

Retention in the British National Health Service of medical graduates trained in Britain: cohort studies

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ABSTRACT

Objective To report the percentage of graduates from British medical schools who eventually practise medicine in the British NHS.

Design Cohort studies using postal questionnaires, employment data, and capture-recapture analysis.

Setting Great Britain.

Subjects 32 430 graduates from all British medical schools in nine graduation cohorts from 1974 to 2002, subdivided into home based medical students (those whose homes were in Great Britain when they entered medical school) and those from overseas (whose homes were outside Great Britain when they entered medical school).

Main outcome measures Working in the NHS at seven census points from two to 27 years after qualification.

Results Of home based doctors, 88% of men (6807 of 7754) and 88% of women (7909 of 8985) worked as doctors in the NHS two years after qualification. The corresponding values were 87% of men (7483 of 8646) and 86% of women (7364 of 8594) at five years; 86% (6803 of 7872) and 86% (5407 of 6321) at 10 years; 85% (5404 of 6331) and 84% (3206 of 3820) at 15 years; and 82% (2534 of 3089) and 81% (1132 of 1395) at 20 years. Attrition from the NHS had not increased in recent cohorts compared with older ones at similar times after graduation. Of overseas students, 76% (776 of 1020) were in the NHS at two years, 72% (700 of 972) at five years, 63% (448 of 717) at ten years, and 52% (128 of 248) at 20 years.

Conclusions The majority of British medical graduates from British medical schools practise in the NHS in both the short and long term. Differences between men and women in this respect are negligible. A majority of doctors from overseas homes remain in Britain for their years as junior doctors, but eventually about half leave the NHS.

INTRODUCTION

Training adequate numbers of physicians and retaining a high proportion of them in the medical workforce are global concerns. Policy makers need to know the extent to which medical school graduates contribute not just to long term medical practice but specifically to the national medical workforce in their country of training.¹ Furthermore, as the number of women in

medical training rapidly expands in many countries, it is important to investigate how the participation of women in the medical workforce compares with that of men.² We report participation rates in the British NHS of graduates from British medical schools.

METHODS

Design

We used data from longitudinal surveys of doctors undertaken by our Medical Careers Research Group (MCRG) using postal questionnaires, supplemented by data from NHS employment records. Survey data and NHS data were analysed with capture-recapture methods, originally developed in animal ecology,³ to provide very accurate information about NHS participation. NHS posts included those held by doctors in academic posts with honorary contracts to practise medicine in the NHS.

Data from UK MCRG surveys

The study population comprised all medical graduates from all medical schools in Great Britain (England, Wales, and Scotland) who qualified in 1974, 1977, 1983, 1988, 1993, 1996, 1999, 2000, and 2002. Our methods, used in ongoing surveys, have been described elsewhere.⁴ In the year of qualification of each cohort, we obtained addresses from doctors' registration with the General Medical Council. We used postal questionnaires to seek information, including job histories, current employment, dates of jobs, job location, employer, specialty, and basic demographic information. Questionnaires were mailed to all graduates one year after qualification, at subsequent intervals of two years up to seven years, at 10 years, and at approximately 15 and 25 years. Reminder mailings were sent to non-respondents.

We used location of family home (Great Britain or overseas), as reported to us by the doctors, to classify each doctor as a "home" student or "overseas" student at the time of entry to medical school.

Data from the Department of Health

From employment records the English Department of Health produces an annual census of all doctors

working in the NHS on 30 September each year. Department of Health staff specified whether each doctor was in the NHS on the census date using the doctor's General Medical Council registration number.

Capture-recapture calculations

For capture-recapture analysis, NHS employment status was classified at each census point as (a) known to both MCRG and Department of Health to be working in the NHS, (b) known to MCRG, but not to Department of Health, to be working in the NHS, and (c) known to Department of Health, but not to MCRG, to be working in the NHS. These three categories were used to calculate the size of a fourth group (d), working in the NHS, but not known as such to either the MCRG or the Department of Health, using the formula $d=bc/(a+1)$. An estimated total number (e) in the NHS can then be calculated as $a+b+c+d$.⁵⁻⁷ This value can be compared with the total of all doctors in each cohort (f), excluding the small numbers known to be deceased or who asked to be non-participants, to give the percentage of the cohort estimated to be in the NHS at each census time (e/f). The 95% confidence interval for each percentage was estimated using the standard formula for calculating the standard error of a capture-recapture estimate.⁵

We present results for particular landmark years: at two years, five years, 10 years, 15 years, 20 years, 25 years, and 27 years after graduation.

