A comparison of research general practices and their patients with other practices — a cross-sectional survey in Trent

Vicky Hammersley, Julia Hippisley-Cox, Andrew Wilson and Mike Pringle

SUMMARY

Background: *When interpreting results of studies undertaken by research networks we need to know how representative volunteer practices and their registered patients are of the total population of practices and patients in their locality.*

Aim: *To compare the following in research and non-research general practices in one region: practice and population demography, morbidity and mortality, selected performance indicators, and health outcomes.*

Design of study: *Cross-sectional survey.*

Setting: *Sixty-six Trent Focus Collaborative Research Network general practices and 749 other general practices in Trent, United Kingdom.*

Method: *Practice characteristics and GP contract data were obtained from the NHS Executive, Quarry House, Leeds. The Trent Regional NHS Hospital Admission Database was searched to identify all relevant admissions to hospital from all practices between 1 April 1993 and 31 March 1997. Ward-linked data on cancer were obtained from the Trent Cancer Registry.*

Results: *Of the 815 general practices in Trent Region in the study period, 66 (8%) were in the Trent Focus network. They were more likely to be involved in training GPs and to have a female partner. They tended to be larger, with fewer single-handed doctors and younger GPs. Network practices prescribed a higher proportion of generics (median % prescribed/practice = 70%, versus 51%, Mann–Whitney U = 1615, P<0.0001). There were no clinically important differences between hospital admission rates between the two groups or waiting times for surgical procedures. There was no difference in the incidence of cancer and standardised mortality ratios related to the electoral wards of the GP surgery.*

Conclusion: *Although there were differences in practice structure and some aspects of performance, we found no important differences in the demography of registered patients, nor in morbidity, mortality, or access to or use of secondary care.*

Keywords: *primary care research networks; representativeness; generalisability.*

V Hammersley, BSc, research network co-ordinator, Trent Focus; J Hippisley-Cox, MD, MRCP, MRCGP, senior lecturer in general practice; and M Pringle, MD, FRCP, FRCGP, professor of general practice, Division of General Practice, University of Nottingham. A Wilson, MD, FRCGP, Trent Focus regional co-ordinator and reader in general practice, Department of General Practice and Primary Health Care, University of Leicester.

Address for correspondence

V S Hammersley, Division of General Practice, 13th Floor, Tower Building, University of Nottingham, Nottingham NG7 2RD. E-mail: vicky.hammersley@nottingham.ac.uk

Submitted: 29 June 2001; Editor's response: 7 September 2001; final acceptance: 11 December 2001.

Introduction

RESEARCH general practice networks are one of the key developments in the drive to increase research capacity in primary care.[1] There are currently more than 30 primary care research networks in the United Kingdom (UK). Although their detailed aims and organisations differ, a core objective is to conduct generalisable research.[2,3] To realise this objective, research practices need to be representative in terms of population demography, morbidity, and mortality and use of primary and secondary care services.[4,5] There is some evidence that UK research general practices differ in structure from other general practices. This may be owing to the selection criteria for their recruitment.[6] A study from New Zealand found that research practices were broadly similar in terms of morbidity but differed in process measures, such as use of secondary care services and uptake of immunisation.[7] There is no comparable evidence for the representative nature of research network general practices in the UK. As nearly all of the UK research networks are funded from NHS Research Funds, this is an important issue.

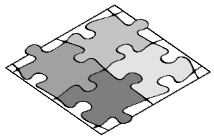
The Department of Health has proposed a number of performance indicators in *The new NHS: modern, dependable*[8] and *Quality and performance in the NHS: a summary of high level performance indicators*,[9] although the validity of these measures in assessing quality of care has been questioned.[10] Our study compares research practices with non-research practices in one NHS region in terms of practice and population demography, morbidity and mortality, performance indicators, and health outcomes.

