalents per 1000 patients	0.50	0.15	67
Satisfied with the GP practice, %	82.8	(8.03	68
Able to get through to the GP practice on the telephone, %	65.2	15.42	68
Able to speak to a GP, %	24.1	13.11	68
Able to get an appointment fairly quickly, %	77.4	13.33	68
Able to book ahead, %	70.2	14.02	68
Satisfied with the opening hours, %	75.5	8.28	68
Desire more opening hours, %	66.5	7.37	68
Felt out-of-hours care took a long time, %	35.9	12.7	67
Felt that the out-of-hours GP service was good, %	50.2	11.1	67
Able to see a preferred GP, %	60.5	13.82	68
Had to wait a long time at the GP practice, %	42.5	13.92	68
Registered population that live within 1 km from the GP practice, %	63.2	13.57	68
Male, %	47.8	3.62	68
On GP register and aged >65 years, %	10.4	4.13	68
On GP register and who are white, %	72.9	6.97	67
Standardised mortality ratio	87.8	13.71	68
Registered population receiving incapacity benefits, %	7.1	1.8	68
Registered lone-parent households, %	8.2	2.7	68
On GP register and in a lone-pensioner household, %	10.5	1.06	68
Index of Multiple Deprivation	29.6	7.62	68

SD = standard deviation.

which was not statistically different from 2008–2009 (mean = 184.1); however, it still indicated considerable variation between GP practices in the emergency department utilisation of their registrant population, even when their list sizes had been taken into account (Table 1).

In the 2007–2008 dataset, 68 409 of the 94 739 emergency department attendances (72.2%) were repeated visits by the same individuals. The figure for 2008–2009 was not statistically different (71.2%). The majority of these visits were carried out by individuals visiting the emergency department twice or three times in the year (66.5% in 2007–2008 and 65.3% in 2008–2009). There were no statistically significant differences in age and sex distribution of attendees when comparing the avoidable attendances with the total dataset; however, 16–29 and >76 year olds were relatively over-represented in the frequent attender group.

Table 1 shows the variation in access and population characteristics between GP practices. Table 2 shows the findings from the simple linear regression analysis. Analysis across the three time periods demonstrated that none of the access variables were significantly associated with emergency department utilisation by patients who were registered with a GP practice. GP practices that scored poorly on functional access assessments demonstrated no greater or lower likelihood for their patients to utilise emergency department services than GP practices that scored well. Only SMR, IMD, incapacity benefits and lone-parent households independently demonstrated covariance with the emergency department attendance rates for GP practices. For the 2007–2008 time period only, the proportion of white patients registered was also related to emergency department attendance.

Table 3 shows that explanatory models vary from year to year; however, variables are all related to underlying patient-population-included characteristics. For the whole time period (2007–2009), and not taking into account cluster differences, the IMD accounted for 47.9% of the variation in avoidable emergency department attendance across the borough. GP practices that have patient populations from highly deprived areas are more likely to use emergency department services than those from less deprived areas. The avoidable emergency department attendance rate increases by 6.1 visits per 1000 GP-registered patients per year for every unit increase in IMD.

DISCUSSION

Summary

The data in this study have shown that access to primary health care does not

Table 2. Simple linear regression analysis for GP access, population characteristics, and underlying ill-health against avoidable emergency department attendances across three time periods

