

Career choices for nephrology and factors influencing them: surveys of UK medical graduates

Atena Barat , Michael J Goldacre and Trevor W Lambert 

UK Medical Careers Research Group, Unit of Health-Care Epidemiology, Nuffield Department of Population Health, University of Oxford, Oxford OX3 7LF, UK

Corresponding author: Trevor W Lambert. Email: trevor.lambert@dph.ox.ac.uk

Abstract

Objectives: To study early and eventual career choices for nephrology among UK medical graduates and investigate factors which influenced career preferences.

Design: Self-completed survey questionnaires mailed to medical graduates 1, 3, 5 and 10 years after graduation.

Setting: United Kingdom.

Participants: UK medical graduates in 15 year-of-qualification cohorts between 1974 and 2015.

Main outcome measures: Early career specialty choices, career specialty destinations at 10 years and ratings of factors affecting career choices.

Results: Around 0.4%–1.1% of these junior doctors expressed a career preference for nephrology, varying by year of qualification and years after qualification. Among all graduates of 1993–2002 combined, 0.4% expressed a career preference for nephrology 1 year after qualification rising to 1.0% in year 5. Among graduates of 2005–2008, the corresponding figures were 1.0% in year 1 falling to 0.7% in year 5. Only 18% of doctors who chose nephrology in year 1 eventually became nephrologists. Of doctors who were practising as nephrologists for 10 years and more after qualification, 74% of the women and 56% of the men had decided to pursue a career in nephrology by year 5 after qualification. ‘Enthusiasm/commitment’ had a great deal of influence on those who chose nephrology, for all cohorts and all years studied.

Conclusions: The most recent data suggest that the proportion of young doctors who sustain an interest in nephrology through the early postgraduate training years may be lower than among their predecessors. Efforts are needed to reverse the declining trend and increase interest in nephrology.

Keywords

nephrology, specialisation, career choice, medical education, workforce, doctors

chronic disease, which is associated with substantial healthcare resource use.² For instance, in 2014 in England, 2.6 million adults aged over 16 years were living with chronic kidney disease stage 3–5, which constitutes 6.1% of population of this age group.³ It was estimated that chronic kidney disease imposed 1.44–1.45 billion pounds in 2009–2010 on the English NHS (equivalent to nearly 1.3% of all NHS budget in that year).⁴ The global burden of chronic kidney disease continues to increase as a consequence of higher detection rates, population growth and greater life expectancy.⁵

The status of kidney care varies over time and across world regions. The renal workforce plays a pivotal role in kidney care delivery and includes nephrologists, primary care physicians and nurse practitioners who hold different levels of responsibility. Globally, nephrologists are the main specialist medical providers responsible for both chronic kidney disease (93%) and acute kidney injury (95%) care, regardless of national income level.¹ The density of nephrologists is variable across countries, which has an impact on the availability and delivery of care for patients.⁵ Most countries (74%) reported shortages in nephrologists. Overall, the mean number of nephrologists and nephrology trainees was 8.83 and 1.87 per million population (pmp), respectively.¹ Africa, South Asia and Oceania & South East Asia have the lowest nephrologist density around the world (less than 5 pmp).¹ Correspondingly, Ireland, Turkey and the UK (8.5 pmp) have the lowest ratio among European nations.⁵

The underpinning reasons for the shortage of nephrologists in developed countries are different from those in developing countries. In developed nations, researchers report declining interest in nephrology among trainees because the field is ‘unappealing’, demanding and has poor work–life balance with less remuneration compared to other specialties such as dermatology.^{5,6} Conversely, in developing countries, lack of training programmes, undersupply

Background

Kidney disease, whether acute kidney injury or chronic kidney disease, is an important global public health challenge facing health systems.¹ It is a major cause of mortality and morbidity related to

of expensive treatment such as dialysis and transplantation, and migration of health professionals including nephrologists from developing to developed countries are the main causes for the current paucity of nephrologists.^{6,7}

A nephrology training programme is available in 96 out of 121 countries (79%) with variations in structure and length. Most training programmes (86%) take two to four years. Nephrology training can follow training in general internal medicine, be a dedicated training after qualification, or be a mix of both depending on region and/or training centre, or follow some other structure.¹ In the UK, the nephrology training programme is usually delivered within five years including two years Core Training in General Internal Medicine (Acute Medicine), delivered either through the core medical training programme or the acute care common stem, followed by three years of clinical nephrology and runs up to the award of a Certificate of Completion of Training.⁸ According to the latest figures, in 2017 in England, 376 medical registrars and 536 consultants were working in the renal field.⁹

A better understanding of factors that motivate trainees to choose nephrology as a specialty is essential. This will allow achievement of optimal criteria for admission to renal specialty training programmes and ensure that talented trainees are attracted and retained in nephrology. In turn, this would be of great benefit not only for health systems but also for trainees and medical graduates who intend to pursue a career in nephrology.

