

Nephrology Advanced Practitioners in the United States, 2010-2018

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Aging of the population in the United States and increasing incidence of chronic diseases such as diabetes, hypertension, and CKD have contributed to a growing demand for healthcare services. Increasingly, healthcare organizations employ Physician Assistants (PAs) and Nurse Practitioners (NPs), known collectively as Advanced Practitioners (APs) to meet this growth (1).

A substantial need for APs in nephrology emerged in 2004 after the Centers for Medicare and Medicaid Services changed physician reimbursement for outpatient dialysis to encourage frequent face-to-face visits. Between 2004 and 2013, 75% of nephrology practices nationwide added an AP (2). Among nephrology PAs surveyed in 2008, >90% of respondents reported seeing hemodialysis patients (3).

Over the past decade, clinicians have faced new challenges in caring for patients with kidney disease. Challenges include incentives to co-ordinate care, adapting to the implementation of value-based payment for dialysis, and declining numbers of physician trainees (4). It is unknown whether the role of nephrology APs has changed in response to these new challenges.

Since 2010 the National Kidney Foundation (NKF) has administered a biannual, standardized online survey to its AP membership asking about demographics, scope of practice, and work experience. NKF members are asked to share the survey link with colleagues. We analyzed survey data from 2010 to 2018 to describe the scope of AP activities and to identify changes over time. Our primary outcome was the proportion of time APs reported spending in the following activity categories: dialysis (hemodialysis or peritoneal), office/clinic, hospital, education, administrative, interventional, and research. Among APs who reported providing outpatient dialysis care, we also examined changes over time in hemodialysis-related tasks. We conducted univariate analyses to identify linear time trends in reported activities, using *P* values <0.05 to identify statistically significant differences. Because of large differences in survey methodology, we excluded surveys administered in 2016. The study protocol was approved by an Institutional Review Board at Baylor College of Medicine.

During the study period, 1088 APs responded to survey questions about practice scope. In 2018, nephrology APs spent 53% of their time providing outpatient hemodialysis care, 23% of their time caring

for patients in the office/clinic, and 14% of their time providing hospital care. This was unchanged over the period from 2010 to 2018. Remaining AP time (<5% in each activity in all survey years) was spent providing peritoneal dialysis, education, research, and administrative tasks; time in interventional nephrology and working with industry were negligible. During the study period, nephrology APs reported spending an increasing proportion of their time in administrative tasks (3.2% in 2018 versus 1.7% in 2010; *P*=0.04), although overall time spent in administrative tasks remained small (Table 1).

The distributions of practitioners who reported working in hospitals and in the clinic/office were skewed. In 2018, 59% of APs reported spending no time providing hospital care, while 32% reported spending no time providing office/clinic care. These percentages remained stable during the study period. Depending on the survey year, between 86% and 88% of APs reported providing any hemodialysis care. Among those who reported providing hemodialysis care, the proportions who worked on monthly notes, protocols, medication lists, forms, and providing call coverage increased over time (Table 1).

Our comparison of national surveys administered to nephrology APs between 2010 and 2018 indicates that a majority of nephrology AP time remained devoted to providing hemodialysis care. Yet, some practitioners also focused on other clinical areas (*e.g.*, hospital or office/clinic). Significant increases in the amount of time spent in administrative tasks reflect a national trend toward increasing administrative demands of clinicians (2).

Expansion of Medicare's ESKD Prospective Payment System in 2011 led to an increase in protocol-driven dialysis care as dialysis facilities became more involved in decisions about the administration of injectable medications. A focus on quality metrics such as hospital readmissions created new incentives for dialysis providers to co-ordinate care. The responsibilities of APs in dialysis appear to have adapted in order to meet these challenges with APs spending an increasing amount of time creating protocols and reconciling medications. Meanwhile, recent declines in the numbers of nephrology trainees may account for part of the observed increase in call responsibilities among APs (4,5).

Strengths of this study include 8 years of survey data, nationwide coverage, and high survey response

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Table 1. Changes over Time in Reported Advanced Practitioner Activities

| Survey Year | 2010 (n=276) ^b | 2012 (n=280) ^b | 2014 (n=244) ^b | 2018 (n=288) ^b | P Value ^a (linear trend) |
|---|---------------------------|---------------------------|---------------------------|---------------------------|--|
| Overall activities, % of total time (SD) | | | | | |
| Hemodialysis | 54 (33) | 53 (33) | 55 (33) | 53.0 (33) | 0.9 |
| Peritoneal dialysis | 2.0 (5.8) | 2.5 (5.9) | 2.3 (5.3) | 2.8 (7.2) | 0.2 |
| Hospital ^c | 14 (25) | 15 (26) | 14 (25) | 14 (26) | 0.9 |
| Interventional ^d | 0.3 (2.3) | 0.4 (3.6) | 0.6 (5.8) | 0.1 (0.9) | 0.4 |
| Education ^c | 3.0 (7.9) | 3.5 (10.2) | 2.7 (6.6) | 2.5 (7.9) | 0.3 |
| Private industry ^d | 0.4 (6.2) | 0.1 (1.2) | 0.1 (1.4) | 0.4 (4.9) | 0.9 |
| Office ^c | 24 (28) | 21 (27) | 22 (24) | 23 (25) | 1.0 |
| Research ^c | 1.6 (6.6) | 1.7 (7.3) | 1.3 (4.0) | 1.1 (5.2) | 0.3 |
| Administrative ^c | 1.7 (7.1) | 2.3 (9.0) | 2.7 (8.4) | 3.2 (10.0) | 0.04 |
| Hemodialysis activities, % of practitioners reporting any time spent | | | | | |
| Weekly rounds | 95 | 95 | 97 | 94 | 0.6 |
| Monthly note | 48 | 50 | 48 | 60 | 0.01 |
| History and physicals | 70 | 75 | 74 | 70 | 0.8 |
| Protocol management | 56 | 61 | 64 | 74 | <0.001 |
| Primary care | 78 | 72 | 36 | 74 | 0.5 |
| Quality improvement | 39 | 42 | 40 | 37 | 0.5 |
| Care plans | 53 | 57 | 53 | 59 | 0.2 |
| Medication lists | 39 | 39 | 41 | 59 | <0.001 |
| Patient forms | 37 | 38 | 34 | 45 | 0.049 |
| Call coverage | 51 | 63 | 71 | 72 | <0.001 |

Data stratified by percentile are the percentage of time that practitioners report spending in each activity, averaged across all practitioners in a given percentile ranking of time spent in that activity. Separate percentile ranks were calculated for each activity.

^aP-values represent a test of a linear time trend that includes all survey years and is based on a 95% confidence interval. Linear regression was used to evaluate continuous variables and a Cochran-Armitage test was used to evaluate linear trends in proportions.

^bCombined numbers of surveys sent to NKF members and to other APs is unknown.

^cSkewed response distributions with the following 50th–90th percentile ranges in 2018: peritoneal dialysis 0%–10%; hospital 0%–50%; education 0%–5%; office 15%–65%; research 0%–5%; administrative 0%–10%.

^d90th percentile reported 0% time participating in this activity in 2018.

rates. Limitations include self-reporting, a “snapshot” of practice patterns, and the absence of information about trends in transplant care. Future studies will need to investigate whether observed changes in AP activities are associated with improvements in care delivery.

In summary, the scope of responsibilities of nephrology APs appear to change in response to changing clinical demands, particularly in the delivery of dialysis care. These findings suggest that APs will continue to have a critical role in meeting current and future challenges of delivering high-quality care to patients with kidney disease.

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