RESULTS

Study population and response rate

The initial study population comprised the 32 430 doctors who graduated from British medical schools in the relevant years. After excluding 160 doctors known to be deceased at the time of the most recent survey of each cohort, and 257 who declined to participate, 32 013 doctors from these cohorts (98.7%) were included in questionnaire mailings. Responses were received from 28 439 of 32 013 doctors (88.8%) on at least one occasion. Appendix 1 shows the details for individual cohorts.

Over all cohorts, we knew the family home location of 25 833 of 32 013 doctors (80.7%). Of the 25 833, 94% (24 361) were from family homes in Great Britain and 6% (1472 doctors) were from family homes overseas. The contribution of individual cohorts of home based and overseas based doctors to the analysis for landmark years is shown in appendix 2. For the early years of the 1974, 1977 and 1983 cohorts, Department of Health data, needed for capture-recapture analysis, were not available.

Participation in the NHS in Great Britain: home based graduates

Of graduates with family homes in Great Britain, 88% were working in the NHS in Great Britain two years after qualification (table 1). Subsequent years showed a gradual, small decline: participation was 86% in years

five and 10, 85% by year 15, 82% by year 20, and 81% by year 25.

Percentage participation in the NHS by men and women was very similar. 88% of men and 88% of women were in the NHS two years after qualification. The corresponding figures were 87% of men and 86% of women at five years, 86% and 86% at 10 years, 85% and 84% at 15 years, 82% and 81% at 20 years, and 81% and 81% at 25 years. Considering individual cohorts, by five years after qualification percentage participation in the NHS was fractionally higher for men than for women in all but the 2000 cohort. Although differences between men and women were small, the number of doctors in each cohort was large, and some differences were statistically significant.

Comparing cohorts over time, we noted an increasing trend in the more recent cohorts for doctors to be employed in the NHS in the middle years after qualification (five, 10, and 15 years) (table 1), although the overall increase in percentages in the NHS was fairly small. The trend towards retention in the NHS was more evident for women than for men. Importantly, there is no evidence that younger cohorts were more inclined than older cohorts to leave the NHS; and no evidence that there were any periods of time over the past 30 years when there was any sudden loss of doctors from the NHS.

Part time work: home based graduates

Approximately 2% of both male and female home based graduates were working part time two years after qualification (men 1.6%, 86 of 5296; women 2.2%, 145 of 6476; $\chi^2=5.4$, $P=0.02$). Among men, part time working settled at about 5% between years five and 15, and then increased to 9% by year 20 and 10% by year 25. The percentages of women working part time at each stage were much higher, with more than 20% working part time at five years, 50% at 10, 54% at 15, and 47% at 25.

Participation in the NHS in Great Britain: doctors with family home outside Britain

Participation in the NHS was significantly lower among overseas based doctors than among their home based contemporaries (table 2). For example, combining the cohorts, two years after qualification 76% of overseas based doctors were working in the NHS compared with 88% of home based doctors. The values were, respectively, 72% and 86% at five years, 63% and 86% at 10, 58% and 85% at 15, 52% and 82% at 20, and 50% and 81% at 25 years. As with home based doctors, differences between men and women were small.

Destinations outside the NHS: home based graduates

We subtracted the numbers of doctors in the NHS (known from capture-recapture) from the total number of doctors in the initial cohorts to give the numbers of doctors known not to be in the NHS. We then used the data from the respondents who were not in the NHS, as

Table 1 | Percentage (95% CI) of doctors from homes in Great Britain who were working in the NHS after qualification

