Physician assistants and nurse practitioners: the United States experience

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ABSTRACT

- Physician assistants (PAs) and nurse practitioners (NPs) were introduced in the United States in 1967.
- As of 2006, there are 110 000 clinically active PAs and NPs (comprising approximately one sixth of the US medical workforce).
- Approximately 11 200 new PAs and NPs graduate each year.
- PAs and NPs are well distributed throughout primary care and specialty care and are more likely than physicians to practise in rural areas and where vulnerable populations exist.
- The productivity of NPs and PAs, based on traditional doctor services, is comparable, and the range of services approaches 90% of what primary care physicians provide.
- The education time is approximately half that of a medical doctor and entry into the workforce is less restrictive.
- The interprofessional skill mix provided by PAs and NPs may enhance medical care in comparison with that provided by a doctor alone.

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In the United States, medical care has evolved to be a role shared between doctors and non-physician clinicians — physician assistants (PAs) and nurse practitioners (NPs). These non-physician clinicians were introduced in 1967 and provide services that overlap with the traditional roles of doctors.[1,2] In the following, I discuss this task transfer and the characteristics of PAs and NPs.

Characteristics of PAs and NPs

As of 2006, there are about 110 000 clinically active PAs and NPs in the US, comprising about one sixth of the US medical workforce. Numbers are equally divided between the two groups. The mean age is 41.5 years for PAs and 46 years for NPs, with women making up about 60% of PAs and 90% of NPs. About 90% of PAs and 50% of NPs work full-time (> 32 hours per week).[3]

The settings in which NPs and PAs work are diverse and include individual and group practices, urban and rural areas, hospitals, battalion-aid stations, correctional institutions, inner city clinics, migrant worker clinics, emergency medical departments, and other typical doctor offices. Many PAs and NPs are employed by large capitated managed-care organisations. Almost a quarter of all PAs and NPs are located in non-metropolitan areas, often in communities with populations smaller than 10 000.[4]

About 50% of PAs and 85% of NPs practise in primary care (defined as general internal medicine, family medicine, general paediatrics and women's health), compared with 30% of doctors. The remaining NPs and PAs work in the non-primary care discipline of surgery (including general surgery, cardiovascular surgery, orthopaedics and emergency medicine) and medical subspecialties (eg, occupational and environmental medicine, neonatology, oncology, psychiatry and acute care). In specialised medical services, PAs are more likely than NPs to work in surgical specialties, while NPs are more likely than PAs to work in paediatrics and women's health.

Qualifications for practice and legal parameters

The licensure of health professionals in the US is the responsibility of the 50 states, five territories and the District of Columbia, rather than the federal government. These licensing regulations are tailored as individual medical statutes that define the scope of practice activities. Entry to practise as an NP or PA requires a uniform set of characteristics: certification of graduation from an accredited program, and a passing score on a certifying examination.[5]

Clinical professional activities and scope of practice are regulated by individual state licensing boards — usually the state medical board for PAs, and the state board of nursing for NPs. While NPs are professionally autonomous in the performance of nursing care functions, in most states they are required to work in collaboration with a physician, recognising that their extended roles encompass medical diagnostic and therapeutic tasks. However, in 16 states, they may practise independently and, in 11 of these, they may also prescribe independently. In contrast, all PAs are required to work under the delegated authority of a physician supervisor. However, most states allow practice at a distance from the supervising physician as long as some form of communication is maintained. This allows PAs to work in rural and under-served areas — for example, in satellite clinics.

"Scope of practice" includes the roles, responsibilities, duties and range of services a clinician may perform. For some jurisdictions, this scope is broadly or expansively defined. In others, the definition may be so highly detailed that it restricts the performance of daily tasks. While in many instances the statutes are fairly equal for PAs and NPs, the scope-of-practice legislation can sometimes provide a competitive edge for one profession over the other.[6]

Hospital roles

A growing number of NPs and PAs are employed in hospitals. Most are employed by the institution or a doctor, and are usually viewed as part of a two-person medical or surgical team. In general, PAs and NPs in hospitals can prescribe narcotics, undertake procedures, and direct patient care with fewer restrictions than in outpatient settings. About 30% of PAs report having some type of hospital relationship.[7] In some instances, NPs and PAs serve as inpatient specialists or "hospitalists", providing "back-fill" for junior hospital doctors who are no longer working extended hours, or providing care previously covered by junior doctors.[8,9]