Method

Approval for the study was received from Trent Multi-Centre and Local Research Ethics Committee. The setting for this study was practices recruited to the Trent Focus Collaborative Research Network, established in 1997. All practices in Trent were invited to apply to join the network and 66 practices were chosen, based on the following criteria: (a) minimum levels of chronic disease and lifestyle recording on computer (for example, more than 50% of adults with a blood pressure recording in the past five years); (b) at least one general practitioner (GP) interested in collaborating in research; and (c) a willingness to collaborate in at least one research project a year. When recruiting practices a representative geographical spread was achieved, with a similar proportion of practices covering rural, urban, and inner-city areas within the Trent Region.

All 815 practices in the Trent Region on 1 April 1998 were identified. Practice characteristics and GP contract data were obtained from the NHS Executive, Quarry House,

HOW THIS FITS IN



What do we know?

There is limited information on how generalisable are the research findings from studies done using primary care research networks to other primary care settings.

What does this paper add?

This is the first time that a UK research practice network has been assessed in this way and we found no important differences in the demography of registered patients, nor in morbidity, mortality, or access to or use of secondary care in one network in Trent. These findings should be encouraging to those who want to work with a research network, either on epidemiological studies or health services research involving secondary care.

Leeds. All relevant admissions to hospital from all practices between 1 April 1993 and 31 March 1997 were identified by searching the Trent Regional NHS Hospital Admission Database. The International Classification of Disease 9 and 10 codes were used to identify these admissions. Teenage pregnancies were identified using the method published elsewhere.[11] Prescribing data were requested from ten individual health authorities (South Humber was excluded as it was not in the Trent Region in our data collection period).

Practice and population demography

The proportion of practices that were single handed, involved in GP training, dispensing, providing personal medical services (PMS), and rural were compared. The sex and mean age of GPs, mean practice list size, mean number of patients per whole time equivalent (wte) GP and per wte practice nurse were compared, together with the age–sex structure of the practice populations. The Carstairs' Rurality Score linked to the electoral ward of the GP surgery postcode[12] was also compared. The Townsend score associated with the electoral ward of the GP surgery was chosen for the main analysis, as it most closely adheres to the concept of material deprivation.[13] Reliable patient data on deprivation were unobtainable.

Assessment of performance and health outcome measures

Performance/outcome measures recommended by the NHS Executive[8,9] were selected, which were measurable using routinely available data. Data for deaths linked to general practice other than those occurring during inpatient admissions were inaccessible. The indicators/outcome measures have been grouped under the published headings.[8,9]

Published headings

(a) Health improvement. 'Admission and operation rates for cancer of the lung, bowel, breast, prostate, and colon'. The incidence of each type of cancer was compared using the number of new registrations for the electoral ward in which the surgery was located, using data supplied by the Trent Cancer Registry. This was used as a proxy, as cancer registrations by individual general practice were not available.

(b) Effective delivery of appropriate health care. The following were compared:

- *'Disease prevention and health promotion'*. The proportion of practices that achieved target payments for immunisations, school boosters, and cervical cytology for three successive quarters in 1998/1999.
- *'Inappropriate surgery'*. Operation rates for dilatation and curettage (D&C) in women under 40 years old; operation rates for grommet surgery.
- *'Avoidable admissions'*. Admission rates for ear nose and throat (ENT) infections; urinary tract infections (UTI) including pyelonephritis and renal abscess and congestive cardiac failure (CCF).
- *'Chronic care management'*. Admission rates for asthma, diabetes, and epilepsy.
- *'Cost effectiveness prescribing composite'*. Net ingredient cost per prescribing unit (NIC/PU) of combination products, modified release products, drugs of limited clinical value and net ingredient cost/defined daily dose (NIC/DDD) of inhaled steroids.

(c) Fair access. Surgery rates and waiting times (time from deciding to operate to date of operation) were compared for the following operations:

- coronary artery bypass grafts (CABGs);
- percutaneous transluminal coronary angiography (PTCA);
- hip replacement over the age of 65 years;
- knee replacement over the age of 65 years; and
- cataract surgery.

