“To Be, or Not to Be” a Nephrologist: Students’ Dilemma and a Strategy for the Field

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Keywords

Nephrology education · Mentors · Perception of nephrology · Nephrology workforce · Career decisions · Nephrology · Kidney medicine · Training · Internal medicine fellows · Recruitment

Abstract

The attractiveness of a career in nephrology has diminished over the past decades, leading to global concerns about the future of the specialty’s workforce. The reasons physicians choose (and do not choose) a career in the field must be identified in order to boost recruitment of new nephrologists. In this article, a multilevel strategy is proposed to deal with the declining interest in the specialty: (1) increasing contact and providing early exposure to nephrology; (2) promoting mentoring and role models in medical schools; (3) improving the experience of trainees and medical students; (4) incorporating procedural skills and combined fellowship training with critical care in nephrology; (5) facilitating exchanges between trainees and young and senior nephrologists; (6) adopting an active approach to identify reasons for dissatisfaction, reduce burnout, and encourage a suitable work-life balance among nephrologists; (7) increasing remuneration; and (8) incentivizing advances in the field. Finally, a positive perspective for nephrology is presented to the next generation.

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Introduction

Interest in the nephrology career has been steadily declining worldwide over the past years, leading to concerns and increased debates on the issue [1–4]. Although the causes of the low attractiveness of a career in nephrology are multifactorial and may vary from country to country, key elements remain constant. At first glance, some nephrologists may view this phenomenon positively, since it leads to less competition in the job market and possibly higher salaries. However, from a broader perspective, little interest in nephrology weakens the field in the long term, as it decreases the medical specialty’s representativeness and may reduce the quality of the nephrology workforce – a natural consequence of a less competitive recruitment process. In addition, it also raises a relevant concern to society: the risk of a shortage of nephrologists – already a reality some countries face.

According to the 2019 Global Kidney Health Atlas, >70% of nations reported a shortage of nephrologists. In addition, disparities in distribution of human resources and healthcare inequalities worsen the scenario. While there are about 25 nephrologists per million population (pmp) in Western, Eastern, and Central Europe, this number is lower in regions such as Latin America (9.8 pmp) and the Middle East (8.1 pmp) and much lower in South Asia (1.2 pmp) and the African continent (0.6

pmp). The prevalence of nephrology trainees also follows this trend; while there are 3.7 pmp in high-income countries, there is a shortage of nephrology trainees in upper-middle (1.2 pmp), lower-middle (0.6 pmp), and low- (0.1 pmp) income countries [5].

Despite its importance, little attention has been paid to recruitment of new nephrology physicians globally. In order to deal with this issue, first we must further understand the causes that lead medical students “to be, or not to be” nephrologists. Then, we will discuss policies and propose actions. After all, when it comes to the future of the workforce, what can we do today for nephrology tomorrow?

“To Be”: Why Do They Choose Nephrology?

A recent study conducted in the UK tried to answer this question. After semistructured qualitative interviews, driven motivators for choosing a career in nephrology were identified. The presence of role models and a previous experience in the field seem to have important influence on career selection. In addition, the research highlighted positive aspects of kidney care, such as the long-term relationship with patients, the continuity of care, and the multidisciplinary environment – being part of a team with dietitians, nurses, and other healthcare professionals. Nephrology was also described as an interesting specialty, with a broad variety of clinical conditions and wide range of medical practice – from specialist to generalist, from management of acutely affected patients to a long-term holistic care. In the respondents’ own words, a nephrologist “never gets bored” [6].

Another UK study reported similar results. Enthusiasm and commitment to the specialty, previous work experience in the field, and contact with a certain professor or department were key driving factors for selecting nephrology as a career. Noteworthy, aspirant nephrologists were not driven by economic factors [7].

A US survey similarly highlighted the importance of a mentor and the interest in kidney physiology. The most important factors related to a nephrology career choice were interest in the subject (92%), a suitable work-life balance (73%), access to mentors (70%), and subject exposure (66%) [8].

A few years before, a larger US survey showed that about half (49%) of the respondents recognized intellectual interest in the kidney as the main motivator for selecting a career in nephrology. As suggested by other studies, early contact with nephrology, mentoring experi-

ence, and previous participation in nephrology electives were also described as important factors [9].