	2007–2008		2008–2009		2007–2009	
Variable	**Beta**	**95% CI**	**Beta**	**95% CI**	**Beta**	**95% CI**
Total opening hours per week per 1000 patients[a]	0.296	–20.34 to 0.615	0.318	–10.127 to 0.647	0.307	–0.975 to 0.623
Total whole-time equivalents per 1000 patients[a]	0.473	–0.63 to 10.57	0.312	–0.826 to 10.45	0.393	–0.700 to 10.48
Satisfied with the GP practice[b], %	0.130	–10.95 to 20.21	0.332	–10.81 to 20.48	0.231	–10.83 to 20.30
Able to get through to the GP practice on the telephone[b], %	–0.182	–10.26 to 0.899	–0.257	–10.37 to 0.859	–0.220	–10.29 to 0.855
Able to speak to a GP[b], %	–0.519	–10.78 to 0.748	–0.452	–10.76 to 0.859	–0.485	–10.75 to 0.774
Able to get an appointment fairly quickly[b], %	–0.690	–10.93 to 0.550	–10.11	–20.38 to 0.152	–0.902	–20.13 to 0.323
Able to book ahead[b], %	–0.218	–10.40 to 0.971	–0.084	–10.31 to 10.15	–0.151	–10.33 to 10.03
Satisfied with the opening hours[b], %	10.06	–0.929 to 30.07	10.08	–0.981 to 30.15	10.07	–0.908 to 30.06
Desired more opening hours[b], %	–0.277	–20.54 to 10.98	–0.404	–20.74 to 10.93	–0.341	–20.58 to 10.91
Felt out-of-hours care took a long time[b], %	–0.497	–10.82 to 0.822	–0.665	–20.02 to 0.694	–0.581	–10.89 to 0.727
Felt that the out-of-hours GP service was good[b], %	0.534	–0.976 to 20.04	10.05	–0.494 to 20.59	0.792	–0.701 to 20.29
Able to see a preferred GP[b], %	–0.459	–10.66 to 0.744	–0.798	–20.03 to 0.435	–0.629	–10.819 to 0.562
Had to wait a long time at the GP practice[b], %	0.389	–0.807 to 10.58	0.514	–0.719 to 10.75	0.451	–0.735 to 10.64
Registered population that live within 1 km from the GP practice[a], %	–0.453	–10.67 to 0.772	–0.145	–10.42 to 10.13	–0.299	–10.52 to 0.921
Male[c], %	10.31	–30.29 to 50.91	0.809	–30.95 to 50.57	10.06	–30.51 to 50.63
On GP register and aged >65 years[c], %	–0.377	–40.42 to 30.66	–20.37	–60.50 to 10.77	–10.37	–50.38 to 20.63
On GP register and white[c], %	**20.40**	**0.057 to 40.74**	10.74	–0.714 to 40.19	20.07	–0.272 to 40.41
Standardised Mortality Ratio[c]	**20.12**	**10.02 to 30.22**	**20.19**	**10.06 to 30.33**	**20.16**	**10.07 to 30.25**
Registered population receiving incapacity benefits[c] , %	**200.68**	**120.95 to 280.42**	**270.10**	**200.24 to 330.97**	**230.89**	**160.81 to 300.98**
Registered lone-parent households[c], %	**150.12**	**100.19 to 200.05**	**180.37**	**130.86 to 220.87**	**160.74**	**120.19 to 210.29**
On GP register and in a lone-pensioner household[c], %	–0.524	–160.22 to 150.17	–30.55	–190.74 to 120.64	–20.04	–170.6 to 130.55
Index of Multiple Deprivation[c]	**50.35**	**30.59 to 70.10**	**60.91**	**50.42 to 80.41**	**60.13**	**40.56 to 70.70**

[a]Brent Commissioning.[20] [b]General Practice Patient Satisfaction Survey.[22] [c]London Health Observatory — GP practice profiles.[21] Data in bold represent P<0.05.

Table 3. Multiple linear regression models with explanatory power over emergency department utilisation

	Model and period		
	1 (2007–2008)	2 (2008–2009)	3 (2007–2009)
Registered lone-parent households, %	15.12	—	—
Index of Multiple Deprivation	—	14.74	6.128
On incapacity benefits,	—	–33.84	—
Constant	82.08	–12.43	13.478
P-value	0.000	0.043	0.000
R	0.602	0.772	0.692
R^2	0.362	0.596	0.479

explain the differences in potentially avoidable emergency department attendance patterns across GP practices; it is not possible to say that, in Brent, patients registered to GP practices that have poor access are more likely to self-refer to emergency departments than patients that are registered to GP practices that have good access. This study has examined multiple parameters of access and none of these were found to correlate well with potentially avoidable ED attendance. It can be concluded from this that increasing GP access so that emergency department utilisation can be reduced is a policy that is founded on weak or little evidence. While increasing GP access might be a sound policy for other reasons, for example, to improve patient satisfaction, increasing access to primary care services might not be the correct lever to impact on potentially avoidable emergency department attendance.

