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American Journal of Medical Quality published online 9 May 2011
DOI: 10.1177/1062860611402984

American Journal of Medical Quality
1–9

DOI: 10.1177/1062860611402984
http://ajm.sagepub.com

Physician Assistant and Nurse Practitioner Utilization in Academic Medical Centers

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Abstract

The purpose of this study was to collect information on the utilization of physician assistants (PAs) and nurse practitioners (NPs) in academic health centers. Data were gathered from a national sample of University HealthSystem Consortium member academic medical centers (AMCs). PAs and NPs have been integrated into most services of respondent AMCs, where they are positively rated for the value they bring to these organizations. The primary reason cited by most AMCs for employing PAs and NPs was Accreditation Council for Graduate Medical Education resident duty hour restrictions (26.9%). Secondary reasons for employing PAs and NPs include increasing patient throughput (88%), increasing patient access (77%), improving patient safety/quality (77%), reducing length of stay (73%), and improving continuity of care (73%). However, 69% of AMCs report they have not successfully documented the financial impact of PA/NP practice or outcomes associated with individual PA or NP care.

Keywords

physician assistant, nurse practitioner, productivity, outcomes, workforce

Since 1967, the American health care system has expanded to include the roles of advanced practice providers such as physician assistants (PAs) and nurse practitioners (NPs), who, when used optimally, provide services traditionally performed by physicians. It is estimated that there are currently more than 210 000 PAs and NPs in the United States (74 469 PAs and 140 000 NPs).[1-3] Over the past 2 decades, the supply of PAs and NPs has grown at a faster rate than the supply of physicians,[1-4] and PAs and NPs practice in virtually every clinical setting and in virtually every medical and surgical specialty. A recent driver of this trend has been the restrictions on resident duty hours implemented by the Accreditation Council for Graduate Medical Education (ACGME) in 2003. NPs and PAs have been used increasingly in the management of hospitalized patients and have been identified as a solution for meeting the physician manpower shortage caused by the implementation of ACGME regulations.[5,6] With potential further reductions in resident duty hours on the horizon, the need for an additional workforce is anticipated to increase significantly as early as July 2011, with approximately 5984 PAs and NPs needed to help bridge this gap.[7] In addition, the United States is on the verge of a significant physician shortage. The Association of Academic Medical Colleges (AAMC) estimates a shortage of 124 000 to 159 000 physicians by 2025.[1] The AAMC predicts that even if the PA and NP workforce supply were to double by 2025, the projected physician demand would be reduced by only 75 500 physicians. All these predictions predate national health care reform, which will extend coverage to an additional 32 million Americans in the coming years, placing additional strain on an already burdened system and increasing the projected shortfall of physicians by as much as 25%.[1] NPs

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Funding and support for this project was provided by the University HealthSystem Consortium.

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and PAs have been identified as one solution to meet the looming workforce shortage and to meet the increasing need for health services in the US population.[7-10] At issue is how to use and integrate a growing supply of NPs and PAs into the care of patients and to bridge the gaps in access and quality. As impending health care workforce shortage predictions intensify the interest in and need to better understand PA and NP utilization, productivity, and value, the purpose of this study was to collect information on the different ways that academic medical centers, the engine of medical advances and education, use PAs and NPs to deliver care, how they measure performance, and how they support these positions financially. Results reported in this article could be the benchmark for inter-institutional comparison and longitudinal follow-up.

Methods

In collaboration with the University HealthSystem Consortium (UHC) Midlevel Provider Benchmarking Project Steering Committee, we developed a structured 3-part questionnaire that was administered by e-mail to academic medical centers. UHC is an alliance of 107 academic medical centers and 233 of their affiliated hospitals, representing approximately 90% of the nation's nonprofit academic medical centers. An invitation to participate in the study was sent via e-mail to benchmarking coordinators at 74 UHC member academic medical centers in June 2009. These 74 academic centers were selected because they participate in the UHC Imperatives for Quality program (formerly known as Benchmarking and Improvement Services program). The survey was adapted from prior national surveys conducted on PA and NP roles. It contained 82 questions overall and was designed to be completed in 3 hours or less. Face validity was established with a panel of NP and PA experts. Prior to sending the questionnaire, 2 conference calls were conducted with study participants in June and July 2009 to facilitate their participation, address their questions, and provide any needed clarifications. Data collection began in July 2009 and was completed in early September 2009. The reporting period for most questions pertained to the most recent 12 months. For questions on policies and procedures, answers were requested based on what was currently in place at member organizations at the time of survey completion.