(d) Health outcomes. The following rates were compared:

- teenage pregnancy rates from 13 to 19 years of age;
- admissions resulting in death from stroke from 35 to 64 years of age;
- admissions resulting in death from coronary heart disease CHD at under 65 years of age; and
- admissions resulting in death from myocardial infarction within 30 days of admission.

(e) Efficiency. Percentage of generic prescribing was compared.

Statistical analysis

Although all practices in Trent were included in the study, significance tests were used as our study represented a sample in time. We calculated the ratio of the admission rates, waiting times, prescribing rates, and screening and immunisation rates between research and non-research practices. A rate ratio of over 1 indicates, for example, a higher admission rate in research practices compared with non-research practices. The χ^2 test was used for differences in categorical data and Mann–Whitney U or Student *t*-tests were used, depending on the distribution of the data. It was decided that a difference of more than 10% in admission

rates and waiting times between research and non-research practices would be clinically important and a *P*-value of 0.01 would make that difference statistically significant. A significance value of 0.01 (two-tailed) was selected, since a large number of variables were examined.

Results

On 1 April 1998, 66 out of the 815 (8.1%) practices in the Trent Region were in the network. In total, there were 2307 GPs in the non-network practices and 285 GPs in the network practices. Of the 4.9 million patients registered with practices in Trent, 10.0% were registered with a network practice. The network practices were spread across 62 wards and 35 Primary Care Groups/Trusts.

Table 1 shows the comparison between the practice and population characteristics. Network practices were more likely to be involved in training GPs and to have a female partner. The GPs tended to be younger and the network practices tended to be larger with fewer single-handed doctors. There were no other significant differences for the structural characteristics.

Table 2 shows the median rates of admission per 10 000 patients for the four-year period 1 April 1993 to 31 March 1997. There were no significant differences between the admission rates of the two groups. Although network practices had a 12% higher admission rate for grommets, this did not reach the $P<0.01$ significance level ($P = 0.04$). There was also a greater than 10% difference for a number of other admissions; for example, lung cancer surgery, asthma admissions, PTCA admissions, and death rate from stroke in patients aged 35 to 64 years, although again none reached the $P<0.01$ significance level.

There were no significant differences in waiting times for surgical operations in the study period as shown in Table 3. The screening and immunisation targets are shown in Table 4. While more network practices achieved the higher targets, this was not statistically significant at the $P<0.01$ level. There was no difference in the incidence of cancer and standardised mortality ratios related to the electoral wards of the GP surgery (Table 5). Prescribing data were provided from only four out of 11 health authorities in the Trent Region. There was no difference for cost-effectiveness or quality prescribing indicators between network and non-network practices, except that network practices prescribed a higher proportion of generics (median % prescribed/practice = 70%, versus 51%, Mann–Whitney U = 1615, $P<0.001$).

Discussion

There are some important limitations to this study. First, only one health region (Trent) was looked at in the UK and so its generalisability to other regions may be limited. However, the Trent region appears to be representative of the country as a whole in terms of practice and sociodemographic characteristics.[14] Secondly, practices have been assigned to ward characteristics as relevant data were not available at practice level. However, this applies to the network practices and non-network practices so it is not suspected that any important biases have resulted. The Department of Health indicators have been used; these are more frequently used by health authorities and Trusts and are considered to be most applicable to primary care. Many have argued that this indicator set is not necessarily relevant;[10,15] however, these data are currently available and were the most appropriate that could be found for this comparison. The data is from the Trent Regional NHS Hospital Admission Database is for the period 1 April 1993 and 31 March 1997 and data from Quarry House is from 1998. This data may now be old but it was the latest data available at the time of this study.

We examined how far research practices and their patients are representative of the total population. This covered a spectrum of data; at one end aspects over which the practice had high control (for example, list size) and, at the other end, aspects over which the practice has no control (for example, deprivation levels). Between these extremes

Table 1. Practice and population characteristics. Numbers are counts and percentages unless otherwise specified.