Years after qualification, and cohort	Men	Women	Total
2 years after			
1988	87.0 (86.5 to 87.4)	87.4 (87.1 to 87.7)	87.2 (86.9 to 87.4)
1993	87.5 (86.9 to 88.0)	87.5 (87.0 to 88.1)	87.5 (87.1 to 87.9)
1996*	87.8 (86.9 to 88.6)	90.1 (89.2 to 91.0)	89.0 (88.4 to 89.7)
1999*	91.0 (89.5 to 92.5)	88.6 (87.4 to 89.7)	89.6 (88.7 to 90.6)
2000	87.2 (85.9 to 88.5)	87.7 (86.8 to 88.7)	87.5 (86.7 to 88.3)
2002	86.5 (85.2 to 87.8)	86.8 (86.1 to 87.5)	86.6 (86.0 to 87.2)
Total	87.8 (87.4 to 88.2)	88.0 (87.7 to 88.4)	87.9 (87.7 to 88.2)
5 years after			
1983	85.8 (84.7 to 86.8)	83.0 (81.7 to 84.4)	84.8 (84.0 to 85.6)
1988	84.4 (83.9 to 85.0)	83.5 (82.7 to 84.2)	84.0 (83.5 to 84.5)
1993	86.5 (85.2 to 87.7)	84.4 (83.2 to 85.5)	85.4 (84.6 to 86.3)
1996	87.3 (85.9 to 88.8)	83.2 (82.1 to 84.2)	85.2 (84.3 to 86.1)
1999	88.6 (87.3 to 89.8)	85.6 (84.6 to 86.7)	86.9 (86.1 to 87.7)
2000	86.9 (85.1 to 88.7)	92.3 (90.7 to 94.0)	90.0 (88.8 to 91.2)
Total	86.5 (86.0 to 87.1)	85.7 (85.2 to 86.2)	86.2 (85.8 to 86.5)
10 years after			
1977	86.0 (85.5 to 86.5)	81.8 (80.7 to 82.9)	84.7 (84.2 to 85.2)
1983	85.6 (85.0 to 86.2)	83.0 (82.0 to 83.9)	84.7 (84.1 to 85.2)
1988	88.1 (87.6 to 88.5)	87.5 (86.9 to 88.1)	87.8 (87.4 to 88.1)
1993	89.4 (88.1 to 90.6)	86.7 (85.5 to 87.8)	88.0 (87.2 to 88.9)
1996	86.4 (84.1 to 88.6)	88.4 (86.1 to 90.6)	87.5 (85.9 to 89.1)
Total	86.4 (86.0 to 86.8)	85.5 (85.0 to 86.1)	86.0 (85.7 to 86.4)
15 years after			
1974	83.1 (82.6 to 83.7)	82.7 (81.3 to 84.2)	83.1 (82.5 to 83.7)
1977	85.7 (85.0 to 86.3)	82.3 (81.2 to 83.4)	84.7 (84.1 to 85.3)
1983	85.6 (84.6 to 86.5)	82.0 (80.8 to 83.3)	84.3 (83.6 to 85.1)
1988	87.2 (86.6 to 87.8)	87.6 (86.8 to 88.3)	87.4 (86.9 to 87.9)
Total	85.4 (85.0 to 85.7)	83.9 (83.4 to 84.5)	84.9 (84.6 to 85.3)
20 years after			
1974	81.6 (81.0 to 82.2)	82.7 (81.5 to 84.0)	82.0 (81.4 to 82.5)
1977	82.5 (81.6 to 83.3)	79.8 (78.2 to 81.4)	81.5 (80.7 to 82.3)
Total	82.0 (81.5 to 82.6)	81.1 (80.0 to 82.2)	81.7 (81.2 to 82.2)
25 years after			
1974†	80.0 (79.4 to 80.6)	82.0 (80.8 to 83.2)	80.6 (80.0 to 81.1)
1977	81.6 (80.9 to 82.4)	79.3 (78.2 to 80.5)	80.9 (80.2 to 81.5)
Total	80.9 (80.4 to 81.3)	80.5 (79.6 to 81.4)	80.8 (80.3 to 81.2)
27 years after			
1977	82.0 (81.4 to 82.7)	79.4 (77.9 to 81.0)	81.2 (80.6 to 81.7)

Results include data from most recent survey, for doctors who indicated that their family home location is in Great Britain.

Data were not available for capture-recapture analysis for the earliest years of the oldest cohorts, as the tables indicate.

Excluded: graduates who were deceased and those who asked to be non-participants.

Our surveys included doctors who qualified in Northern Ireland. However, we do not have data for capture-recapture analysis from Northern Ireland. We have therefore omitted doctors who qualified in Northern Ireland from all analyses.

*Results are for year 3 for 1999 and 1996 cohorts.

†Results are for year 24 for 1974 cohort.

known to us from each survey of each cohort, and apportioned their responses across the numbers known not to be in the NHS. This assumes that the characteristics of respondents who were not in the NHS are similar to those of the non-respondents who were not in the NHS in respect of sector of employment.