In spite of methodological limitations, due to their retrospective observational nature and some degree of recall, nonresponse, and selection biases potentially present in the aforementioned studies, the overall findings were consistent. Taken together, these studies suggest that the choice for a career in nephrology is mainly influenced by the presence of a role model or mentor, previous experience in the field, interest in the subject, long-term relationship with patients, and an adequate work-life balance. Practical procedures have also been identified by several studies as having influence on the choice of a career in nephrology, although rarely considered among the top motivators [6, 8, 10, 11].

As important as understanding what leads physicians to select a career in nephrology is investigating their satisfaction with their choice. According to the annual Nephrology Fellow Survey conducted by the American Society of Nephrology, each year since this survey’s inception in 2014, an increasing number of nephrology fellows recommend the specialty. In 2015, 67.7% responded they would recommend the specialty for future trainees, whereas in 2019 about 80% of the US nephrology fellows would recommend the field to future trainees. Long-term relationships with patients, intellectual stimulation, and the rewards of a challenging specialty field were usually identified as positive factors for recommending the nephrology career [12].

A relatively high degree of overall career satisfaction among nephrologists has also been reported by other recent studies [9, 13–15]. By assuming the key influence of role models in the career selection, which is true not only for nephrology [16], the satisfaction of nephrology practitioners may be pivotal for attracting interest to the specialty among medical students. How can we serve as positive role models for future kidney doctors if we are not satisfied in our own daily practice? [17].

“Not to Be”: Why Do They Not Choose Nephrology?

Rather than a failure in retention of trained professionals, the nephrology workforce shortage occurs mainly due to a problem in recruitment of new nephrology physicians [3]. In addition to knowing the causes that lead physicians to choose nephrology, we must also be able to answer the opposite question.

A survey conducted with US internal medicine subspecialty fellows aimed to address why they did not choose

Fig. 1. Key factors identified in medical literature that may affect selecting nephrology as a career. Art by Vinicius Carvalho and José A. Moura-Neto, based on Hamlet's epic soliloquy and the poster by the Beggarstaff brothers (William Nicholson & James Pryde), 1894, Museum of Modern Art, New York, NY, USA.

nephrology at the time of specialty selection. About one-quarter of all the nonnephrology fellow respondents had considered nephrology at some point before making the decision and had ultimately changed their minds. When posed the question "what did you not like about nephrology?," the most recurrent answers were complexity of kidney patients, insufficient practical procedures in nephrology, and lack of role models or mentors to guide their path toward the specialty. In sequence, other factors were also listed, such as difficulty of the subject matter, long working hours (work-life balance), low remuneration, and the fact that the subject was not taught adequately during medical school and residency. In the qualitative analyses of the free responses, caring for patients with chronic disease was described as a concern [18].

Conversely, some of the factors identified in this survey as negative influencers are reported by other studies as positive motivators for choosing a career in nephrology, as discussed earlier. However, some may consider the complexity of kidney patients and conditions as a positive motivator, for example [6], nephrology is often negatively described as a difficult and complex subject. In this same US survey with nonnephrology fellows, 31% of the respondents conveyed that nephrology was the most complex subject taught during medical school [18]. In another survey with US medical residents, about one-quarter (23.8%) of respondents considered kidney physiopathology "too complex" [19]. By asking medical residents

and fellows about their impressions during medical school, there might be some degree of recall bias. This percentage may be even higher during graduation, as showed by a survey with third- and fourth-year students from five US medical schools; an impressive 78% described kidney physiopathology courses during graduation as highly complex, of little relevance, or not interesting [4, 20].

In a recent US survey previously discussed in this article, lack of interest in and exposure to the subject, as well as concerns related to poor remuneration and work-life balance, was the main reason to forgo a nephrology fellowship. In addition, respondents cited frustration when dealing with chronic patients and possible patient nonadherence [8]. Recently, lack of advancements and novel therapeutics in the field was identified as a barrier in focus groups of US internal medicine residents – a factor rarely, if ever, mentioned by previous studies [21].

The International Pediatric Nephrology Association also conducted a web-based survey that received responses from 71 countries. Some obstacles to fellow recruitment in pediatric nephrology were listed, such as low trainee interest, perception of low remuneration, lack of government or institutional support, and concerns regarding low availability of jobs for pediatric nephrologists [22]. Figure 1 summarizes the main factors identified in the literature that drive physicians "to be, or not to be" nephrologists.