	Trent Focus practice				*P*-value
	Yes		No		
	Number (n = 66)	Percentage (SD)	Number (n = 749)	Percentage (SD)	
Characteristics of practice					
Single handed practice	6	9.1	203	27.1	0.002
Approved GP trainer in practice	34	51.5	139	18.6	<0.0001
VTS course organiser in practice	3	4.5	22	2.9	0.47
PMS pilot by 1999	3	4.5	12	1.6	0.07
Rural practice (Carstairs Rurality Score)	17	25.8	174	23.2	0.6
Practice with a female partner	56	84.8	432	57.7	<0.0001
Dispensing practice	17	25.8	135	18.0	0.12
Mean Townsend score for electoral ward of surgery postcode (n = 746)	1.57	(3.44)	1.76	(3.71)	0.74
GP and nurse details					
Mean age of GPs	42	(4.1)	46	(7.3)	<0.0001
Mean practice list size	7418	(3609)	5856	(3894)	<0.0001
Mean number of patients per wte GP 2000	(490)	2122	(614)	0.04	
Mean number of patients per wte practice nurse	4809	(1539)	5515	(3813)	0.34
Population details					
Percentage of total population under five years old	5.9		5.8		0.92
Percentage of total population over 75 years old	7.6		7.4		0.43

Table 2. Median rate of admissions per 10 000 patients between 1993 and 1997.

	Trent Focus practice				Ratio of research to non-research practices	*P*-value
	Yes		No			
	Median rate	25th/75th centile	Median rate	25th/75th centile		
Health improvement						
Colon cancer	28.47	18.3/48.6	25.10	12.6/46.2	1.13	0.14
Colon cancer surgery	6.55	3.7/9.1	5.80	2.9/9.2	1.13	0.33
Breast cancer	46.65	31.3/69.7	47.00	25.6/71.2	0.99	0.66
Breast cancer surgery	14.56	10.5/18.9	14.30	8.8/20.2	1.02	0.96
Lung cancer	39.37	25.4/55.5	41.90	23.9/59.9	0.94	0.72
Lung cancer surgery	0.99	0.0/2.91	1.30	0.0/3.0	0.76	0.42
Prostate cancer	6.29	3.0/9.4	5.44	2.1/9.9	1.16	0.36
Prostate cancer surgery	6.29	3.0/9.4	5.40	2.1/9.9	1.16	0.75
Chronic care management						
Asthma	52.05	36.2/71.2	54.84	32.8/80.5	0.95	0.41
Epilepsy	28.39	16.8/40.2	23.20	13.9/37.6	1.22	0.33
Diabetes	32.95	20.7/48.3	32.70	19.9/51.3	1.01	0.90
Avoidable admissions						
ENT infections	27.11	21.8/39.4	28.30	17.9/39.9	0.96	0.54
UTI, renal abscess, and pyelonephritis	29.00	16.0/40.0	20.0	10.0/34.0	1.45	0.72
Congestive cardiac failure	63.32	47.6/82.8	65.54	47.8/89.3	0.97	0.30
Inappropriate surgery						
Grommet	30.09	22.5/41.8	26.90	17.4/37.6	1.12	0.04
D&C in women under 40 years of age	9.0	4.0/16.0	6.0	2.0/12.0	1.5	0.53
Fair access to services						
Knee surgery rate for over 65-year-olds	14.57	9.5/21.2	13.90	7.8/20.3	1.05	0.38
Hip surgery rate for over 65-year-olds	18.07	12.5/23.6	17.15	9.5/25.6	1.05	0.66
Cataract surgery	100.39	80.4/120.7	101.00	75.3/133.5	0.99	0.60
CABG	10.90	7.0/13.6	10.03	5.8/15.1	1.09	0.60
PTCA	3.70	1.4/8.1	5.15	1.9/10.0	0.72	0.16
Health outcomes						
Teenage pregnancy rate for 13 to 15-year-olds	1.66	0.0/2.7	1.01	0.0/2.93	1.64	0.33
Death rate from myocardial infarction within 30 days of admission	11.52	6.9/16.7	12.03	6.8/17.8	0.96	0.66
Death rate from coronary heart disease for under 65-year-olds	1.99	0.0/3.1	1.45	0.0/3.45	1.37	0.49
Death rate from stroke for 35 to 64-year-olds	1.53	0.0/3.0	1.48	0.0/3.38	1.03	0.61

Table 3. Median waiting time (days) for operations between 1993 and 1997.