Considering doctors not in the NHS, the largest group were in medicine overseas (for example, 7% of both men and women at year two; 9% of men and 7% of women at year 20). Doctors in medical jobs in Britain, but not in the NHS, comprised 3% of men and 1% of women in year 2; and 7% of men and 6% of women in year 20. Doctors who were not working in medicine at all comprised 2% of men and 4% of women in year 2; and 2% of men and 6% of women at year 20).

DISCUSSION

Main findings

The great majority of British medical graduates from British medical schools practise in the NHS in both the short and long term. Differences between men and women in whether they worked in the NHS are negligible. Most doctors who were not in the NHS were in medical employment elsewhere. This finding accords with data about what junior doctors say they will do if they leave the NHS: they are much more likely to want to work in medicine elsewhere than to leave medicine.⁸

Strengths and weaknesses of the study

Our study provides large scale, long term longitudinal survey data about doctors in Britain. Although response rates were high, we have to consider the possibility of non-responder bias. However, the opportunity to enhance our survey data with workforce statistical records from the Department of Health, and undertake capture-recapture analysis, greatly increased the precision with which we estimated NHS participation in the cohorts. The essence of capture-recapture is to combine the results of two or more independent sources of data to produce much more precise estimates of a population than would be possible from one source alone.

Our calculations of the employment of doctors who were not in the NHS depend on applying the percentages of respondents known to be in non-NHS jobs to the numbers of non-respondents whom we knew were not in the NHS. We have no way of knowing whether the assumption that non-NHS non-respondents have a similar job distribution to non-NHS respondents is justified.

Policy implications and conclusions

A view exists that the increased intake of women to medical school may substantially reduce the percentage of qualified doctors who will eventually work in medicine.^{2,9} Our evidence from Britain does not support this view. Percentages of men and of women who eventually work in the NHS are very similar. It is true that, of graduates not employed in the NHS, a slightly higher percentage of women than men are not in medicine; and a slightly higher percentage of men than women are in medicine overseas or in medicine in Britain outside the NHS. It is conceivable that a higher percentage of women who are not in medicine than of men who are not in medicine replied to our questionnaires. If so, some of the apparent difference between women and men not working in

Table 2 | Percentage (95% CI) of doctors from overseas homes who were working in the NHS in Great Britain after qualification

