Geographical Mobility of General Practitioners

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Introduction

A major component of the rural health problem is the lower availability of services for rural dwellers (Craig 1993). While this paper examines general practitioners, the analysis and results may be relevant to other professionals. Solving this problem requires addressing two issues: increasing supply, and decreasing attrition. The water tank, with its level affected by past history and the relationship between inflow and outflow is an analogy with which all rural people are familiar.

In recent years much work has been performed in Australia and overseas to examine these issues. Surveys of current rural practitioners have shown that they are more likely to be male, and Australian, but British and other overseas graduates are well represented among them. Many have extra training. Surveys of students and new graduates have shown the factors that lead or might lead to a career in rural medicine. They include rural origin, undergraduate or postgraduate training in rural areas, possession of or acquiring skills appropriate for rural areas, gender, origin and career of spouse (Strasser 1992; Piterman 1989; Kamien 1987 & Gill 1992 South Australian Report).

In consequence, these factors have been addressed by policy changes. They include preferential entry schemes for rural students, and during the course, more rural attachments, rural clubs, and teaching about rural medical issues. At the immediate postgraduate level, increased training is being funded through the Rural Incentive Package and available through the newly developing rural training units and the Faculty of Rural Medicine of the RACGP.

These are supply initiatives, but the attrition side has also been approached by a variety of public policy measures and incentives including the Rural Incentive program and the Rural Health, Support Education and Training program (RHSET). Most of these are recent, but the incentives in Queensland and in Western Australia have been in place much longer.

To retain doctors in rural towns, in Queensland the medical superintendents of small hospitals are paid a substantial salary and benefits to provide services at the hospital, while right of private practice in the community supplements this income. As part of the package, they now also have guaranteed locum relief. In Western Australia, in the Kimberley and Pilbara regions, medical officers are paid a salary including a substantial package of benefits, and do not bill patients.

Much of the work in Australia parallels that in North America, and elsewhere in the world. They too have found that characteristics of rural doctors include rural origin, medical education in a rural state, education focusing on family physicians, and rural location educational experiences. They have tried educational experiments, and shown positive relationships between rural training and initial rural placement of graduates.

Most studies are cross-sectional, looking at opinions or locations at one point in time. However, in recent work, Don Pathman of North Carolina makes an important caveat about methods (Pathman 1992). Cross sectional studies are at risk of making inappropriate conclusions because they include a range of people who have been in rural areas for varying periods of time - up to forty years. Conditions for choice were very different forty years ago -

and there has been attrition. Only the survivors, the bold, the brave, or the stupid, remain. Predictions from these, or even from those who have been in practice for ten or fifteen years, may have minimal relevance to current graduates.

Therefore, to examine how long different doctors stay, Don Pathman obtained an inception cohort, comprising those who first arrived at a given time, and then followed them in a time series analysis. His work has focused on an interesting sample - doctors who were working in federally funded clinics, usually serving the indigent, and Indian Health Services. These clinics have a high turnover of doctors. Almost half these doctors were serving in the National Health Service Corps, repaying student loans. The frequent rotation of doctors in these programs provides medical care with low continuity and reciprocal understanding between doctor and patients. It may not be generalisable to Australia, but is similar to the Queensland bond system, where students are subsidised during their undergraduate course, but then have to repay by services for a specified number of years thereafter.

Pathman found that various factors recognised as correlates (if not determinants) of recruitment do not predict retention. For example, rural upbringing is the strongest known predictor that a doctor will locate in a rural area after training, yet retention duration for doctors from rural origins was no longer. When physicians left these rural practices, a few might move to another rural area, but if they went to a city, they did not return to rural practice.

In another analysis, this time of non-NHSC doctors in community health clinics, which he presented at the United States National Rural Health Conference, he found that retention was predicted in sequence by:

Salary level
Retirement benefit packages
Feeling appreciated
On-call frequency (up to 2 vs more than 2)
Teaching students
Providing hospital services

These factors did not include the conventional predictors of rural choice. He concluded that retention of practitioners in rural medicine is likely to be affected by a separate set of factors from those which influence recruitment.

Given the possible implications of these problems for health workforce policy we need to examine these issues in the Australian context. Some of this work can use routinely collected data, rather than surveys and other annoying instruments. This paper explores the use of one such routinely collected set. Although it does not provide information on all the suggested factors relating to retention, it does provide a useful first look at some attributes of doctors, in the hope of stimulating further ideas and work.