Survey Instrument

Part 1 of the survey consisted of a self-assessment of the perceived organizational value of PAs and NPs and was completed by a consensus of the following organizational leaders (or their designees): chief operating officer, chief medical officer, representative of the faculty practice group, chief PA or PA representative, performance improvement staff member, finance representative, chief nursing officer, and ambulatory care leader. This portion of the survey consisted of 15 fixed-choice items on a Likert-type scale and 2 open-ended questions.

Part 2 of the survey involved an assessment of each academic medical center's characteristics related to PA and NP integration and was inclusive of organizational demographics, organizational structure, professional growth opportunities, PA/NP role and level of resident substitution, payment and billing processes, financial impact, productivity, patient outcomes, patient satisfaction, credentialing and ongoing evaluation, as well as orientation and training processes. This portion of the survey contained 63 questions—49 fixed-choice and 14-open ended questions.

Part 3 of the survey consisted of 2 open-ended items to identify innovative strategies related to deployment of PAs and NPs or to solicit additional comments the respondents wished to provide.

This article is focused on organizational demographics, role and level of resident substitution, financial impact, productivity, patient outcomes, patient satisfaction, and perceived organizational value of PAs and NPs.

Results

Organizational Demographics

Of the 74 UHC member academic medical centers invited to participate in the study, 26 (35%) responded. The responding medical centers are listed in Table 1. The geographic distribution of responding academic centers is displayed in Figure 1.

The number of active physicians in the study sample ranged from 350 to 2700 (mean = 1052) per medical center, the number of NPs ranged from 48 to 352 (mean = 119) per medical center, and the number of PAs ranged from 2 to 181 (mean = 49) per medical center. The ratio of PAs/NPs to physicians ranged from 1/3.7 to 1/18.5 (median = 1/5.3; Table 1). Virtually every medical center uses both PAs and NPs across most services (Table 2). Nineteen medical centers (73%) reported that PAs functioned in outpatient clinics; 25 (96%) had NPs functioning in this setting. Similarly, 17 medical centers (65%) reported that PAs worked in primary care; 21 (81%) had NPs working in primary care. Surgical care was a responsibility for PAs in 15 (58%) medical centers and for NPs in 20 (77%) medical centers.

The average length of time to fill a vacancy (defined as time from job posted to start date) ranged from 3.5 to 95.5 weeks (mean = 17.6 weeks) for NPs and from 3.5 to 63 weeks (mean = 18.7 weeks) for PAs.

Table 1. Respondent Academic Medical Center Demographics, Staffing

AMC Name (City, State)	Active Physicians	NPs	PAs	Ratio
University of Colorado (Denver, CO)	1072	69	29	1/10.9
Stanford Hospital and Clinics (Stanford, CA)	1800	100	45	1/12.4
University Hospital of the SUNY Upstate Medical University (Syracuse, NY)	735	116	30	1/5.0
Penn State M.S. Hershey Medical Center (Hershey, PA)	613	78	67	1/4.2
University of Illinois Medical Center at Chicago (Chicago, IL)	980	48	5	1/18.5
UC Davis Medical Center (Sacramento, CA)	880	87	4	1/9.7
University of Pennsylvania Health System (Hospital of the University of Pennsylvania, Philadelphia, PA)	1830	275	70	1/5.3
University of Wisconsin Hospital & Clinics (Madison, WI)	1200	120	95	1/5.6
University of Maryland Medical Center (Baltimore, MD)	1000	150	5	1/6.5
Virginia Commonwealth University Health System (Richmond, VA)	851	156	19	1/4.9
The Nebraska Medical Center (Omaha, NE)	550	88	62	1/3.7
Vanderbilt University Medical Center (Nashville, TN)	—	352	9	—
The Ohio State University Medical Center (Columbus, OH)	1216	177	40	1/5.6
University of Kentucky Hospital (Lexington, KY)	500	64	32	1/5.2
The University of Connecticut Health Center, John Dempsey Hospital (Farmington, CT)	350	50	23	1/4.8
The University of Michigan Hospitals and Health Centers (Ann Arbor, MI)	1599	192	181	1/4.3
North Carolina Baptist Hospital (Wake Forest University Baptist Medical Center, Winston-Salem, NC)	612	68	69	1/4.5
Froedtert Memorial Lutheran Hospital (Milwaukee, WI)	838	102	76	1/4.7
Brigham and Women's Hospital (Boston, MA)	2700	150	130	1/9.6
UNM Hospitals (Albuquerque, NM)	890	120	60	1/4.9
Presbyterian Medical Center (Philadelphia, PA)	—	50	40	—
Fletcher Allen Health Care (Burlington, VT)	771	80	67	1/5.2
UT Southwestern Medical Center University Hospitals-St. Paul (Dallas, TX)	1100	—	—	—
Rush University Medical Center (Chicago, IL)	816	77	40	1/7.0
University of Mississippi Health Care (Jackson, MS)	510	93	2	1/5.4
Barnes-Jewish Hospital (St Louis, MO)	1827	109	17	1/14.5
Summary (26 detail records)				
Mean	1052	119	49	1/7.1
Minimum	350	48	2	1/3.7
Median	885	100	40	1/5.3
Maximum	2700	352	181	1/18.5