To date, little research has been carried out that particularly seeks the views of medical graduates at different points of time regarding a career choice for nephrology. In order to bridge this knowledge gap, we describe the findings from our surveys which identify trends for nephrology choice over different cohorts and examine factors affecting career choices for nephrology.

Methods

Data collection

The UK Medical Careers Research Group has undertaken longitudinal national surveys of cohorts of medical school graduates since 1974. The design and sampling frame of surveys aim to recruit and follow all medical graduates from all UK medical schools in particular graduation years, identified by registration with the General Medical Council. The subjects were asked to answer multi-purpose questionnaires by post or online at different time slots: one, three and five years after qualification and longer intervals thereafter. Thus the surveys were contemporaneous, with longitudinal follow-up of the cohorts. Non-respondents in

each survey year were sent up to four postal or email reminders. Further details of the design and survey methods are reported elsewhere.¹⁰

For the present paper, we utilised data gathered from 15 cohorts, comprising the UK medical graduates of 1974, 1977, 1980, 1983, 1993, 1996, 1999, 2000, 2002, 2005, 2008, 2009, 2011, 2012 and 2015. Based on the study aims, three main areas of investigation are: career choice, influencing factors and career destination. Relevant data for addressing the two former issues were extracted from 15 cohorts (1974–2015), 12 cohorts (1974–2008 and 2012) and 10 cohorts (1974–1980 and 1993–2008) at the first, third and fifth year after qualification, respectively. Ten years after graduation, data on qualifiers from 1993 to 2002 (5 cohorts) were used for identifying destinations.

Research instrument

The survey instrument used in this study was developed and revised over many years to allow the survey to be self-completed and to reflect doctors' careers and concerns. Participants received a research questionnaire containing both open and closed questions exploring demographic information, career choice and plans and employment history.

We explored participants' career choice by asking 'What is your choice of long-term career?', giving boxes for entering up to three specialty choices in order of preference. Respondents were also asked about the level of certainty of their specialty choices and were offered three options: 'definite', 'probable' and 'uncertain'. In all surveys, 13 factors were listed and participants were asked to assess their impact on their choice of future career. A three-point response scale was provided: 'not at all', 'a little' and 'a great deal'.

Data analysis

To stabilise cohort variations, for most analyses, individual cohorts were merged into three cohort groups: graduates of 1974–1983, graduates of 1993–2002 and graduates of 2005–2015.

For analysing specialty choices, choices with equal preference were considered as 'tied' choices, e.g. if a participant's first choice was both for nephrology and for another named specialty, we specified it a tied first choice for nephrology.

In our analysis, the term 'other hospital physician specialties' refers to specialties, except nephrology, in which the consultants are hospital physicians. In the UK, trainees in these specialties usually complete Core Medical Training prior to entering a Specialty Training programme.

Bivariate cross-tabulation with χ^2 test was used for assessing trends over time and statistically significant differences between two variables. The Mantel–Haenszel linear-by-linear χ^2 test was employed for linear trend over cohorts. Confidence interval widths were 95% for all calculations. The data were analysed by means of the IBM SPSS Statistics for Windows, V22¹¹ and Microsoft Excel (2010).

Results

Response rate

Overall, 15 surveys were included in this paper; 69,670 registered doctors were contacted in the first year after qualification, of whom 40,412 responded (58.0%). Correspondingly, the response rate was calculated to be 64.3% (31,466/48,899) in year 3 and 66.7% (24,970/37,424) in year 5.

Early career choices for nephrology: one, three and five years after graduation

Considering all cohorts combined, one year after qualification 0.57% (95% CI: 0.50% to 0.64%) of all participants indicated that their first choice of long-term career was nephrology. The figures for years 3 and 5 after graduation, respectively, were 0.85% (95% CI: 0.76% to 0.96%) and 0.74% (95% CI: 0.64% to 0.85%); see Table 1. In all three years, there was a significant rising linear trend in nephrology as a first career choice across cohorts overall; for statistical results, see Table 1. We note that in the most recent cohort group (graduates of 2005–2015), we only have year 5 survey results for two cohorts, those of 2005 and 2008. Consequently, we show as an extra column in Table 1

the results for 2005 and 2008 graduates combined in years 1 and 3, for comparison with these cohorts in year 5: 0.8% of respondents from these cohorts chose nephrology in year 1 compared with 0.7% in year 5.