From 1984 onwards, the Medicare data set has information on doctors - their specialty, their sex, place of graduation, practice location and amount of work undertaken. The register of practitioners can be linked to their Medicare billing. This data set has limitations, and care must be taken not to infringe privacy provisions which prevent identification of individual practitioners. That precaution will be taken in this analysis, where we will not show any table with cells of smaller than 3 members, and small modifications have been made to ensure totals sum correctly.

Using the Rural and Remote Area Classification (Department of Health, Housing and Community Services), doctors' records can be analysed to show how much they have moved over time, and which characteristics of themselves and their location are important in predicting movements.

We have, therefore, conducted exploratory analyses of this data set, asking:

How long do general practitioners stay in areas with the same regional classification?

Where do they move to?

What characteristics of the doctor or the place predict stability or movement?

Methods

Data Sets

Since the introduction of Medicare in 1984, the Medicare Provider File (formerly CROMP) has listed doctors who are eligible to render services that attract Medicare benefits. Each doctor has a provider number comprising a stem unique to that doctor and a variable practice location suffix. The data in this file has variable accuracy, and this has changed over time. In the early years of Medicare, there was a tendency for some group practices to bill in the name of one principal doctor, but with improved procedures the vast majority of services are now attributable to the doctor doing the work. For this study, all services rendered by a doctor were attributed to the practice location generating most Medicare fee for service income (major practice) and the postcode of that location was used to determine the doctor's RARA code. At the margin this distorts the analysis for those doctors whose activities straddle different RARAs, but this is the case for few GPs who, because of the nature of their work, tend to practise within a small geographic region. Locums will also produce some anomalies, but they are relatively few in number.

The Medicare Provider File contains limited information - it includes only basic demographic details and qualifications, and covers only those services attracting Medicare benefits. It excludes income derived from the Department of Veterans' Affairs, payments for sessional work in public hospitals, insurance and workers' compensation work and salary payments. Many of these sources of income are substantial for rural doctors in particular. Nonetheless, it gives a rough indication of the major component of income for most GPs, and therefore, should allow us to select them reasonably for our purpose, except in the special areas where salaried services predominate.

Definitions

The Department of Health, Housing and Community Services has a complex provider classification system which allocates each doctor to a category. In broad terms, GPs are those doctors who earn at least half their Medicare income from GP consultations.

General practitioners were classified, according to their total Medicare Schedule Fee income, into four groups: inactive, occasional, part-time and full-time. The groupings are to some extent arbitrary, but follow precedents which have been found useful for descriptive purposes. A doctor was regarded as active if there was any billing in the quarter. The threshold for part-time was $10,000, and for full-time was $42,000 in 1984 prices. These figures were progressively indexed and reached thresholds of $15,390 and $64,000 respectively for 1991-92.

Full-time equivalents for general practitioners are calculated as the sum of individuals above the full-time threshold plus the total income of those below the threshold divided by the mean Schedule Fee income of those above it.

Cohorts

A series of cohorts was established of doctors who became general practitioners in each of the financial years 1985/6, 1986/7 and 1987/8. The operational definition of entry to general practice was the first year that the doctor passed the threshold for full-time practice.

Results

We began by examining the current raw distribution of general practitioners by the RARA classification. We added population figures, so that population-doctor ratios can be calculated. Table 1 (over page) updates the previously described (Dickinson 1991) uneven distribution. Note that the doctor numbers and population estimates are from different years, but this will introduce only small errors in the ratios.

Table 2 includes some of the same figures, rearranged to show the differences between states. Part of this will be due to differences in the way some rural practitioners are remunerated in Western Australia, Queensland and the Northern Territory. Services delivered by salaried

doctors do not register under Medicare, so care must be taken in interpreting both the doctor population ratio, and any change over time.