Abbreviations: AMC, academic medical center; NP, nurse practitioner; PA, physician assistant.

Level of Resident Substitution and Clinical Roles

Twenty-one academic medical centers (81%) reported using PAs and NPs as resident substitutes. Most reported using PAs and NPs as resident substitutes beyond the first postgraduate year (PGY). In fact, resident substitution occurred, to various extents, across the first 4 years of postgraduate residency: 14% of PAs and NPs were used as PGY-2 resident substitutes, and 33% of PAs and NPs were used as PGY-3 or PGY-4 resident substitutes. No medical centers reported NP/PA substitution for PGY-5 residents. Importantly, 8 respondents (31%) reported that they did not know the equivalent level of functioning when substituting for residents.

NPs were identified as functioning in roles other than direct patient care providers in 16 (62%) medical centers, filling roles such as care coordinator (30%), case manager (23%), and research coordinator (12%). NPs function in clinical nurse specialist roles in 2 medical centers (8%), and in more traditional nursing roles, such as inpatient nursing, in 2 medical centers (8%). PAs are licensed to practice medicine under physician supervision and traditionally do not function in these types of roles.

Financial Impact and Productivity

Eighteen academic medical centers (69%) reported they had not successfully documented the financial impact of PA and NP practice. Six (23%) reported that they were not billing professional services for hospital-employed PAs and NPs. Only 7 (27%) had quantified an increase in expenses related to the increase in PA/NP staffing, and 3 (12%) had

Figure 1. Geographic distribution of respondent academic medical centers

Table 2. Academic Medical Center Services Utilizing PAs and NPs

Service	PA	NP
Behavioral health	1 (4%)	18 (69%)
General surgery	18 (69%)	20 (77%)
Internal medicine	15 (58%)	19 (73%)
Surgical ICU/CCU	7 (27%)	14 (54%)
Medical ICU/CCU	6 (23%)	16 (62%)
Emergency department	17 (65%)	16 (62%)
Hospitalist	8 (31%)	11 (42%)
Orthopedic surgery	20 (77%)	20 (77%)
Neurosurgery	13 (50%)	20 (77%)
Urology	13 (50%)	15 (58%)
Plastic surgery	15 (58%)	13 (50%)
Cardiothoracic surgery	15 (58%)	13 (50%)
Gynecologic	7 (27%)	15 (58%)
Oncology	14 (54%)	24 (92%)
Transplant	11 (42%)	17 (65%)
Pediatrics	6 (23%)	16 (62%)
Neonatal ICU	4 (15%)	18 (69%)
Interventional radiology	8 (31%)	16 (62%)
Other[a]	13 (50%)	12 (46%)

Abbreviations: PA, physician assistant; NP, nurse practitioner; ICU, intensive care unit; CCU, critical care unit.
[a]Other services listed included the following: dermatology, cardiology, anesthesiology, neurology, obstetrics, gynecology, hematology, endocrinology, occupational health, palliative care, EP/cath labs, vascular surgery, bariatric surgery, pulmonology, nephrology, otolaryngology, infectious diseases, radiation oncology, electrophysiology, physical medicine and rehabilitation, gastroenterology, pediatric surgery, family medicine, gerontology, ophthalmology, and trauma surgery.

quantified the cost associated with PA/NP care or the cost of resource utilization associated with PA/NP care.