Education

Historically, PA and NP tracks started as certificate programs, but have evolved, with most now at graduate level, awarding master's degrees.[10] Most programs are on the same campus as a medical or nursing school.[11]

Nurse practitioners

As of 2006, there are NP programs at 334 institutions in the US. In 2005, these programs enrolled 20 965 students and produced 6552 graduates. The number of graduates has declined from 8200 in 1998 — a 20% decrease over 7 years. The average length of education is 26 months (typical range, 15–36 months), and the average class size is 40. Most students are part-time. The primary care tracks (family, adult, paediatrics, geriatrics and women's health) account for 84% of graduates, with specialty tracks such as neonatology, oncology, psychiatry/mental health, and emergency medicine accounting for the remainder. NP education emphasises health assessment, diagnosis and treatment as an extension of nursing practice.[10]

Physician assistants

In 2006, there are 137 accredited PA programs in the US. In 2005, these programs enrolled 10 100 students, and produced 4644 graduates. The number of graduates has increased from 4261 in 1998 — a 9% increase over 7 years. Almost all PA programs are primary care-oriented, but two programs emphasise surgery, and one emphasises paediatrics. Students are full-time, and the average length of education is 27 months (range, 20–36 months). The average class size is 39, with a range of 15–100. An outlier is a joint military services PA program which graduates about 200 students annually.[11]

Efficiency

The literature on PA and NP productivity (measured as efficiency and cost effectiveness) is growing. An analysis of the early economic research on the impact of PAs on rural or solo practices generally found a PA to be an asset. PAs increased productivity in terms of the number of patients seen, and improved the workload and income of the employing doctor.[12] A comparison of the productivity of PAs/NPs and physicians in internal medicine, family medicine, obstetrics and gynaecology, paediatrics and orthopaedics revealed that PAs/NPs generally saw 10% more patients annually in the ambulatory setting than doctors. This was because doctors' collateral roles and hospital responsibilities took them out of the clinic. However, the productivity based on number of patients seen per hour was the same for all three types of provider.[13]

NPs have been shown to provide primary care services comparable to physicians in particular settings, as exemplified by the study of Mundinger and colleagues.[14] In a randomised study of follow-up care for patients who presented to a hospital emergency department and who had no personal physician, care delivered by physicians and NPs showed similar outcomes at 1 year in terms of clinical status and patient satisfaction. While some authors have criticised this work based on the demographic characteristics of the population (90% Hispanic, 77% female, and largely poor), it does suggest that the roles of NPs are probably undervalued.[15]

In another example, a family practice model was intensively studied to identify the trade-off between employing a PA versus another doctor. The PA had a "same task" substitution ratio of 0.86, compared with the supervising physician (ie, the PA saw the same types of patients and rendered the same care as the physician 86% of the time). Overall, the PA was economically beneficial to the practice, with a compensation-to-production ratio of 0.36. (The compensation-to-production ratio compares the salary and benefit [compensation] cost to employ a provider with the revenue generated [benefit] for their services.) Compared with a practice employing a full-time physician, a practice employing a full-time PA had an annual financial differential of $52 592 (in 1999 US dollars).[16]

However, because many PAs and NPs are employed by large capitated managed-care organisations (where all care is prepaid rather than fee-for-service), the economics of their use must be viewed in terms of the resources used for an episode of care rather than the revenue generated. Regarding the benefits of employing PAs, a health maintenance organisation found that when patient variables (age, health status, comorbidities and sex) were held constant, as well as the medical department (general internal medicine, paediatrics, or family medicine), the cost of care by a PA was less than the cost of care by a physician. For some diagnoses, this was due to the lower wage of the PA; in others, it was due to lower use of resources (imaging, laboratory services, medication, referral, and return visit) for the episode of care. Overall, for an episode of acute primary care, the cost of employing a PA was less than the cost of employing a doctor and represented a greater saving to the health maintenance organisation in patient management resources.[17]

NPs and PAs are cost effective, as they have substantially lower salaries than doctors but see a comparable number of patients per specified period. At certain levels of medical care, when reimbursement is examined, the profits of a health care organisation are increased when a PA or NP provides services. When a national database on group medical practices was assessed, the compensation-to-production ratio was found to be 0.38 for PAs, 0.41 for NPs and 0.49 for family physicians.[18]