Table 1: Doctor Population Ratios by State and RARA Classification

State	Region	Population	GPs Casual	PT	FT	Total	FTE	Pop/GP	Gr per 10,000
NSW	Capital City	3,656,543	1455	972	3164	5591	3416.4	1070.3	93.4
	Other Urban	572,877	137	105	450	692	475.7	1204.4	83.0
	Rural Major	988,554	178	177	726	1081	770.8	1282.5	78.0
	Rural Other	520,262	57	72	302	431	321.0	1620.6	61.7
	Remote Major	21,962	10	3	14	27	15.0	1461.2	68.4
	Remote Other	66,652	13	9	30	52	32.4	2059.8	48.5
State Total		5,826,850	1850	1338	4686	7874	5031.3	1158.1	86.3
VIC	Capital City	3,080,881	1257	805	2387	4449	2594.0	1187.7	84.2
	Other Urban	149,998	50	27	108	185	114.4	1311.3	76.3
	Rural Major	359,155	98	96	286	480	310.0	1158.6	86.3
	Rural Other	727,682	106	90	400	604	424.7	1713.6	58.4
	Remote Major	41,479	3	3	23	29	23.6	1755.8	57.0
	Remote Other	20,627	4	*	15	19	15.1	1364.5	73.3
State Total		4,379,822	1518	1029	3219	5766	3481.8	1257.9	79.5
QLD	Capital City	1,301,658	641	408	1113	2162	1219.1	1067.7	93.7
	Other Urban	569,616	224	145	569	938	605.7	940.4	106.3
	Rural Major	382,309	58	62	257	377	272.8	1401.2	71.4
	Rural Other	540,979	76	57	231	364	246.2	2197.6	45.5
	Remote Major	23,935	9	*	9	18	9.4	2550.3	39.2
	Remote Other	87,241	16	9	34	59	36.1	2413.9	41.4
State Total		2,906,778	1024	681	2213	3918	2239.4	12165.6	8.2
SA	Capital City	1,049,843	462	322	931	1715	1016.7	1032.6	96.8
	Rural Major	143,624	25	21	103	149	108.8	1320.4	75.7
	Rural Other	195,609	25	32	134	191	141.5	1382.7	72.3
	Remote Major	12,828	*	4	10	14	10.8	1191.3	83.9
	Remote Other	37,217	4	4	22	30	23.2	1605.9	62.3
State Total		1,439,121	516	383	1200	2099	1300.9	1106.3	90.4
WA	Capital City	1,193,059	508	304	852	1644	933.8	1277.6	78.3
	Rural Major	119,131	23	20	108	151	112.7	1057.1	94.6
	Rural Other	171,010	15	12	86	113	88.7	1929.0	51.8
	Remote Major	76,060	30	20	34	84	39.0	1952.5	51.2
	Remote Other	74,565	12	7	25	44	27.1	2751.8	36.3
State Total		1,633,825	588	363	1105	2056	1201.2	1360.1	73.5
TAS	Capital City	183,537	71	77	161	309	180.1	1018.8	98.2
	Other Urban	93,514	20	26	85	131	91.9	1017.7	98.3
	Rural Major	68,325	10	8	50	68	51.8	1320.0	75.8
	Rural Other	84,768	13	20	45	78	50.9	1665.4	60.0
	Remote Other	26,489	6	5	15	26	16.5	1604.7	62.3
State Tota		456,633	120	136	356	612	391.2	1167.3	85.7
NT	Capital City	73,291	46	29	47	122	54.4	1346.9	74.2
	Rural Other	8,552	5	*	*	5	1.1	7605.2	13.1
	Remote Major	31,495	16	5	13	34	13.3	2373.2	42.1
	Remote Other	43,466	31	19	11	61	15.4	2825.3	35.4
NT Total		157,277	98	53	71	222	84.2	1868.0	53.5
ACT	Capital City	284,018	129	84	193	406	215.0	1320.9	75.7
ACT Total		285,077	129	84	193	406	215.0	1325.8	75.4
Gr Pop ratio whole Australia									
	Capital City	10,822,830	4569	3001	8848	16418	9629.7	1123.9	89.0
	Other Urban	1,386,005	431	303	1212	1946	1287.6	1076.4	92.9
	Rural Major	2,061,098	392	384	1530	2306	1626.9	1266.9	78.9
	Rural Other	2,249,921	296	291	1199	1786	1274.0	1766.0	56.6
	Remote Major	207,759	70	34	102	206	111.0	1871.1	53.4
	Remote Other	356,257	85	54	152	291	165.8	2149.0	46.5
Australia#		17,085,383	5,843	4,067	13,043	22,953	14,095	1212.2	82.5

Note: # Population figure does not add to total due to missing regions.
Some figures have been deleted because of small numbers.
* Adjacent figures have been adjusted to ensure row and column total are correct.
. FTE = Full Time Equivalent, calculated as described
. Estimated population figure as at 1990 June.
. GPs number as September quarter 1992.