Sixteen medical centers (57%) tracked work relative value units (wRVUs) for some positions, but 40% of those that tracked wRVUs specified that it was done in a limited capacity, more common for outpatient roles and for physician-employed PAs/NPs and not routinely done for hospital-employed PAs/NPs. Other metrics used by respondent organizations to track PA/NP productivity included ambulatory encounters (77%), hospital encounters (31%), number of procedures (50%), gross charges (58%), collections (42%), number of shared visits for Medicare patients (12%), number of indirect billing visits for Blue Cross patients (12%), and number of visits billed under PA/NP provider number (42%). Very few medical centers had defined productivity targets and those that did generally varied by department. Only 3 (12%) had compensation linked to productivity targets.

Seven medical centers (27%) described tracking the increase in physician productivity associated with the use of PAs and NPs. Of the academic centers that tracked physician productivity associated with advanced practice providers, 5 (19%) tracked bundled revenue, 5 (19%) tracked volume of new patients seen, 3 (12%) tracked volume of surgeries, and 5 (19%) tracked number of new consults.

Outcomes and Patient Satisfaction

The majority of academic medical centers (69%) did not track outcomes associated with individual PA or NP care and were more likely to track complications by service, comparisons across services, or overall outcomes by service. Outcome measures that were being tracked for both PAs and NPs by the remaining respondent medical centers included the following: access to ambulatory care (23%), complications (19%), length of stay (15%), throughput (15%), readmission rates (12%), resource utilization (8%), ventilator days (8%), urinary tract infection rates (4%), ventilator-associated pneumonia rates (4%), venous thromboembolism prophylaxis rates (4%), skin breakdown (4%), and catheter-related bloodstream infection rates (4%). Eleven medical centers (42%) measured patient and family satisfaction related to the care provided by PAs and NPs, but only indirectly (by comments or by medical or surgical service) and not typically associated with individual PAs/NPs.

Value of PAs and NPs to the Organization

Academic medical centers were asked to complete an organizational self-assessment by consensus about the value of advanced practice providers to their organization on a scale of 1 to 5, with 1 being strongly disagree and 5 strongly agree. The highest rated statement (4.5 average) was that "Midlevel providers are easily accessible to other members of the health care team to discuss and provide direction for patient care." The lowest rated statement (2.7 average) was that "Revenue streams have increased for physicians who utilize midlevel providers."

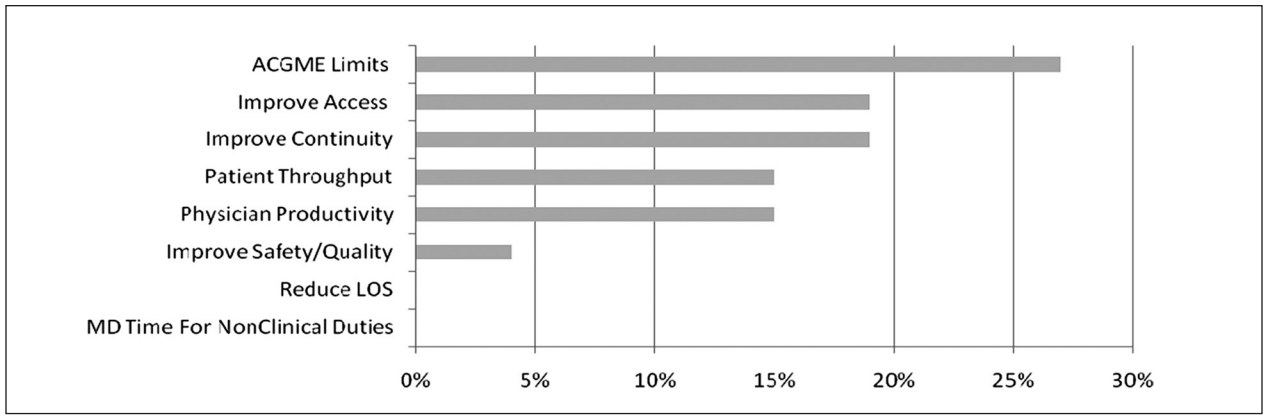

Figure 2. Primary reason for employing PAs and NPs
Abbreviations: PA, physician assistant; NP, nurse practitioner; ACGME, Accreditation Council for Graduate Medical Education; LOS, length of stay.