Table 1. Proposed actions at different levels to improve recruitment of nephrology physicians

Medical school level	Fellowship/residency level	Professional level
Providing early exposure to nephrology		
Increasing contact to nephrology	Incorporating procedural skills in nephrology training (interventional nephrology)	An active approach to identify and address reasons for dissatisfaction among nephrologists
Promoting mentoring and role models in medical schools	Combined training with critical care	Strategies to reduce burnout among nephrologists
Improving experience of medical students and promoting uncomplicated teaching of nephrology	Improving experience of trainees	Increasing remuneration and monetary benefits
<ul style="list-style-type: none"> – Novel educational tools – Innovative learning methodology – Use of technology – Broadening the scope of the discipline 	Facilitating exchanges between trainees and young and senior nephrologists	<ul style="list-style-type: none"> Encouraging a suitable work-life balance Incentivizing research and advances in the field

What Can We Do? A Multilevel Strategy for Nephrology

National societies have been promoting efforts and leading initiatives in the past decades to address this issue and increase interest in nephrology [23]. Focus groups composed by kidney educators from top US medical schools responsible for future nephrologists' certification identified factors that in their view contributed to educational success and may shed light on the discussion of a strategy for nephrology. They are nephrology faculty interaction with students; clinical exposure to nephrology and clinical relevance of kidney physiopathology materials; use of innovative educational techniques; and exposure, particularly early exposure, to the breadth of nephrology practice [24].

Some strategies could be intuitively drawn based on the main reasons that lead physicians to choose a career in nephrology. Several of these proposed actions can be done at the university level – where nephrology should shift its focus for a while in order to improve recruitment of new nephrology physicians. The presence of role models and/or mentors is probably the major factor that needs to be addressed. Strengthening nephrology in medical schools, with good professors who in addition to traditionally teaching the subject can also serve as role models, and increasing the contact students have with the field are some of the actions that can be performed.

For many students during medical school, nephrology is a complex and difficult course, which may lead them to not consider the field when selecting a specialty. Jhaveri et al. [18] reported, among US fellows, that 31% of re-

spondents indicated nephrology as the most difficult physiology course during medical school. Of note, if nephrology were taught adequately, they might have considered a career in the field. Acid-base and electrolyte disorders, sodium and water homeostasis, glomerular diseases, and dialysis modalities are commonly referred to as the most difficult topics [18, 25]. Kidney educators should try to make it fun, simple, and less complex, especially these topics. Thus, innovative tools and technologies as well as novel educational methodologies, such as the problem-based learning method, creative writing exercises, nephrology puzzles, role-playing teaching games, and e-learning, should be part of a broader strategy to improve recruitment in nephrology [8, 26].

In addition, few nephrology courses address current topics such as bioethics and cultural competency [23, 25]. Although concerning, this deficiency creates an opportunity to widen the basic scope of the discipline and introduce a multidisciplinary approach, focusing on innovative areas. Combined training with critical care and procedural skill training (interventional nephrology) are other opportunities to improve the attractiveness of nephrology among physicians [8].

There is a strong belief that decisions regarding the choice of the medical specialty tend to be made early, as suggested by Beckwith et al. [6]. Noteworthy, even when the final decision is made afterward, initial interest in the specialty commonly occurs during or even before medical school, in a proportion that varies from 44 to 64.9% in the literature [9, 19]. Previous contact in the field – practical work or research experience – has been constantly identified as a positive motivator for choosing nephrol-

ogy [6, 7, 9]. Therefore, promoting early exposure to the specialty may be beneficial, especially if associated with strategies to sustain the interest in nephrology during medical school [7].

At the professional level, encouraging advancements in the field, as suggested by Beck et al. [21], may have a positive long-term effect on nephrology recruitment. The satisfaction of current nephrologists is another point of focus. A recent survey investigated burnout among US nephrology fellows and reported a concerning prevalence of 35.4% of self-reported depressive symptoms [13]. Moreover, perception of low financial benefits, which may be true in some regions, has been indicated by studies [8, 18, 22] and may contribute to little satisfaction among nephrologists. Thus, general strategies to reduce burnout, improve quality of work, and increase remuneration are not only a moral duty for nephrology – “to take care of the current workforce” – but it is also a good strategy to recruit new nephrology physicians.

Lastly, nephrology should use successful experiences as models when discussing strategies at national or international society levels. In the past years, nephrology has become an attractive career in France, ranked among the top specialties selected. Several reasons have been listed for its success, such as a wide range of activities (clinical nephrology, kidney transplantation, and dialysis), the University College of Nephrology Teachers (CUEN) initiative, the dynamism of the national societies and nephrology departments in the medical schools, and development of platforms where fellows and nephrologists can meet [27, 28]. Table 1 lists possible actions that can be taken at different levels to boost recruitment of nephrologists.