Improving access to care

Improving access to care has been the raison d'être for the development of PAs and NPs in the US. While anecdotal evidence is positive, research documenting improved access has been slow to come. A study of the impact of NPs and PAs on access to health care in Washington State identified 4189 generalist physicians, and documented the number of patients they saw over 1 year. Their productivity was calculated at 2760 family physician full-time equivalents, which equalled 105 outpatient visits per week. The number of visits to PAs and NPs was also calculated over the same period. Primary care PAs and NPs made up 23.4% of the generalist provider population and performed about 21% of the generalist outpatient visits in the state. In the aggregate, PAs and NPs were more productive than family physicians in providing outpatient services as a measure of annual productivity. As a percentage of types of providers, PAs were more likely to be found in areas with a shortage of health professionals than doctors or NPs.[19]

In California, PAs and NPs ranked ahead of primary care physicians in likelihood of serving rural locations and areas with vulnerable populations, as well as likelihood of establishing a practice in areas with a shortage of health professionals.[20]

Skill mix

Although the concept of providing a mix of skills from a range of health care personnel in a team-based approach to patient management dates back centuries, the organisation of medicine in the latter quarter of the 20th century led to a wider range of work being delegated to other workers.[21] The use of PAs and NPs to deliver health care in areas that are under-served or where physician services are stretched has been the subject of a number of studies. Some of the resulting publications contain useful examples of expanded roles of NPs, PAs and other first-contact personnel from around the globe.[22] While it is not clear where in the milieu of medical work PAs and NPs have emerged, it is apparent that their skills largely overlap those of primary care physicians, and that they are also capable of taking on a high degree of responsibility in other areas of medicine.[23]

The institutional licensure to practise medicine has narrowed the gap between physicians and PAs/NPs, creating more shared dependency (J Strand, J Cawley, E Schneller, Duke University, Durham, NC, USA, personal communication). Non-physician clinicians can bring strengths to different health systems. They are deployed in primary care, emergency departments, hospitals, and in areas with acute shortages and where doctors are overworked. Inner cities tend to welcome any medical personnel resource, especially if they can contribute to the role of diagnosing and treating common problems and providing needed "wellness" checks. General surgery, cardiovascular surgery, orthopaedics and gastroenterology are noted examples where PAs and NPs perform many technical procedures that would be time-consuming for doctors. This division of labour and skill mix frees physicians to manage more patients or oversee more trainees.

Supply of NPs and PAs

As of 2006, the US population, at 298 million, is outstripping the capacity of its medical workforce. The annual number of medical graduates has increased by only 9% since 1980. In contrast, the annual graduation rates of NPs and PAs have increased from a few hundred of each in 1980 to around 6500 and 4600, respectively. This shift in supply has theoretical implications for public health, as NPs have historically provided at least three times more health promotion and disease/injury prevention services than physicians or PAs.[1,24] On the other hand, PAs are assuming more hospital-based roles as the funding for postgraduate medical training is constrained, and the work hours of junior hospital doctors are reduced. How these lost roles will be managed remains to be seen, but it is apparent that PAs and NPs are assuming a larger proportion each year.

Discussion

The numbers of NPs and PAs in the American medical workforce have increased steadily since 1967. This increase is attributable to a number of factors. First, the medical marketplace has remained strong for the past three decades, resulting in an increase in the number of education programs for both PAs and NPs. However, since the late 1990s, NP education output is declining, while PA education output is increasing. This decline may be related to the overall general shortage of nurses. Given the ageing of the nursing workforce and the waning interest in nursing as a career, the number of NPs entering clinical roles may decrease even further.[25]

Second, changes in medicine and the health care environment are driving a need for partnership and interprofessional practice. Observers believe that traditional medicine can no longer sustain the old "command and control" model of medical practice (J Strand, J Cawley, E Schneller, Duke University, Durham, NC, USA, personal communication). The intersecting of professions such as the PA/NP–doctor partnership is an example of shared domain and is grounded in the work of Abbott, Freidson and others.[26-29] This work emphasises that when a labour shortage occurs, especially in health care, a substitute arises to fill the vacant role.