Online Appendix Table 1 presents the percentages of doctors in each individual cohort who expressed a preference for an eventual career in nephrology. There was a wide range of variation in choices in terms of cohort and years after qualification. For instance, in year 5 first preferences for nephrology varied from 1.3% in the 2000 cohort to 0.2% in the 1974 and 1977 cohorts.

Nephrology as a career choice for male and female doctors

Considering all cohorts and years, nephrology has been a more popular career choice among men than women; however, the size of the observed gap has varied according to cohort and time since qualification (Figure 1).

Comparison between cohort groups in year 1 revealed an increase over time in the percentage of both male and female doctors choosing nephrology as their first preference. In year 3, nephrology as a first choice of eventual career grew steadily in popularity for men but for women showed a rise among 1993–2002 graduates, then a substantial fall among 2005–2012 graduates. The first choices for nephrology in year 5 for both genders had an increase in cohorts 1993–2002, and then a decline in cohorts 2005–2008.

Online Appendix Figure 2 shows nephrology as any career choice (i.e. first, second or third choice) for both male and female doctors. The observed trend is similar to the trend in nephrology as first choice.

Table 1. First choices 1, 3 and 5 years after graduation for eventual careers in nephrology.

Year after graduation	Cohorts (years of graduation)				All cohorts % (N)
	1974–1983 % (N)	1993–2002 % (N)	2005–2015 % (N)	2005 and 2008 only % (N)	
Year 1	0.1 (13)	0.4 (62)	1.0 (157)	0.8 (50)	0.6 (232)
Year 3	0.5 (44)	1.0 (142)	1.0 ^a (82)	1.1 (64)	0.9 (268)
Year 5	0.3 ^b (22)	1.0 (127)	0.7 ^c (35)	0.7 (35)	0.7 (184)

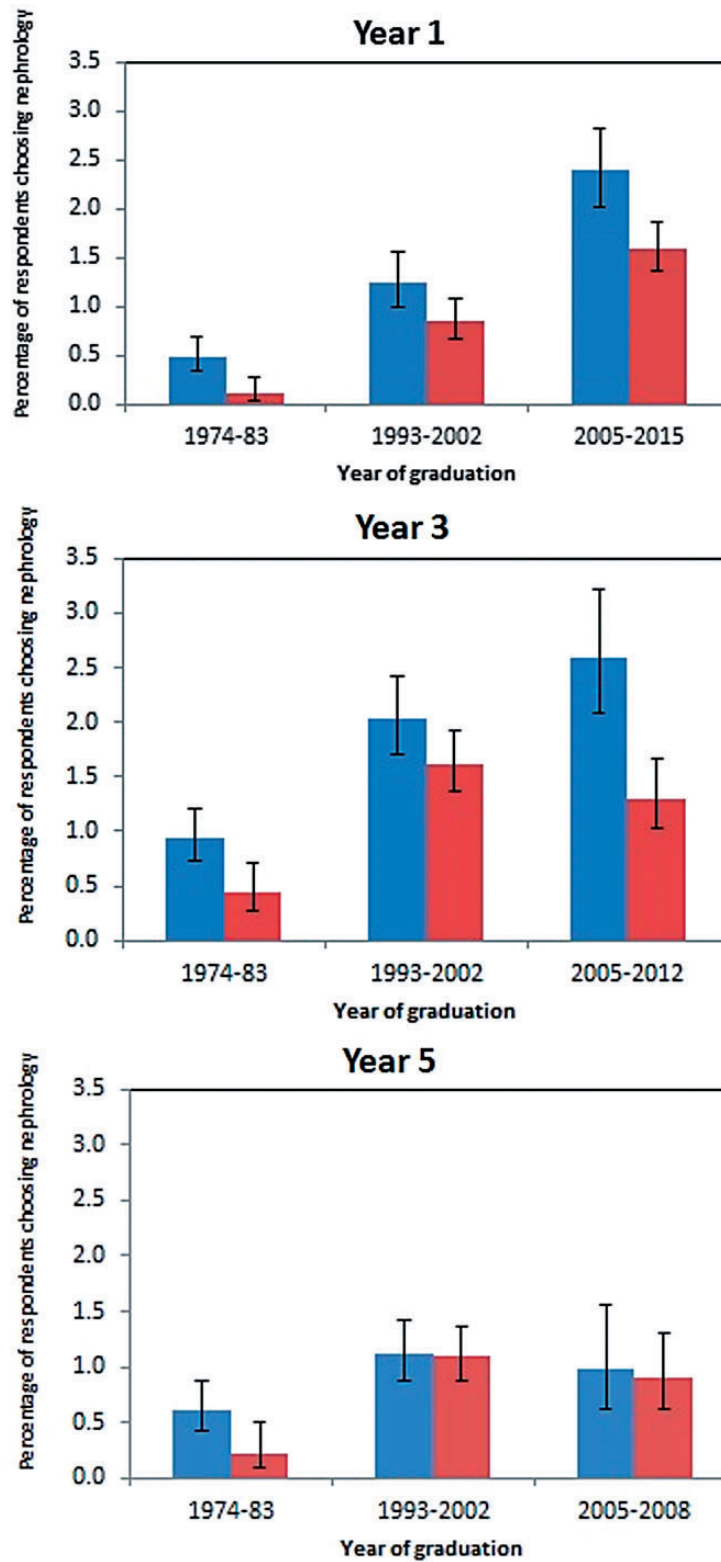
Note: Linear trend and heterogeneity have been calculated using the columns headed 1974–1983, 1993–2002 and 2005–2015. Linear trend across cohorts (χ^2): year 1: 88.8, year 3: 18.5, year 5: 10.8 (all $p < .001$). Heterogeneity across cohorts (χ^2): year 1: 91.0, year 3: 26.3, year 5: 26.8 (all $p < .001$).