	Trent Focus practice				Ratio of research to non-research practices	*P*-value
	Yes		No			
	Median	25th/75th centile	Median	25th/75th centile		
Breast cancer	16.3	12.8/20.3	14.7	12.0/18.7	1.11	0.03
CABG	128.8	86.0/173.8	127.0	86.9/182.6	1.01	0.99
Cataracts	177.1	147.8/225.6	175.5	148.4/222.9	1.01	0.86
Colonic cancer	16.2	12.2/19.8	15.7	12.0/21.8	1.04	0.76
D&C	54.8	32.3/77.1	53.0	35.3/74.3	1.03	0.97
Grommet	88.9	59.3/129.9	82.3	57.5/118.7	1.08	0.15
Knee surgery for over 65-year-olds	238.8	170.0/311.9	250.9	181.3/314.5	0.95	0.66
Hip surgery for over 65-year-olds	218.1	171.6/267.6	208.7	154.0/262.4	1.05	0.42
Lung cancer	15.0	9.0/23.0	17.0	10.0/27.0	0.88	0.41
Prostate cancer	68.7	35.0/108.3	55.7	32.4/99.7	1.23	0.34
PTCA	57.6	34.5/105.8	67.0	35.3/116.5	0.86	0.34

Table 4. Percentage of practices achieving higher screening and immunisation targets between 1998 and 1999.

	Trent Focus practice						*P*-value
	Yes			No			
	Number of practices with data	Number achieving target	Percentage	Number of practices with data	Number achieving target	Percentage	
Cervical cytology	41	41	100.00	496	459	92.54	0.07
Immunisation for under one-year-olds	51	50	98.04	639	564	88.26	0.03
Pre-school booster	41	35	85.37	526	357	67.87	0.02

Table 5. New cancer registrations per 10 000 patients and standardised mortality ratios in associated electoral ward between 1993 and 1997.

	Trent Focus practice				Ratio of research to non-research practices	*P*-value
	Yes		No			
	Median	25th/75th centile	Median	25th/75th centile		
Incident cases of cancer						
Breast cancer	56.1	43.1/71.6	55.4	44.9/67.4	1.01	0.89
Colon cancer	28.8	21.8/36.0	29.0	23.7/34.5	0.99	0.93
Cervical cancer	6.1	3.0/10.1	5.5	3.0/8.6	1.10	0.33
Lung cancer	35.4	28.5/45.9	36.6	28.3/45.9	0.97	0.74
Prostate cancer	32.1	22.9/45.3	32.2	25.2/41.3	1.00	0.82
Standardised mortality ratio						
Accidents	127.7	44.8/172.4	94.6	52.4/152.3	1.35	0.22
All deaths	105.2	94.4/123.9	109.5	93.9/124.8	0.96	0.69
Coronary heart disease	110.7	87.9/129.0	104.8	86.46/125.3	1.06	0.31
Lung cancer	109.3	72.7/128.9	105.3	72.1/139.7	1.04	0.43
All cancers	104.1	92.8/122.0	104.3	89.2/118.5	1.00	0.46
Respiratory disease	95.2	68.7/129.6	108.0	77.6/140.2	0.88	0.09
Stroke	112.6	82.9/146.0	117.3	81.8/154.4	0.96	0.56

are measurements of health where the practice, secondary care provision, and population characteristics contribute to variance. For example, the practice organisation might make an important impact on immunisation rates but is unlikely to significantly impact on incidence of lung cancer.

Giuffrida *et al*[10] have recently emphasised the differences between health outcomes and performance indicators, suggesting that the latter should be confined to measures for which the relevant provider of care can reasonably be held to account. They demonstrated that admission rates for chronic conditions are unstable and seriously affected by confounders, making them questionable markers of quality in primary care. The same could be argued for many of the other comparisons presented in this paper.