Third, economics may play a role. According to the Bureau of Labor Statistics, the employment future for PAs and NPs in the US is likely to remain optimistic for the next decade.[30] A factor is the 80-hour limit placed on the average working week of medical residents (postgraduate medical trainees) by the Accreditation Council for Graduate Medical Education in 2003. Institutions failing to comply can face loss of accreditation. As a short-term response, many hospitals have employed PAs and NPs to fill staffing gaps.[31]

With the number of medical students graduating each year largely static, limited growth in residents and fellows (Box), and a decrease in the numbers of international medical graduates both entering and remaining in the US, demand for other health care providers is likely to increase.[32] Compound this with an expanding (and ageing) population, declining physician work effort, and a projected decrease in career spans of doctors, nurses and other health professionals, and the problem appears even greater. Newer workforce theories predict that economic expansion correlates with demand for physician services, which places additional pressure on the existing health system, which will only mount as physician supply fails to keep pace.[33]

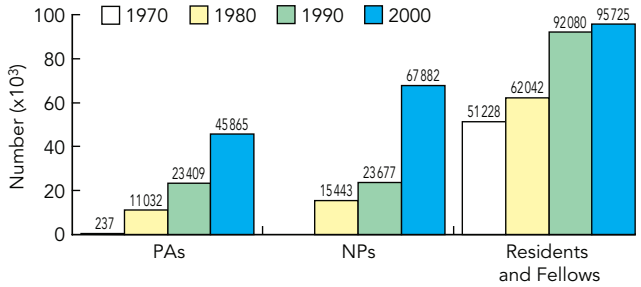
Finally, primary care is thought to be in a crisis. Fewer medical school graduates are selecting primary care, and fewer still are remaining in this sector.[34-37] With a shortage of physicians interested in general medicine, medical systems are increasingly turning to PAs and NPs to shoulder the burden of primary care. While this may not have been the intent of early policymakers, the reality is that PAs and NPs may be the only resource available in the near future.

Conclusion

The introduction of PAs and NPs has been an important innovation in the division of medical labour. Their inclusion in American society came at a time when the demand for physician services was significant and growing. While they were not embraced wholeheartedly at first, their role has been evolving over the past 40 years and continues to expand throughout the nation. PAs and NPs are employed by more than a quarter of all group practices, and are major sources of patient access in large health maintenance organisations. Demand for them is increasing.

Examining the role of NPs and PAs has resulted in examining health workforce policies and assumptions of care that might otherwise have been overlooked. At a time of workforce shortages, their presence can stimulate the exploration of organisational efficiencies. NPs and PAs are trained in a considerably shorter time than doctors, and their willingness to shift to where demand for services is greatest makes them highly desirable in a changing economy. Based on the increasing per capita needs of all people, the demand for medical services is likely to increase in the

Number of physician assistants (PAs), nurse practitioners (NPs), residents and fellows since 1970



foreseeable future and PAs and NPs will likely continue to fill those needs.

Competing interests

None identified.