^a2005, 2008 and 2012 cohorts only.

^bExcludes 1983 cohort in year 5.

^c2005 and 2008 cohorts only.

Figure 1. Percentage of doctors making nephrology their first career choice 1, 3 and 5 years after graduation. Blue: male. Red: female.



Certainty of choice

The level of certainty between aspiring nephrologists and those who gave their first choice as other hospital physician specialities was very similar and showed upward trend as time passed graduation (see online Appendix Table 2). Gender differences in certainty of choice of intending nephrologists were apparent in years 1 and 3, with 41% of women and 24% of men unsure of their choice in year 1, and 29% of women and 14% of men unsure in year 3, but the difference had almost disappeared by year 5, with 93% of women and 98% of men regarding their career choice as definite or probable.

Factors influencing career choice

The doctors were asked to provide a view on the importance of 13 different factors affecting the choice of career specialty. A number of factors were identified by most respondents as having a great deal of importance (Table 2).

The highest percentage of doctors whose first choice of career was nephrology in year 1 (60.7%) and 5 (81.7%), scored 'enthusiasm/commitment' as having a great deal of influence. Although the importance of this element increased over time, in year 3, it ranked as the second most important influence (65%) after 'experience of jobs so far' (75%) for aspiring nephrologists. In all three survey years, 'hours/working conditions' was the only factor that was significantly less important ($p < 0.001$) for aspiring nephrologists than aspiring other hospital physician specialists.

Comparing men and women, 'enthusiasm/commitment' was the most important consideration for men. The second important driver for men was 'self-appraisal' in year 1 (45%) and 'experience of jobs so far' in the following years. For women, the two most important motivators were 'enthusiasm/commitment' (60%) and 'a particular teacher/department' (55%) at year 1 and 'experience of jobs so far' and 'enthusiasm/commitment' in the following years.

In comparison, for doctors seeking a career in other hospital physician specialities, on all survey occasions and for both genders, 'enthusiasm/commitment' and 'experience of jobs so far' were respectively identified as the first and second powerful drivers of specialty choice. The importance of these factors continued to increase as time passed from graduation. Women scored more highly for these factors than men.

Overall cohorts and years, financial issues such as 'future financial prospects' and 'financial circumstances whilst training' were perceived to be unimportant influences.

Comparing early choice with eventual destination

Looking forward from early choice to eventual destinations. Medical graduates of 1993 to 2002 who initially intended to become nephrologists were followed 10 years after qualification (Table 3). Of 50 junior doctors who considered nephrology as their untied first career choice in year 1, only 9 (18%) eventually practised in it. This rose to 44% in year 3 and 65% in year 5 postgraduation. Nearly half of the intending nephrologists at year 1 (48%) eventually worked in other 'physician' specialities.

Male doctors were significantly more likely than female doctors to maintain their early career choice and become practising nephrologists. For instance, 71% of men and 60% of women whose early career choice in year 5 was nephrology eventually progressed into nephrology.

Looking backward from career destinations to early choices. The early career choices of doctors who were practising nephrologists in year 10 after qualification were categorised into five groups (Table 4). The results show that only a small percentage (7%) of practising nephrologists had considered nephrology as a sole first career choice in their first postgraduation year. This percentage rose to 44% in year 3 and to 66% in year 5. Respondents who specified nephrology as their sole career choice were more likely to work in renal medicine eventually than those who gave tied first choices for nephrology and those who considered it as a second or third career choice. Similar trends were seen for males and females.