Specialty with a Purpose: A Positive “Between-the-Line” Perspective from an Enthusiastic Nephrologist

Surveys may not identify subjective factors or society and market trends, and they certainly do not reflect the passion of respondents. So, what factors exist between the lines of the previously cited articles that might influence young physicians’ decision?

The current market is encouraging to nephrologists. A broad variety of roles and jobs in the sector are available – ranging from basic research to various positions in dialysis and pharmaceutical companies. In a multibillion-dollar industry with a strong presence in many countries, nephrologists with eclectic profiles combining management abilities, soft skills, and technical knowledge often occupy leadership positions.

The specialty also offers flexibility and the opportunity for a “portfolio” career, which means “having multiple jobs instead of a full-time job” [6]. If the professional decides to become a clinical practitioner, he/she can act as a specialist or a generalist, when providing holistic and long-term care for dialysis and kidney transplanted patients. Diversity of patients and clinical conditions make the job dynamic, rather the opposite of a monotonous routine.

As a medical discipline, nephrology is both complex and beautiful at the same time. While many topics have been widely studied, which results in a strong evidence-based framework, there are still subjects, such as glomerular diseases and kidney transplantation, that are full of controversies and gaps of knowledge. Although this was already described as a possible negative factor [21], a “glass half-full” outlook shows a fertile ground for young investigators eager to contribute and make a positive impact on the field. Its complexity turns nephrology not only charming but also respected in internal medicine. Nephrologists are often recognized as good clinicians. Of note, when fiction had to create a brilliant (and quite polemic) doctor to represent state-of-the-art clinical reasoning – Doctor House, played by the British actor Hugh Laurie – they made him a nephrologist!

Finally, nephrology needs a future generation of leaders with huge ambitions. Chronic kidney disease and the inequitable access to kidney care are indeed global major issues. Several developing countries still do not provide adequate access to dialysis or kidney transplantation, leading to 2.3–7.1 million deaths annually, a phenomenon called “renal replacement therapy gap” [29]. Sooner or later, the global nephrology community should shift its focus to this issue [30]. More than a sizable workforce, we will need to recruit idealists who are passionate and enthusiastic about social advancement. The so-called millennials are becoming doctors – a generation driven by “jobs with a purpose” and that “dreams of changing the world.” Within nephrology, they will have a chance; there are plenty of opportunities for young physicians with humanistic and altruistic aspirations. Are you up to this challenge?

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Conflict of Interest Statement

The author declares himself completely passionate about nephrology, which occasionally can lead to a biased view of the field. There are no other conflicts of interest to declare.