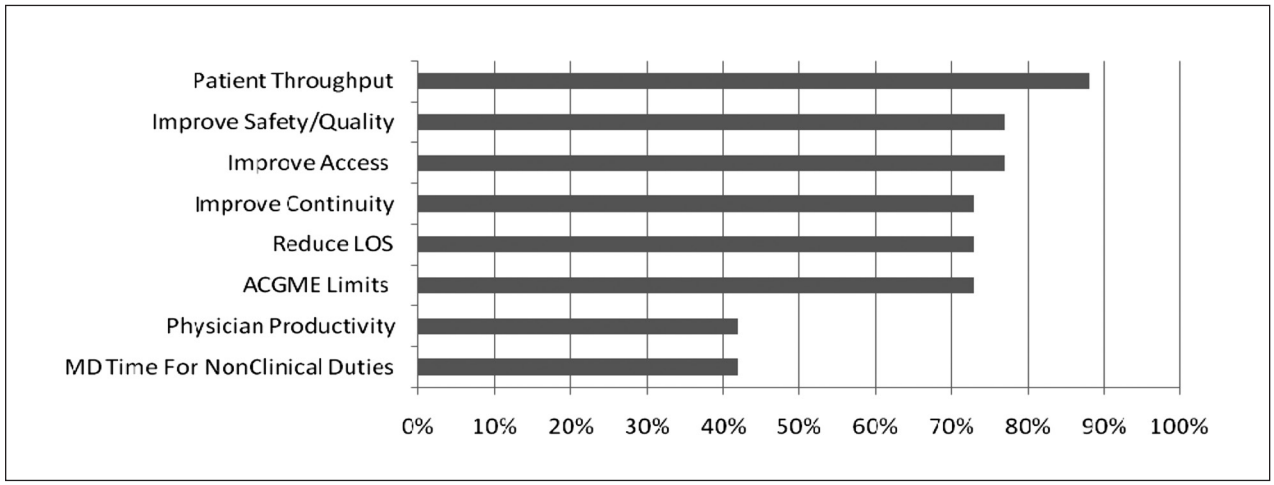

Figure 3. Secondary reasons for employing PAs and NPs
Abbreviations: PA, physician assistant; NP, nurse practitioner; ACGME, Accreditation Council for Graduate Medical Education; LOS, length of stay.

Reasons for employing PAs and NPs in academic medical centers are shown in Figures 2 and 3. The primary reason most commonly cited by respondent medical centers was to satisfy ACGME resident duty hour restrictions (27%). Nineteen (73%) agreed that employing NPs and PAs helped them meet ACGME resident work hour limits. The most common secondary reason to employ advanced practice providers was to increase patient throughput (88%).

Academic medical centers specified that both PAs and NPs could play a stronger role in quality and patient safety initiatives, research, mentorship and precepting new practitioners, protocol implementation, patient flow, leadership, and call coverage.

Discussion

Academic medical centers that employ PAs and NPs report that they provide a high degree of value and contribute to improvements in continuity of care, access, patient safety/quality, physician productivity, patient throughput, length of stay, as well as increasing physician time for other activities. As a result, academic centers around the country have continued to employ greater numbers of PAs and NPs, notably since 2003 with the institution of the 80-hour workweek restriction for residents. Indeed, some academic centers employ as many as 1 PA/NP for every 3.7 physicians. As most academic medical centers agreed that employing NPs and PAs helped them meet ACGME resident work hour limits, it is likely that any further restrictions in resident duty hours will result in an even greater demand for PAs and NPs. Yet supply continues to be an issue for both provider types with the time to fill a position ranging from 3.5 to 95.5 weeks for NPs (mean = 17.6 weeks) and from 3.5 to 63 weeks for PAs (mean = 18.7 weeks). Currently, there are 149 PA programs graduating approx-

imately 4600 graduates per year and nearly 75 000 clinically practicing PAs.[2] The supply of NPs is greater with more than 325 educational programs graduating approximately 8000 NP students per year and approximately 140 000 clinically practicing NPs.[3,5] According to AAMC estimates, even if the supply of PAs and NPs were to double, the physician shortfall would still be substantial.[1] Therefore, it is likely that the United States will need more PAs and NPs to meet the demand for patient care services, and more academic training programs may be required. However, to date most estimations of provider shortages have focused solely on the supply of and demand for physicians. Additional study is required to provide better estimates of the numbers of PAs and NPs required, as well as the appropriate number of training programs necessary to meet the demand.