When looking back to year 1 and 3 after graduation, more male than female nephrologists had specified nephrology, but a higher percentage of female than male nephrologists had specified nephrology as their preferred career choice in year 5 (75% vs 56%).

The commonest career choice in year 1 for practising nephrologists had been other hospital physician specialities (69%).

Discussion

Main findings

To our knowledge, this is the first nationwide survey in the UK to examine the trend of choices for career in nephrology and report on the influencing factors among medical graduates at time intervals.

More medical graduates have initially chosen nephrology as a career recently compared to previous generations, but nephrology choices among the most recent medical graduates we surveyed did not increase as time passed from graduation. This failure to maintain early choice, which was unlike that seen in earlier

Table 2. Percentages scoring each factor as having a great deal of influence on their career choice.

Factor	Career choice	Year 1 % (N)	Year 3 % (N)	Year 5 % (N)
Domestic situation	Nephrology	17.2 (31)	13.5* (24)	15.0** (26)
	OHPS	24.8 (1769)	23.8 (813)	28.4 (948)
Hours/working conditions	Nephrology	19.6** (30)	17.9** (24)	17.1** (26)
	OHPS	33.7 (1974)	38.1 (850)	41.3 (1070)
Future financial prospects	Nephrology	2.6 (3)	1.5* (2)	2.0* (3)
	OHPS	466 (9.6)	8.9 (198)	8.2 (214)
Financial circumstances whilst training	Nephrology	0.0 (0)	4.5 (3)	1.9 (1)
	OHPS	3.4 (34)	5.2 (85)	6.3 (73)
Career/promotion prospects	Nephrology	11.5* (14)	20.6 (28)	16.6* (29)
	OHPS	22.6 (1316)	29.2 (853)	26.2 (880)
Self-appraisal	Nephrology	37.8* (51)	60.3 (105)	56.6 (99)
	OHPS	49.5 (3008)	54.7 (1869)	56.9 (1907)
Advice from others	Nephrology	13.4 (17)	23.7 (32)	17.7 (31)
	OHPS	16.9 (1005)	19.9 (581)	16.5 (553)
Student experience of subject	Nephrology	37.3 (62)	16.4* (28)	19.2 (33)
	OHPS	39.9 (2689)	26.9 (857)	23.6 (744)
A particular teacher/department	Nephrology	46.9** (60)	47.9* (70)	51.8* (73)
	OHPS	28.9 (1709)	35.8 (976)	37.3 (1021)
Inclinations before medical school	Nephrology	4.2 (5)	1.8* (3)	4.1 (7)
	OHPS	9.2 (540)	8.0 (256)	6.9 (218)
Experience of jobs so far	Nephrology	39.7* (54)	75.0** (132)	80.6** (141)
	OHPS	53.6 (2817)	57.4 (1954)	64.5 (2162)
Enthusiasm/commitment	Nephrology	60.7 (102)	65.4 (87)	81.7 (125)
	OHPS	59.3 (3554)	70.0 (1553)	80.1 (2082)
Other reasons	Nephrology	28.2* (11)	16.4 (11)	20.4 (10)
	OHPS	12.6 (260)	17.8 (266)	24.2 (282)

OHPS: other hospital physician specialties.

* $p < .01$; ** $p < .001$, comparing nephrology with other hospital physician specialties, within each year, for each factor.

cohorts, requires further investigation to reveal underlying reasons.

A gender difference was reported in this study, with men more likely than women to

specify nephrology as their first choice. The gender gap almost disappeared for graduates of 1993–2002 but returned for recent graduates from 2005.

Table 3. Career destinations for nephrology at 10 years looking forward from early choices.

Year and gender	Four final destinations after 10 years				Total % (N)
	Nephrology % (N)	Other hospital physician specialties % (N)	Other clinical specialties % (N)	Non-clinical careers % (N)	
Year 1 first choice					
Nephrology – men	25 (6)	29 (7)	42 (10)	4 (1)	100 (24)
Nephrology – women	12 (3)	27 (7)	54 (14)	8 (2)	100 (26)
Nephrology – men and women	18 (9)	28 (14)	48 (24)	6 (3)	100 (50)
Year 3 first choice					
Nephrology – men	54 (28)	15 (8)	31 (16)	0 (0)	100 (52)
Nephrology – women	35 (20)	21 (12)	40 (23)	4 (2)	100 (57)
Nephrology – men and women	44 (48)	18 (20)	36 (39)	2 (2)	100 (109)
Year 5 first choice					
Nephrology – men	71 (35)	12 (6)	16 (8)	0 (0)	100 (49)
Nephrology – women	60 (35)	3 (2)	33 (19)	3 (2)	100 (58)
Nephrology – men and women	65 (70)	8 (8)	25 (27)	2 (2)	100 (107)

Only one-seventh of doctors who chose nephrology in year 1, and a fifth in year 3, were sure about their choice. Workforce planners and educational decision makers may find it worthwhile to investigate why so few of those who express a choice for nephrology at this stage are firmly committed to their choice.