Table 2:Distrubution of Doctors by States and RARA Classification Rates per 1000/00

State	Cap City	Other Maj Urban	Rural Centres	Rural Other	Remote Centre	Remote Other
NSW	90.8	81.9	66.7	64.4	73.2	52.9
VIC	74.9	82.7	76.8	63.8	51.6	55.7
QLD	99.7	89.8	73.7	60.4	93.2	49.5
SA	89.1		66.4	74.1	79.8	66.3
WA	77.1		94.2	61.0	54.2	25.4
TAS	80.2	84.7	65.4	66.4	110.6	49.5
NT	81.8			24.5		35.6
ACT	84.5					

Prior to computing the changes between regions, we checked the proportion of doctors who transfer between states. Since they are few, interstate movement does not interfere with our analysis.

When we examined changes of location over time (data not shown), there was a progressive change in doctors in each area, as we would expect - with rural and remote 'other' areas having the largest movement. But the total set of doctors present in any one year is a mixed group. When we examined the new doctors who went into practice in each year thereafter, we found a different series of slopes, all very similar. The numbers dropped off quickly over the first year or two, then stabilised. We presume this occurs because of itinerants who try locum work in various areas for short periods befor settling down to their planned lifetime work. This shows the need to examine inception cohorts, to find what happened after people went to their first major location of work.

Consequently we developed a series of inception cohorts. For the purposes of our analysis, we wished to follow them over five years, so we chose the entrants to general practice in the financial years 1986-86, 1986-87, 1987-88 and 1988-89, with the idea of following them for five years.

The intakes were 290, 690 and 870 in each of these three years. Basic descriptive analyses of these groups show that they are similar to one another, and different from the characteristics of the doctors who enrolled initially (prevalence group). Because of the definition and the beginning of Medicare, there may be an edge effect which accounts for the lower apparent number in the first year. To obtain sufficient numbers for analysis, these groups were combined.

Cohort members as defined mostly stayed in their original location over five years, but as expected, the more rural their initial practice, the less likely they were to remain there. Movement was mostly inwards to the cities, but a substantial number were also 'lost' to this system - which may have occurred because of retirement, death, emigration, moving into salaried or specialised practice.

Characteristics of cohort members according to where they established themselves, and how many remained at the end of five years are readily identified. Slightly fewer females went to rural areas initially, but the attrition was similar to that of males. Most of the cohort was young (less than 35 years), but age did not seem to affect the proportion entering each stratum of rural areas.

Most graduates established themselves in capital cities and other major urban areas. This proportion was lower for New Zealand graduates and those from the United Kingdom or Ireland, while it was higher for those from Asian countries. The proportions going to the rural areas were complementary to the city figures. Overall, more of the New Zealand and UK/Ireland group (English Speaking Background, ESB) were 'lost' to the system at the end. The absolute numbers in rural and remote areas from any of these groups were small and Australian graduates comprised 76.8%, 78.1% and 76.7% respectively of the three strata initially and 78.1%, 83.2% and 80.3% after five years.

Given the complexity and type of inormation we are using, the best method of adjusting for the effects of several different variables at once are multivariate logistic regression analyses - these were performed with the SAS statistics package. The location after five years was the dependent variable, divided into two groups: capital cities, other major urban, and rural major centres, against rural other and the two remote regions. The independent variables tested were age, time since primary qualification, sex, and country of primary degree.

Not surprisingly, the initial location is the best predictor for final location - being in an initial urban setting gives odds of 1:142 against finishing in a rural area. Gender is a predictor for initial location, but not for retention. Australian qualification predicts rural location both initially and after five years, while English speaking background is a slightly higher predictor initially, but may not be so for retention. Because of the small numbers the confidence intervals for this finding are wide. Younger age has a slight and non-significant effect for recruitment, and slightly higher for retention. The time since graduation may be a predictor of retention.

Discussion

The pattern of movement of rural doctors is important. If doctors stay relatively long periods, to increase their numbers will require new recruitment (increased inflow). On the other hand, in areas where they currently move rapidly, strategies to reduce turnover (turning off the tap) could be more effective than simply increasing recruitment, and possibly work in a shorter term.

