Reenvisioning the Adult Nephrology Workforce: The Future of Kidney Care in the United States

The cover image in this issue of *Advances in Chronic Kidney Disease* illustrates the various components (pieces) that make up the nephrology workforce. Although our nephrology community strives to complete this puzzle, these pieces are dynamic and constantly evolving. It is up to our community to react to changes in kidney care to ensure our workforce is able to provide optimal care for patients with kidney disease.

Over the last decade, the field of nephrology has had an opportunity to reflect, reaffirm, and reassert its importance in the healthcare landscape. The original impetus for this inspection was the downturn in the number of trainees choosing nephrology as a career path.[1] The historical context of nephrology is built on dialysis. In fact, the existence of nephrology as a career path in the United States is relatively young – nephrology was first listed in the American College of Physicians directory in 1965 and the American Society of Nephrology was founded in 1966.[2] While many researchers were actively investigating kidney physiology, it was not until the advent of and ability to perform dialysis on a long-term basis that the field of nephrology was born.[3] In 1972, the US Congress approved the Social Security Amendments extending Medicare coverage to individuals with end-stage kidney disease.[4] The 2019 Presidential Executive Order, Advancing American Kidney Health, has the potential to alter the trajectory of the nephrology workforce just as dramatically as the Medicare expansion did in 1972.[5] More recently, the coronavirus disease 2019 (COVID-19) pandemic has further stressed both nephrology and the entire healthcare system because of the increased volume of critically ill patients.[3] However, the pandemic has also demonstrated the importance and need for nephrologists to treat patients who are critically ill and deliver care to a vulnerable group of patients.[4] This issue of *Advances in Chronic Kidney Diseases* examines the current state and future of the nephrology workforce while also providing a closer look into how the nephrology workforce puzzle (depicted on this issue's cover) comes together, by focusing on individual pieces in each article. Diversity of career paths in nephrology has expanded and matured. This issue provides an overview of these career paths as well as changes and adaptations, discusses challenges that must be overcome to sustain our workforce, and finally outlines opportunities for continued growth that will allow for the delivery of optimal care to patients with kidney disease.

The clinician educator pathway reviewed by Roberts and colleagues (pp 312-319) represents an important and growing career path. Opportunities for career advancement strategies, grants, potential institutional roles, educational research, emerging teaching tools, and career development are reviewed in detail. It has become clear that the clinician educator pathway needs more structure and opportunities for academic growth. Furthermore, nephrology education delivery methods have been transforming.[5] Shaikh and colleagues (pp 291-296) discuss the rapidly changing ways in which education in nephrology is being taught, spanning the spectrum from medical school to nephrology fellowship.

Lederer and Lebowitz (pp 281-290) provide an overview of the current state of the nephrology workforce and review the challenges of recruiting trainees in the context of nephrology's past, present, and future. They discuss the importance of diversity and inclusion in all aspects of our workforce and highlight examples of growth in these areas.[6] Next, Neyra and colleagues (pp 297-304) provide a framework for both international medical graduates, a substantial proportion of our workforce, and training programs can use to successfully navigate the complex immigration process.[7] Rangarajan and Agarwal (pp 305-311) then review the current state of research funding, discuss the impact of the KidneyX initiative,[8] the role of the Advancing American Kidney Health Executive Order, National Institutes of Health funding, and other initiatives on the future of research funding in nephrology. To discover novel therapeutics to treat patients with kidney disease, modernize dialysis delivery, reduce healthcare disparities, and improve the care of patients with kidney disease, research priorities need emphasis and broad buy-in from multiple stakeholders. Nephrology researchers and academicians are outnumbered by those physicians in private practice, the largest part of the nephrology workforce. Agha and colleagues (pp 356-360) provide a roadmap for fellowship programs to incorporate important concepts germane to a successful transition to private practice. They also discuss the unique landscape and varied practice models that are currently being used in private practice nephrology.

While general nephrology has dominated potential career paths in nephrology, subspecialization is becoming increasingly common. For patients with end-stage kidney disease, kidney transplantation represents the best form therapy in terms of both quality and quantity of life.[9] Transplant nephrology is the most well-defined career path for subspecialization in nephrology.[10] Concepcion and colleagues (pp 336-343) review the kidney transplant workforce, available educational tracks, and discuss the role of the transplant nephrologist. Interventional nephrology is a growing area of subspecialization in nephrology.[11,12] Dua Niyyar

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and Beathard (pp 344-349) review the educational curricula and discuss opportunities and challenges that can lead to growth of the interventional nephrology subspecialty. End-of-life care is an essential component to taking care of patients with kidney disease.[13] As palliative care is growing as a field, many nephrologists are choosing to further subspecialize in nephrology palliative care. Gelfand and colleagues (pp 350-355) examine the palliative care workforce and discuss the importance of incorporating palliative care into the general nephrology fellowship curriculum. Providing care to patients with critical illness is also becoming a growing area of subspecialization.[14] Zeidman and colleagues (pp 328-335) examine the intersection of nephrology with critical care, describe varying models of practice, and discuss the potential future of critical care nephrology. Finally, Sachdeva and colleagues (pp 320-327) review several emerging areas of subspecialization including glomerular disorders, home dialysis, onconephrology, cardio-nephrology, obstetric nephrology, and uronephrology.

The nephrology workforce is experiencing a rebirth in multiple domains. While growth and growing pains can certainly be a challenge, we would argue that the last decade has allowed our nephrology community to reexamine our priorities, broaden our horizons and use our strengths to further subspecialize, sharpen and strengthen our educational content, and begin to invest in our future – together, these actions allow for a reimagined workforce. Landmark policy that has been enacted already will directly impact how care is delivered to patients with kidney disease. The goal of the Advancing American Kidney Health Executive Order is to shift care from free standing dialysis clinics to more home-based dialysis modalities, dramatically increase the number of patients receiving kidney transplants, and invest in research that will modernize dialysis technology and result in novel therapeutics to halt the thus far unstoppable progression of kidney disease. How this policy will affect the workforce remains a work in progress. We must ensure the future workforce is diverse, multidisciplinary, and dedicated to improving the lives of patients with kidney disease. The COVID-19 pandemic has demonstrated the vital role nephrologists play in public health, especially during a health crisis, and has accelerated several initiatives already in progress. Examples include an emphasis on remote learning and Free Open Access Medical Education (FOAMed), telehealth, implementation of acute peritoneal dialysis, novel dialysis methods in intensive care units, increased home-based dialysis, and improved reimbursement for remote health care. Working toward a complete nephrology workforce puzzle will position our field to meet the ever increasing needs of patients with kidney disease – and the pieces are beginning to fall into place.

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