The findings highlighted that doctors who chose nephrology were mostly influenced by enthusiasm and commitment to the specialty, by their work experiences in the specialty, or by a particular teacher or department. The latter factor was more important in year 1, and in the following years, work experience was more influential. Intending nephrologists were not motivated by financial issues.

Our data on the timing of specialty choice confirm that most of the decision-making about wanting a career in nephrology took place several years after qualification. Doctors who, in the early years after graduation, intended a career in nephrology seemed to change their minds early on but this also continued even after year 5. It would be beneficial to investigate why they did not continue to aspire to a career as nephrologists.

A low level of correspondence was identified between being a nephrologist and having made early career choices for nephrology: many eventual nephrologists did not choose it in years 1 or 3.

Comparison with other research

UK-based studies. Our findings signified a concern regarding the willingness of recent graduates to enter nephrology despite a low competition rate for a UK specialty trainee position in renal medicine (1.37 candidates per post in 2016).¹² Gender disparities in choices for nephrology in our study were small, but it does seem to have more appeal for men than women. Similar papers related to these cohorts have been published in other specialties.^{13–15}

Regarding influencing factors, enthusiasm and work experience were important for both intending nephrologists and doctors aspiring to other hospital physician specialties, which have a common training entrance pathway, i.e. Core Medical Training.⁸

One advantage of nephrology is that, unlike specialties such as surgery, doctors who make late decisions can revise their career plans and enter nephrology training with ‘transferable skills’ from general physician practice, probably with realistic information derived from their work experiences.^{16,17}

Studies outside the UK. Gender disparity has been reported previously in choices for nephrology in various countries outside the UK.⁵ Possible reasons for this issue are the paramount importance for many

Table 4. Original career choices of doctors practising as nephrologists in year 10 (looking backward).

Career choices	Men % (N)	Women % (N)	Total % (N)
Year 1 choices			
Nephrology as untied first choice	8 (4)	5 (2)	7 (6)
Nephrology as tied first choice	4 (2)	3 (1)	3 (3)
Nephrology as second or third choice	4 (2)	3 (1)	3 (3)
Choices for other hospital physician specialties	67 (35)	72 (28)	69 (63)
Other choices	17 (9)	18 (7)	18 (16)
Total	100 (52)	100 (39)	100 (91)
Year 3 choices			
Nephrology as untied first choice	47 (23)	40 (18)	44 (41)
Nephrology as tied first choice	10 (5)	4 (2)	7 (7)
Nephrology as second or third choice	10 (5)	13 (6)	12 (11)
Choices for other hospital physician specialties	22 (11)	36 (16)	29 (27)
Other choices	10 (5)	7 (3)	9 (8)
Total	100 (49)	100 (45)	100 (94)
Year 5 choices			
Nephrology as untied first choice	56 (23)	74 (32)	66 (55)
Nephrology as tied first choice	29 (12)	7 (3)	18 (15)
Nephrology as second or third choice	2 (1)	7 (3)	5 (4)
Choices for other hospital physician specialties	5 (2)	9 (4)	7 (6)
Other choices	7 (3)	2 (1)	5 (4)
Total	100 (41)	100 (43)	100 (84)

women of balancing career and family¹⁸ stemming from stereotypical social roles for men and women¹⁹; nephrologists' out-of-hours working time commitments^{19–21}; possible pay differentials in some countries, which disadvantage female nephrologists²²; course difficulty and poor teaching²³; unattractive practice environment of nephrology; and the existence of specialties such as anaesthesiology and emergency medicine which may be regarded by some as more life-style friendly.⁵ Poor income in nephrology generally was also cited as a disincentive by researchers in Australia²¹ and Spain.²⁴

In many countries, nephrologists seem to make their specialty decision several years after

qualification. Some studies outside the UK have suggested that this might reflect an unfavourable perception of nephrology including difficulty in obtaining posts,²⁰ undesirable level of income,^{21,25} long work hours^{21,25} and complexity of renal patients.^{21,23}

Implications

Women make up 51% of higher specialty trainees in renal medicine in the UK.²⁶ Work-life balance is an important determinant of career choice among female doctors,²⁷ and concerns about long work hours and heavy workload in nephrology were frequently reported in other studies.^{19–21} Workforce planners

and educational providers can support nephrologists through offering family friendly strategies such as flexibility in training and working hours. The NHS Improving Working Lives initiative from 2000 aimed to promote a healthy work–life balance among its staff including doctors,²⁸ but it is unclear that its implementation has had any specific effect on nephrologists. It is interesting that intending nephrologists scored lower on the importance they ascribed to hours, working conditions and domestic considerations than did doctors who chose other hospital physician specialties. It may evidence that those doctors who choose nephrology do so in full awareness of its lifestyle demands.