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References

- 1 Sharif MU, Elsayed ME, Stack AG. The global nephrology workforce: emerging threats and potential solutions. *Clin Kidney J*. 2016;9(1): 11–22.
- 2 Kalloo SD, Mathew RO, Asif A. Is nephrology specialty at risk? *Kidney Int*. 2016 Jul;90(1): 31–3.
- 3 Lane CA, Brown MA. Nephrology: a specialty in need of resuscitation?. *Kidney Int*. 2009; 76(6):594–6.
- 4 Parker MG, Ibrahim T, Shaffer R, Rosner MH, Molitoris BA. The future nephrology workforce: will there be one? *Clin J Am Soc Nephrol*. 2011;6(6):1501–6.
- 5 Bello A, Levin A, Lunney M, Osman M, Ye F, Ashuntantang G, et al. *ISN global kidney health atlas 2019*. Brussels, Belgium: International Society of Nephrology; 2019. <https://www.theisn.org/focus/ckd#health-atlas>.
- 6 Beckwith H, Kingsbury M, Horsburgh J. Why do people choose nephrology? Identifying positive motivators to aid recruitment and retention. *Clin Kidney J*. 2018;11(5):599–604.
- 7 Barat A, Goldacre MJ, Lambert TW. Career choices for nephrology and factors influencing them: surveys of UK medical graduates. *RSM Open*. 2018;9(8):2054270418793024.
- 8 Nair D, Pivert KA, Baudy A 4th, Thakar CV. Perceptions of nephrology among medical students internal medicine residents: a national survey among institutions with nephrology exposure. *BMC Nephrol*. 2019 Apr; 20:146.
- 9 McMahon GM, Thomas L, Tucker JK, Lin J. Factors in career choice among US nephrologists. *Clin J Am Soc Nephrol*. 2012;7(11): 1786–92.
- 10 Royal College of Physicians. The medical registrar: empowering the unsung heroes of patient care. 2013.
- 11 Nakhoul GN, Mehdi A, Taliencio JJ, Brateanu A, Diwakar A, Daou R, et al. Residents' perception of the nephrology specialty. *Kidney Int Rep*. 2020 Jan;5(1):94–9.
- 12 Pivert K, Boyle S, Chan L, McDyre K, Mehdi A, Norouzi S, et al. 2019 nephrology fellow survey-results and insights. In: *ASN survey*. Washington, DC: ASN Alliance for Kidney Health; 2019.
- 13 Agrawal V, Plantinga L, Abdel-Kader K, Pivert K, Provenzano A, Soman S, et al. Burnout and emotional well-being among nephrology fellows: a national online survey. *J Am Soc Nephrol*. 2020 Apr;31(4):675–85.
- 14 Ward DR, Manns B, Gil S, Au F, Kappel JE. Results of the 2014–2015 Canadian Society of Nephrology workforce survey. *Can J Kidney Health Dis*. 2016;3:25.
- 15 Hassen M, Archer E, Pellizzon A, Chikte UME, Davids MR. Human resources for nephrology in South Africa: a mixed-methods study. *PLoS One*. 2020 Feb;15(2):e0228890.
- 16 Borges NJ, Navarro AM, Grover A, Hoban JD. How, when, and why do physicians choose careers in academic medicine? A literature review. *Acad Med*. 2010;85(4):680–6.
- 17 Adams ND. Attracting more residents into nephrology. *Clin J Am Soc Nephrol*. 2012; 7(9):1382–4.
- 18 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(4): 540–6.
- 19 Daniels MN, Maynard S, Porter J, Kincaid H, Jain D, Aslam N, et al. Career interest and perceptions of nephrology: a repeated cross sectional survey of internal medicine residents. *PLoS One*. 2017;12:e0172167.
- 20 Rosner M, Parker M, Kohan D. Nephrology as a career choice: a survey of medical students. *J Am Soc Neph*. 2009;20(s):SA PO2867.
- 21 Beck N, Furgeson S, Chonchol M, Kendrick J. Internal medicine residents' perceptions of nephrology as a career: a focus group study. *Kidney360*. 2020 Aug;1(10):1052–9.
- 22 Glenn D, Ocegueda S, Nazareth M, Zhong Y, Weinstein A, Primack W, et al. The global pediatric nephrology workforce: a survey of the International Pediatric Nephrology Association. *BMC Nephrol*. 2016;17(1):83.
- 23 Parker MG, Pivert KA, Ibrahim T, Molitoris BA. Recruiting the next generation of nephrologists. *Adv Chronic Kidney Dis*. 2013; 20(4):326–35.
- 24 Sozio SM, Pivert KA, Shah HH, Chakkera HA, Asmar AR, Varma MR, et al. Increasing medical student interest in nephrology. *Am J Nephrol*. 2019;50(1):4–10.
- 25 Hoenig MP, Shapiro E, Hladik GA. Lessons learned from the ASN Renal Educator Listserv and survey. *Clin J Am Soc Nephrol*. 2013 Jun;8(6):1054–60.
- 26 Calderon KR, Vij RS, Mattana J, Jhaveri KD. Innovative teaching tools in nephrology. *Kidney Int*. 2011;79(8):797–9.
- 27 Brasme R, Larceneux F, Delion A, Aubert O, Bertocchio JP. French teaching in nephrology: what is the residents' feeling? Results from the first national survey. *Nephrol Ther*. 2017; 13(6):485–94.
- 28 Canaud B, Choukroun G. Nephrology in France. In: Moura-Neto JA, Divino-Filho JC, Ronco C, editors. *Nephrology worldwide*. 1st ed. Basel: Springer Nature Switzerland AG; 2021. p. 521–541.
- 29 Liyanage T, Ninomiya T, Jha V, Neal B, Patrice HM, Okpechi I, et al. Worldwide access to treatment for end-stage kidney disease: a systematic review. *Lancet*. 2015;385(9981): 1975–82.
- 30 Moura-Neto JA, Divino-Filho JC, Ronco C. Nephrology worldwide: the vision, the project, and the mission. In: Moura-Neto JA, Divino-Filho JC, Ronco C, editors. *Nephrology worldwide*. 1st ed. Basel: Springer Nature Switzerland AG; 2021. p. 1–9.