This model is still being developed, so we should not make firm conclusions on the basis of the evidence yet. Indeed because of the limitations on the Medicare data set it can only give gross indications which must be supported by other data from more detailed studies. However, it has the advantages of high accuracy and of being universal, incorporating almost the total set of general practitioners in Australia, wherever they move, so there is no response bias.

Entry to general practice is not easy to define from the limited data available through Medicare data files. Large numbers of doctors do some part-time practice, either as their only paid work, or in addition to work paid by other means. In the career of a young doctor, many do a little part-time work while training as a resident, then spend time in a Family Medicine program post before going to a permanent location. Our operational definition therefore chose to define the entry to general practice as being the year when the doctor first earned more than the full-time threshold, and maintained it for at least one year. Some of the anomalies noted may occur because of the entry criteria. Amongst other problems, our cohorts would have included Australian doctors who made career change late in life, or those who have been away for a period, then returned, perhaps to the same location. The number of new graduates was about 1300 per year in that era, so one would expect a new intake of about 600 young graduates to general practice each year.

The method is limited, since it only allows us to measure location at two points, without knowledge of movement between. Following this would require more sophisticated methods than we have used to date.

With this data set we cannot examine the individual personal opinions and feelings of doctors, which are probably the most important factors that cause movement. However, it is clear that this type of analysis has the potential to be very powerful and helpful in understanding what is happening, and to suggest further lines of inquiry. We could include a variety of other factors which are distributed geographically, such as socioeconomic indicators from other data sets. We will continue this approach.

Distribution

Our initial results are interesting. Clearly general practitioners are distributed more extensively than specialists: few specialists of any sort practise in the rural other and remote other areas. Given the low number of specialists in rural areas and, therefore, the wider complexity of the work performed by general practitioners, one could well desire higher GP-patient ratios in rural areas - a forlorn hope?

The RARA classification has a high face validity, but is difficult to work on using continuous statistics since it is not a fully ordinal series: the category of 'remote centres' does not fit exactly in a sequence. With that exception, the overall turnover of doctors was higher the further outwards they are on the RARA classification. Turnover was relatively low for most areas, which suggests that policies to increase recruitment are the most important. In the remote areas turnover was higher, which sugggests that greater effect will be obtained from additional retention incentives directed to those regions.

Gender

Fewer female doctors go to rural areas but they remain at the same rate as males. We need to consider this carefully, since there is increasing consumer demand for not just any doctors but female doctors specifically. In the US, it was found that rural female doctors are largely married to other doctors, to a greater extent than in the cities (D'Elia & Johnson 1980). What is the situation here?

Foreign Medical Graduates

In New Zealand, Barnett has found that in response to immigration policies, foreign medical graduates go originally to the shortage areas, but the longer they are in New Zealand, the more likely they are to move to the desirable areas. Foreign graduates respond to the same incentives as locals do. In Australia, once in the country, there is no control over where immigrants may practise. Three quarters of all graduates went initially to the capital cities and major metropolitan areas, and remained there. The differences between foreign graduates from different origins may relate to ethnic grouping in the cities, and the type of recruits sought for rural areas.

In these three cohorts, the number of Australians in rural areas increased during the five years, which implies that some moved to rural areas after the year when they first earned above the full-time threshold. At the same time, 429 foreign graduates entered general practice, 91 doing so in a rural area. After five years only 71 (78%) of these were in rural practice. This number would include some of the original 93 and a few who moved from an initial location in urban areas. An increase of 100 (7%) in the number of Australians who chose to work in rural areas would have had greater long-term effect, while not increasing the social costs and Medicare outlays related to more doctors in the cities.

Conclusions

Trying to solve rural doctor shortages by importing doctors will fail if the underlying incentives remain as they are. Studies in New Zealand, Canada, and the United States, and experience in Australia show that producing an oversupply and waiting for diffusion outwards is unlikely to work unless the pressure of numbers is greater than has been tried yet. Given the likely distortions this will cause in the city it would appear far better to address the causes of poor distribution, but to do this we have to know what they are. At present, we have ideas and suggestions but no proof that changing them will make a difference. In the meantime, some policy initiatives have been taken on the best information we have: training and retraining, relocation grants, and some grants for special hardship posts. We will have to measure whether any one of these or their combined effect will make a difference.

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