In addition to requiring greater numbers of PAs and NPs, when this model of care is employed, it will be important that it is leveraged to maximize utilization and efficiency, thereby optimizing return on investment. As evidenced by this study, there are opportunities for improvement in PA and NP utilization within academic medical centers. Most notable are the opportunities to demonstrate financial impact and outcomes of PAs and NPs. Importantly, respondent organizations specified that both PAs and NPs could play a stronger role in quality and patient safety initiatives, research, mentorship and precepting new practitioners, protocol implementation, patient flow, leadership, and call coverage. Although resident substitution, used here as a proxy for level of functioning within the scope of PA or NP license/training, was occurring in 81% of the respondent academic medical centers, the level of substitution and resulting level of functioning varied, with only 27% of medical centers reporting that PAs and NPs function at PGY-3 or higher. This is in contrast to the findings of Riportella-Muller and colleagues who identified 53% of PAs and 62% of NPs substituting for PGY-3 residents and 15% and 18%, respectively, substituting for PGY-5 residents in their 1995 survey of Council of Teaching Hospital members.[11] Their target audience included teaching hospitals whereas ours focused on academic medical centers. Their survey reached 286 teaching hospitals whereas our survey reached only 26 academic medical centers, which could contribute to our disparate findings. In addition, Riportella-Muller et al obtained their results directly from an identified contact person at the department level within 463 clinical departments of the 286 medical centers, whereas we focused on organizational leaders. Consequently, our results should be interpreted carefully. It will be important for future studies that analyze resident substitution with PAs and NPs to obtain data from the department level in order to ensure accuracy.

In spite of the significant investment in NPs and PAs, most respondent academic centers did not measure the financial impact of employing NPs and PAs, or did so in very limited areas. Most medical centers reported difficulty tracking the productivity of their NPs and PAs. One potential consequence of this difficulty is the missed opportunity to bill for provided services. Productivity was tracked by respondent medical centers primarily in the ambulatory setting, using a variety of metrics. Not surprisingly, inpatient productivity metrics are much more limited. PAs and NPs have compared favorably to physicians in a number of studies focused on productivity and cost-effectiveness.[12-22] However, many of these studies occurred in nonacademic primary care settings and focused on PAs and NPs as physician substitutes rather than as members of interdisciplinary health care teams, a model of utilization more common within an academic environment. When making benchmark comparisons, it is always best to compare like specialties and roles in order to make fair judgments on clinical performance. Currently, however, there is little benchmarking data available for PAs and NPs across most specialties and settings, particularly with regard to inpatient roles. Consequently, there is little to guide academic centers in the evaluation of clinical performance of their PAs and NPs. Additional study is required to establish proper benchmarking metrics for PAs and NPs across all specialties and roles, particularly in team-based practice within academic medical centers. Future research focused on the composition of medical teams, the roles of various team members, and overall effectiveness of medical teams involving PAs and NPs also is required.

Nonmonetary contributions are equally important in determining the overall value of PAs and NPs as members of health care teams.[22] A number of studies have focused on outcomes of NPs and PAs in both ambulatory and hospital settings and have substantiated the benefit of NPs and PAs in improving length of stay, mortality, adverse events, continuity of care, increasing adherence to best practice guidelines, and enhancing communication, collaboration, and education.[23-36] However, our analysis showed that most academic centers had not measured the impact of NP- or PA-led interventions; those that did measure reported that the impact was usually very isolated and difficult to quantify. Most did not track patient outcomes related to NP and PA care, primarily because of an inability to match patients to providers. Additional research is required to better assist health care organizations with identification of the proper methods to track productivity, quality, patient satisfaction, and outcomes associated with PA- and NP-provided care. It also will be important that evaluation of PA and NP productivity includes increase in physician revenue and/or the overall economic productivity of the physician–PA/NP team, which our study revealed was occurring in only 27% of respondent academic medical centers.