Many early decisions to choose nephrology did not translate into a later career in the specialty. Moreover, female doctors made late decisions about pursuing their career in nephrology. It is important to address the forward and backward mismatch between original choices and career destination in nephrology by focusing on identifiable influencing factors.

Early exposure to renal medicine in medical school and the foundation programme, including increased use of mentors, could highlight its attractive interventional aspects, as well as necessary exposure to patients with chronic kidney disease.²³ Evidence shows that nephrology is perceived as a challenging subject in medical school^{23,25} and our data highlighted that nephrology is chosen as a specialty because it is what the trainees want (enthusiasm/commitment) which may refer to its intellectual content and clinical activities.

While in a UK setting, there is little scope in the NHS for direct financial incentives favouring one specialty, improvements to working conditions through innovative work scheduling and the promotion of clinical independence at work may confer benefits in increasing commitment.

Strengths and limitations

A strength of this unique large national study of UK doctors is the repeated cohort design, whereby different groups of medical graduates were surveyed in the same ways at different points of time, to follow up their career progression and reveal factors that may affect their choices over time. Furthermore, the high response rate increases confidence in generalising the survey results.²⁹ However, the findings must be considered in light of some methodological considerations. Given the survey methodology, no inference can be made about causal relationships. The scope of this study is limited to UK medical graduates; thus, international medical graduates, who make a

significant contribution to the UK medical workforce,³⁰ were not considered in this research.

Conclusions

There is a shortfall in the medical workforce provision for renal care from UK medical graduates. There seems to be a decline in interest in nephrology as time passes from graduation, especially among female doctors. Several factors including relevant job experience influenced the decision to pursue nephrology. Late decisions to commit to a career in nephrology were evident in our data, which suggests that doctors with an interest in nephrology could be encouraged earlier in their careers to pursue it. Systematic efforts are required to improve interest in nephrology.

Declarations

Competing Interests: None declared.

Funding: The report is based on independent research commissioned and funded by the NIHR Policy Research Programme (project number 016/0118), Department of Health. The views expressed in the publication are those of the author(s) and not necessarily those of the NHS, the NIHR, the Department of Health, its ‘arms’ length bodies or other government departments.

Ethics approval: This study was approved by the National Research Ethics Service, following referral to the Brighton and Mid-Sussex Research Ethics Committee in its role as a multi-centre research ethics committee (ref 04/Q1907/48 amendment Am02 March 2015). Consent to participate was implied by completion of the surveys.

Guarantor: TWL

Contributorship: TWL and MJG designed and conducted the surveys. AB performed the analysis and wrote the first draft of the paper. All authors contributed to further drafts and all approved the final version.

Acknowledgements: We thank Ritva Ellison for data management and Janet Justice and Alison Stockford for data entry. We are very grateful to all the doctors who participated in the surveys.

Provenance: Not commissioned; peer-reviewed by Beryl De Souza.

ORCID iD: Atena Barat  <http://orcid.org/0000-0002-7300-805X>

Trevor W Lambert  <http://orcid.org/0000-0001-9688-3036>

References

1. Bello AK, Levin A, Tonelli M, Okpechi IG, Feehally J, Harris D, et al. *Global Kidney Health Atlas: A report by the International Society of Nephrology on the current state of organization and structures for kidney care across the globe*. Brussels: International Society of Nephrology, 2017.
2. Honeycutt AA, Segel JE, Zhuo X, Hoerger TJ, Imai K and Williams D. Medical Costs of CKD in the Medicare Population. *J Am Soc Nephrol* 2013; 24: 1478–1483.