The results of the study are similar to a study conducted in New Zealand.[7] They show that research practices differ from others in some aspects of their structure (notably size) and performance (notably generic prescribing). We did not seek to collect any data from practices directly. As well as being resource intensive, this approach would introduce biases as, by definition, research practices would have better quality accessible data. The comparison was limited to data that were routinely collected, either by practices for contractual purposes or by secondary care for monitoring. It was not possible to examine, for example, management of chronic diseases such as hypertension and diabetes, which are largely in the control of practices.

No important differences were found in the demography of registered patients, nor in morbidity, mortality, and access to or use of secondary care. This is the first time a UK research practice network has been assessed in this way. Although research networks may emerge in a variety of ways, it is likely that the sorts of practices that are members of the Trent Focus Collaborative Research Network are similar to the sort of practices in other research networks.

These findings should be encouraging to those who want to work with a research network, either on epidemiological studies or health services research involving secondary care. However, studies involving practice-based interventions; for example, to improve health promotion or the management of chronic disease, may have difficulty generalising results from a research practice network to other practices.

References

1. Mant D. *R&D in primary care*. London: Department of Health, 1997.
2. UK Federation of Primary Care Research Networks and Allied Organisations. *The Directory*. 2000.
3. Griffiths F, Wild A, Harvey J, Fenton E. The productivity of primary care research networks. *Br J Gen Pract* 2000; **50:** 913-915.
4. Driver B, Britt H, Harris M, *et al*. How representative are patients in general practice morbidity surveys? *Fam Pract* 1991; **8:** 261-268.
5. Green LA, Miller RS, Reed FM, *et al*. How representative of typical practice are practice-based research networks? A report from the Ambulatory Sentinel Practice Network. *Arch Fam Med* 1993; **2:** 939-949.
6. Smith LFP. Research general practices: what, who and why? *Br J Gen Pract* 1997; **47:** 83-86.

7. Tilyard MW, Dovey SM, Spears GFS. Biases in estimates from the RNZCGP computer research group. *NZ Med J* 1995; **108:** 118-121.
8. NHS Executive. *The new NHS — modern, dependable: a national framework for assessing performance*. London: Department of Health, 1998.
9. NHS Executive. *Quality and performance in the NHS: summary of high level performance indicators*. London: Department of Health, 1999.
10. Giuffrida A, Gravelle H, Roland M. Measuring quality of care with routine data: avoiding confusion between performance indicators and health outcomes. *BMJ* 1999; **319:** 94-98.
11. Hippisley-Cox J, Allen J, Pringle M, *et al*. The association between general practice characteristics and teenage pregnancy rates: cross-sectional survey in Trent 1994-1997. *BMJ* 2000; **320:** 842-846.
12. Carstairs V, Morris R. *Deprivation and Health*. 1st Edition. Aberdeen University Press, 1991.
13. Morris R, Carstairs V. Which deprivation? A comparison of selected deprivation indexes. *J Public Health Med* 1991; **13(4):** 318-326.
14. Department of Health. *General Medical Statistics: England and Wales*. Leeds: NHS Executive, 1994.
15. Roland, M. General practice in an age of measurement. *Br J Gen Pract* 2001; **51:** 611-612.

Acknowledgements

We thank Janine Milligan of the Leicestershire Health Authority for piloting the data collection from Health Authorities, and to the following Health Authorities for providing prescribing data: Leicestershire, North Derbyshire, Rotherham and Sheffield. We thank Quarry House for providing the practice characteristics and GP contract and to Andy Nicholson and Howard Chapman who helped provide all relevant admissions to from the Trent Regional NHS Hospital Admission Database. We thank Carol Coupland for her statistical input and commenting on the paper. This research was funded by NHS Executive, Trent.

Competing interests

Vicky Hammersley, Andrew Wilson and Mike Pringle are part of the Trent Focus Group. Julia Hippisley-Cox uses the network for her research.