Although the mechanism is unclear, the principal lever to reduce emergency department attendance seems to be underlying deprivation, at the borough level. It was found that the main predictive factor for emergency department utilisation was the IMD scores for the GP practice, accounting for up to half of the variance in emergency department utilisation in the borough as a whole.

Strengths and limitations

This small descriptive, analytical study has several limitations. First, it is limited by the quality of the data. The researchers were able to obtain detailed information on characteristics relating to access to GP practices, particularly structural aspects such as the number of full-time GPs and opening hours per week. However, the remaining access variables were obtained from the GP Patient Survey.[22] This is a survey only of patients that have visited the GP practice in the previous 6 months, which by definition means that they have successfully accessed primary care. A selection bias would have been introduced into the study, that is, GP practices would have spuriously high access scores and this is likely to have skewed the study results, although it is difficult to say in which direction. Nonetheless, no evidence was found of a relationship between access and emergency department attendance.

Secondly, data on out-of-hours primary care services, NHS Direct, or the private sector have not been included and the study has not therefore explored whether patients who have difficulty accessing their GP practice seek advice from sources other than the emergency department.

Thirdly, the study dataset was constructed based on emergency department attendances that were registered to a GP, and therefore it was not possible to include emergency department attendances that were not linked to a GP practice. Approximately 10% of emergency department attendees are not registered with a GP,[23] and so, for example, it was not possible to specifically explore the impact of Brent's homeless population on emergency department use. A further 10% do not provide the name of their GP when attending the emergency department. Some selection bias may have been introduced.

Finally, this is an observational study with the usual concerns around ecological fallacy. While an association has been found between IMD and emergency department utilisation, it is not possible to comment on whether this is causal, or whether those individuals that attended emergency departments were from areas with high IMD scores. Brent is fairly uniformly deprived, which may mean that the impact of IMD is underestimated in other areas. Equally, GP practice characteristics are not necessarily reflective of individual GPs, and the study data provide no insight into continuity of care in GP practices, which is very likely to impact on readmission and repeat attendances.

Comparison with existing literature

Much of the existing research commonly uses hospital admissions as the dependent variable;[14–16] however, a hospital admission presupposes that there is legitimate clinical need, and those that require acute medical care would end up there anyway, whether seen first by a GP or not. In order to understand the relationship between primary care access and hospital utilisation, it is necessary first to understand its

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Competing interests

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relationship with avoidable, self-referred emergency department attendances, as these could have potentially been dealt with at the primary care level.

This study focused on avoidable emergency department attendances by using only self-referrals that did not result in admission, transfer, or death, and has drawn on multiple dimensions of primary care access in a more detailed analysis. Although it is small, it has the benefit of being informed by detailed locally-relevant data that have not been aggregated to any level higher than the GP practice.

Implications for research and practice

The findings of this study do, however, suggest that the levers to reduce unnecessary emergency department attendance are not at the level of primary health care, but at the level of the broader social determinants of health. The IMD is a multi-indicator set based on several domains — income, employment, health and education, deprivation, barriers to housing, living environment deprivation, and levels of crime. Areas with high deprivation levels in London are usually those with high migrant populations. It could be argued that migrant groups are confounding the relationship between IMD and emergency department utilisation. These groups may have greater difficulty registering with or using GP practices, or even have a cultural preference towards large tertiary centres.[23] However, the broad implication for policy and research is that policies that simply focus on increasing opening hours alone are potentially blunt instruments; a patient's ability to get through on the phone, or to see a preferred GP, may be more important than the GP service's opening hours. Furthermore, it may impact little on the populations' use of emergency department services.

The majority of emergency department visits were by patients that visit an emergency department only once or twice per year. The authors consider that broad-brush health service interventions might not impact on the health-seeking behaviour of this majority. Targeting the so-called frequent attenders might be beneficial; however, in the present study it was found that in 2007–2008, only 4576 emergency department attendances (4.8% of the total) were accounted for by just 577 individuals utilising tertiary care more than six times in the year. The figure for 2008–2009 was not statistically different (4091 attendances, 5.2%). Grouping these frequent attenders by GP practice may help to identify ways to change health-seeking behaviour; however, this is unlikely to impact greatly on the overall use of emergency departments. Finally, this study shows that there may be scope for developing some predictive modelling at the cluster level, to support GP practices and commissioners of health services in identifying areas of strategic importance.

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