3. Public Health England. *Chronic kidney disease prevalence model*. London: Public Health England, 2014.
4. Kerr M, Bray B, Medcalf J, O'Donoghue D and Matthews B. Estimating the financial cost of chronic kidney disease to the NHS in England. *Nephrol Dial Transplant* 2012; 27: iii73–iii80.
5. Sharif M, Elsayed M and Stack A. The global nephrology workforce: emerging threats and potential solutions! *Clin Kidney J* 2016; 9: 11–22.
6. Jha V, Garcia-Garcia G, Iseki K, Li Z, Naicker S, Plattner B, et al. Chronic kidney disease: global dimension and perspectives. *Lancet* 2013; 382: 260–272.
7. Field M. Addressing the global shortage of nephrologists. *Nat Clin Pract Nephrol* 2008; 4: 583.
8. NHS Health Education England. *Renal medicine training pathway*. London: Health Careers, 2017.
9. Workforce and Facilities Team ND. HCHS doctors by grade and specialty in trusts and CCGs – full time equivalent. In: Horan B (ed) *NHS Hospital & Community Health Service (HCHS) monthly workforce statistics – provisional statistics*. Richmond: NHS Digital part of the Government Statistical Service, 2017.
10. Goldacre M and Lambert T. Participation in medicine by graduates of medical schools in the United Kingdom up to 25 years post-graduation: national cohort surveys. *Acad Med* 2013; 88: 699–709.
11. IBM Corp. *IBM SPSS Statistics for Windows*. Version 22.0. Armonk: IBM Corp, 2013.
12. Health Education England. Competition ratios, 2016. Available from: <https://specialtytraining.hee.nhs.uk/Competition-Ratios>.
13. Emmanouil B, Goldacre M and Lambert T. Aspirations to become an anaesthetist: longitudinal study of historical trends and trajectories of UK-qualified doctors' early career choices and of factors that have influenced their choices. *BMC Anesthesiol* 2017; 17: 100.
14. Goldacre M, Laxton L, Lambert T and Wevster P. Career choices for public health: cohort studies of graduates from UK medical schools. *J Public Health* 2011; 33: 616–623.
15. Smith F, Lambert T, Pitcher A and Goldacre M. Career choices for cardiology: cohort studies of UK medical graduates. *BMC Med Educ* 2013; 13: 10.
16. Goldacre M, Laxton L, Harrison E, Richards J and Lambert T and Parks R. Early career choices and successful career progression in surgery in the UK: prospective cohort studies. *BMC Surg* 2010; 10: 32.
17. Spooner S, Gibson J, Rigby D, Sutton M, Pearson E and Checkland K. Stick or twist? Career decision-making during contractual uncertainty for NHS junior doctors. *BMJ Open* 2017; 7: e013756.
18. Johansen KL. Women in nephrology: one mother's strategies for success in academic medicine. *Kidney Int* 2008; 74: 401–402.
19. Arrizabalaga Clemente P. Feminisation and Nephrology. *Nefrologia* 2010; 30: 110–113.
20. Shah H, Jhaveri K, Sparks M and Mattana J. Career choice selection and satisfaction among US adult nephrology fellows. *Clin J Am Soc Nephrol* 2012; 7: 1513–1520.
21. Lane C, Healy C, Ho M, Pearson S and Brown M. How to attract a nephrology trainee: quantitative questionnaire results. *Nephrology* 2008; 13: 116–123.
22. Desai T, Ali S, Fang X, Thompson W, Jawa P and Vachharajani T. Equal work for unequal pay: the gender reimbursement gap for healthcare providers in the United States. *Postgrad Med J* 2016; 92: 571–575.
23. Jhaveri KD, Sparks MA, Shah HH, Khan S, Chawla A, Desai T, et al. Why not nephrology? A survey of US internal medicine subspecialty fellows. *Am J Kidney Dis* 2013; 61: 540–546.
24. Ortega Suárez F. How can we make nephrology more appealing to junior doctors? *Nefrologia* 2011; 31: 129–130.
25. Daniels MN, Maynard S, Porter I, Kincaid H, Jain D and Aslam N. Career interest and perceptions of nephrology: a repeated cross-sectional survey of internal medicine residents. *PLoS one* 2017; 12: e0172167.
26. Federation of Royal College of Physicians of the UK. *Census of consultant physicians and higher specialty trainees in the UK, 2014–15: data and commentary*. London: Royal College of Physicians, 2016.
27. Goldacre M, Goldacre R and Lambert T. Doctors who considered but did not pursue specific clinical specialties as careers: questionnaire surveys. *J R Soc Med* 2012; 105: 166–176.
28. Department of Health. *Improving working lives standard*. London: Department of Health, 2000.
29. Draugalis J and Plaza C. Best practices for survey research reports revisited: implications of target population, probability sampling, and response rate. *Am J Pharm Educ* 2009; 73: 1–3.
30. Ahmed Khan F, Chikkatagaiah S, Shafiullah M, et al. International Medical Graduates (IMGs) in the UK – a systematic review of their acculturation and adaptation. *J Int Migr Integr* 2015; 16: 743–759.