Our invitation reached 74 UHC member organizations and only 26 (35%) UHC academic medical centers responded. The low response rate may limit the generalizability of our results. It is possible that respondents had more difficulty with PA and NP integration. Alternatively, medical centers that had more experience with the utilization of NPs and PAs may have been more likely to respond. Whichever scenario is more likely, our results may not be generalizable to all organizations that employ NPs and PAs. Another factor that potentially limits the generalizability of our results is that we focused on nonprofit academic centers. It is possible that the results would be different in for-profit hospitals or in private practice environments. Because of the breadth of topics covered, it was difficult to delve into any one subject comprehensively. Consequently, each topic represents a brief overview and additional studies could be conducted within each subject area to elicit more comprehensive results. Our respondent organizations seem to be clustered in the Midwest and along the eastern seaboard, which also could confound the results, particularly considering the variation in state scope-of-practice laws related to PA and NP practice.

We did not assess full-time equivalent (FTE) employee status in addition to overall head count. It is possible that substantial numbers of PAs and NPs work part time, thus inflating the overall head count. Future studies focusing on the performance of PAs and NPs should include FTE employee status and focus primarily on PAs and NPs who practice clinically as direct patient care providers. Of note, 62% of academic centers reported that NPs work in roles other than direct patient care providers, which also may increase head count. It is likely that these roles would be better filled by non–advanced practice personnel, freeing up these providers to focus on direct patient care. Additional information on the integration of NPs into other roles and the resulting impact on institutional outcomes require further assessment.

We are facing a looming health care provider shortage. This benchmarking report provides updated information on the utilization of NPs and PAs in a national sample of academic medical centers, highlighting current roles and identifying opportunities for continued research. Our study revealed a high degree of variability in how PAs and NPs are being used within academic medicine. The predicted provider shortages underscore the importance of a renewed commitment to optimizing utilization of PAs and NPs to provide safe, high-quality care that is also fiscally responsible. This will require a commitment on the part of both the PA and NP professions to assist academic medical centers with PA and NP integration by standardizing the expectations and competencies required to achieve the desired level of clinical practice across all specialties. It is evident from our results that academic medical centers currently do not have a systematic methodology to assess the value of PA- or NP-provided care. Further research on all measures of value, including the economic and noneconomic impact of PA and NP utilization across all specialties and practice settings, is required to ensure optimal deployment of this limited human resource to assist with meeting the growing health care needs of Americans and to ensure optimal return on investment for organizations that choose to employ PAs and NPs.

Acknowledgments

The authors wish to thank University HealthSystem Consortium (UHC) and the UHC PA/NP Benchmarking Steering Committee for their many contributions on this project: Victoria L. Rich, PhD, RN, FAAN, Chief Nurse Executive for University of Pennsylvania Medical Center; Lisa Goodrich, BA, Vice President of Medical Group Operations for Fletcher Allen Health Care; Clare Thomson-Smith, JD, MSN, RN, FAANP, Director of the Center for Advanced Practice Nursing and Allied Health at Vanderbilt University Medical Center and Assistant Dean Faculty Practice for Vanderbilt University School of Nursing; Deena O'Shea, RN, MSN, OCN, Administrative Director of the Stanford Cancer Center, Stanford Hospital & Clinics; Maureen Zaccardi, ANP, MSN, Director of Ambulatory Care Services, University of Colorado Hospital; Emily Brumfield, RN, BSN, MSN, ACNP-BC, Chair, Nurse Practitioner Advisory Council, University of Mississippi Health Care; and Carol E. Dawson, RN, MS, PNP, Advanced Practice Clinician Chair, Upstate Medical University. In addition, the authors wish to thank Darrell Campbell, MD, Chief Medical Officer and Henry King Ransom Professor of Surgery, University of Michigan Hospitals and Health Centers, and Shoou-Yih Daniel Lee, PhD, Associate Professor University of Michigan School of Public Health, for their editing recommendations.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Funding and support for this project was provided by the University HealthSystem Consortium.

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