Years after qualification, and cohort	Men	Women	Total
2 years after			
1988	77.0 (74.6 to 79.3)	66.8 (63.8 to 69.8)	72.6 (70.7 to 74.5)
1993	74.3 (73.0 to 75.6)	82.4 (81.0 to 83.8)	78.0 (77.0 to 79.0)
1996*	62.8 (60.2 to 65.5)	75.8 (71.7 to 79.8)	68.1 (65.8 to 70.5)
1999*	76.7 (73.2 to 80.2)	76.3 (69.2 to 83.4)	75.9 (71.9 to 80.0)
2000	80.6 (78.0 to 83.1)	70.8 (68.8 to 72.8)	75.5 (73.9 to 77.1)
2002	79.5 (76.0 to 82.9)	80.5 (78.6 to 82.5)	80.0 (78.2 to 81.8)
Total	76.2 (75.0 to 77.4)	76.0 (74.7 to 77.2)	76.1 (75.2 to 76.9)
5 years after			
1983	72.6 (69.4 to 75.8)	73.4 (66.7 to 80.2)	72.9 (69.7 to 76.0)
1988	69.5 (65.6 to 73.4)	67.4 (63.1 to 71.7)	68.9 (65.7 to 72.0)
1993	72.2 (68.1 to 76.3)	73.6 (70.0 to 77.3)	72.9 (70.1 to 75.7)
1996	67.3 (62.9 to 71.7)	79.2 (63.0 to 95.5)	70.8 (65.2 to 76.5)
1999	70.0 (67.6 to 72.4)	74.0 (68.0 to 80.0)	72.0 (68.7 to 75.2)
2000	79.4 (71.5 to 87.2)	67.3 (61.8 to 72.7)	73.2 (68.5 to 78.0)
Total	72.4 (70.5 to 74.4)	71.5 (68.9 to 74.2)	72.0 (70.4 to 73.6)
10 years after			
1977	55.0 (52.8 to 57.1)	47.1‡	53.1 (51.3 to 54.8)
1983	63.8 (61.6 to 66.0)	66.0 (62.6 to 69.5)	64.6 (62.7 to 66.5)
1988	63.6 (60.9 to 66.3)	62.4 (58.9 to 65.9)	63.2 (60.9 to 65.4)
1993	69.6 (63.7 to 75.5)	76.7 (70.2 to 83.2)	73.2 (68.6 to 77.8)
1996	56.7 (47.9 to 65.6)	50.6 (45.4 to 55.8)	54.4 (48.6 to 60.2)
Total	61.6 (60.0 to 63.3)	64.0 (61.6 to 66.4)	62.5 (61.2 to 63.9)
15 years after			
1974	54.7 (52.5 to 57.0)	57.3 (53.4 to 61.3)	55.3 (53.3 to 57.3)
1977	49.7 (47.8 to 51.6)	50.6 (47.7 to 53.6)	50.0 (48.3 to 51.6)
1983	61.7 (58.6 to 64.7)	64.7 (61.2 to 68.2)	62.8 (60.4 to 65.1)
1988	62.1 (59.1 to 65.1)	58.0 (54.3 to 61.7)	60.4 (58.0 to 62.8)
Total	57.0 (55.6 to 58.4)	59.6 (57.4 to 61.7)	57.8 (56.7 to 59.0)
20 years after			
1974	56.1 (53.5 to 58.8)	71.7 (64.7 to 78.7)	59.3 (56.7 to 61.9)
1977	43.6 (41.8 to 45.4)	47.1‡	44.7 (43.0 to 46.4)
Total	49.6 (48.0 to 51.2)	58.1 (53.5 to 62.7)	51.6 (49.9 to 53.2)
25 years after			
1974†	54.4 (52.6 to 56.2)	77.2 (68.3 to 86.0)	59.1 (56.7 to 61.4)
1977	43.7 (41.8 to 45.6)	38.2‡	42.4 (40.9 to 43.8)
Total	48.8 (47.5 to 50.2)	54.1 (50.4 to 57.7)	50.0 (48.7 to 51.4)
27 years after			
1977	46.6 (44.9 to 48.2)	38.2‡	44.5 (43.2 to 45.8)

Results include data from most recent survey, for doctors who indicated that their family home location is abroad.

Excluded: graduates who were deceased and those who asked to be non-participants.

*Results are for year 3 for 1999 and 1996 cohorts.

†Results are for year 24 for 1974 cohort.

‡For these cohort years, for women, the number known only to MCRG was 0. A standard error cannot be calculated, and hence the CI cannot be calculated.

medicine might reflect responder bias. Whether or not this is the case, the overall differences between women and men in participation rates in medicine remain small.

As expected, a much higher percentage of women than men work part time. The extent of part-time work by women, rather than whether medically qualified women will work in medicine at all, is the major

WHAT IS ALREADY KNOWN

Very little systematic information is available about the career destinations of medical graduates, including the proportion who eventually practise medicine in the country in which they trained

A common assumption is that a smaller percentage of women than men medical graduates will work in medicine in the long term

It is sometimes considered that there are increases in numbers of doctors quitting the NHS, at times when they become disenchanting with it

WHAT THIS STUDY ADDS

The great majority of British-home British-trained medical graduates worked in the NHS, eg 88% at two years after graduation, 86% at 10 years, and 82% at 20 years

The differences between men and women in this respect were negligible

The majority of medical graduates who were not in the NHS were in medicine elsewhere

The majority of doctors who trained in Britain, but who were residents outside it at entry to medical school, subsequently worked in the NHS

We did not identify any times when sharp increases in departure of doctors from the NHS occurred

factor that needs to be considered in workforce planning.

Current British immigration rules allow all doctors who were trained as medical students in Britain to remain in Britain to practise after qualification and to have equal access to jobs and training.¹⁰⁻¹² Of doctors whose homes were outside Britain when they became medical students at British universities, the great majority worked in Britain after graduating. Two-thirds were still in the NHS 10 years after qualifying.

From time to time, anecdotal evidence is put forward to suggest that doctors, disenchanting with the NHS, have started to leave it. Our evidence does not suggest that there was any period of time over the past 30 years when there was a sudden and substantial increase in loss of doctors from the NHS. Younger generations of doctors are sometimes viewed as less committed than previous generations to a working career in medical practice, but according to our evidence younger generations are as committed as their predecessors.

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