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References

1 Hooker RS, McCaig LF. Use of physician assistants and nurse practitioners in primary care, 1995-1999. *Health Aff (Millwood)* 2001; 20: 231-238.
2 Cooper RA, Getzen TE, Laud P. Economic expansion is a major determinant of physician supply and utilization. *Health Serv Res* 2003; 38: 675-696.
3 Hooker RS, Berlin LE. Trends in the supply of physician assistants and nurse practitioners in the United States. *Health Aff (Millwood)* 2002; 21: 174-181.
4 Cawley JF. The profession in 2002 and beyond. *JAAPA* 2002; 15: 7-15.
5 Cooper RA, Stoflet S. Diversity and consistency. *J Health Serv Res Policy* 2004; 9 Suppl 1: 39-47.
6 Wing P, Langelier MH, Continelli TA, et al. The changing scope of practice of PAs, NPs and CNMs in the United States: 1992 to 2000 [unpublished report]. Rensselaer, NY: Center for Health Workforce Studies, School of Public Health, University of Albany, 2003.
7 American Academy of Physician Assistants (AAPA). 2002 AAPA physician assistant census report. Alexandria, Va: American Academy of Physician Assistants, 2002.
8 Sullivan M. Hospitalist concept a perfect fit for physician assistants. *AAPA News* 2001; Jan 15: 1, 7, 14.
9 Krein SL. The employment and use of nurse practitioners and physician assistants by rural hospitals. *J Rural Health* 1997; 13: 45-58.
10 Fang D, Wilsey-Wisniewski SJ, Bednash GD. 2005-2006 enrollment and graduations in baccalaureate and graduate programs in nursing. Washington, DC: American Association of Colleges of Nursing, 2006.
11 Simon A, Link MS. Twenty-first annual report on physician assistant education in the United States, 2004-2005. Alexandria, Va: Association of Physician Assistant Programs, 2006 Feb 1. Report No. 17.
12 Hooker RS. The economics basis of physician assistant practice. *Physician Assist* 2000; 24: 51-71.
13 Hooker RS. The roles of physician assistants and nurse practitioners in a managed care organization. In: Clawson DK, Osterweis M, editors. The roles of physician assistants and nurse practitioners in primary care. Washington, DC: The Association of Academic Health Centers, 1993: 51-68.
14 Mundinger MO, Kane RL, Lenz ER, et al. Primary care outcomes in patients treated by nurse practitioners or physicians: a randomized trial. *JAMA* 2000; 283: 59-68.
15 Bagley B, Chan-Tack KM, Hicks P, et al. Health outcomes among patients treated by nurse practitioners or physicians. *JAMA* 2000; 283: 2521-2524.
16 Grzybicki DM, Sullivan PJ, Oppy JM, et al. The economic benefit for family/general medicine practices employing physician assistants. *Am J Manag Care* 2002; 8: 613-620.
17 Hooker RS. A cost analysis of physician assistants in primary care. *JAAPA* 2002; 15: 39-50.
18 Medical Group Management Association (MGMA). Physician compensation and production survey: 2006 report based on 2005. Englewood, Colo: Medical Group Management Association, 2006.
19 Larson EH, Palazzo L, Berkowitz B, et al. The contribution of nurse practitioner and physician assistants to generalist care in Washington State. *Health Serv Res* 2003; 38. 1033-1050.
20 Grumbach K, Hart LG, Mertz E, et al. Who is caring for the underserved? A comparison of primary care physicians and nonphysician clinicians in California and Washington. *Ann Fam Med* 2003; 1: 97-104.
21 Schneller ES, Ott JB. Contemporary models of change in the health professions [review]. *Hosp Health Serv Adm* 1996; 41: 121-136.
22 Buchan J, Dal Poz MR. Skill mix in the health care workforce: reviewing the evidence. *Bull World Health Organ* 2002; 80: 575-580.
23 Cawley JF, Hooker RS. Physician assistants: does the US experience have anything to offer other countries? *J Health Serv Res Policy* 2003; 8: 65-67.
24 Lin SX, Hooker RS, Lenz ER, Hopkins S. Nurse practitioners and physician assistants in hospital outpatient departments, 1997-1999. *Nurs Econ* 2002; 20: 174-179.
25 Buerhaus PI, Staiger DO, Auerbach DI. Implications of an aging registered nurse workforce. *JAMA* 2000; 283: 2948-2954.
26 Abbott A. The system of professions: an essay on the division of expert labor. Chicago, Ill: University of Chicago Press, 1988.
27 Freidson E. The profession of medicine. New York: Dodd Mead, 1970.
28 Freidson E. Professionalism reborn: theory, prophecy, and policy. Chicago, Ill: Chicago University Press, 1994.
29 Schneller ES. The physician's assistant: innovation in the medical division of labor. Lexington, Mass: Lexington Books, 1978.
30 Hecker D. Occupational employment projections to 2010. *Monthly Labor Rev* 2001; 124 (11): 57-84.
31 Herrick T. As residents sleep: will PA and NP postgraduate programs awaken? *Clinician News* 2003 Apr 1; 7 (3): 1-14.
32 Hilsenrath P, Lykens K, Mains D. Physician supply: an economic and policy perspective. *Tex J Rural Health* 2003 Mar 1; 21 (3): 16-29.
33 Cooper RA, Getzen TE, Laud P. Economic expansion is a major determinant of physician supply and utilization. *Health Serv Res* 2003; 38: 675-696.
34 Showstack J, Lurie N, Larson EB, et al. Primary care: the next renaissance [comment]. *Ann Intern Med* 2003; 138: 268-272.
35 Sandy LG, Schroeder SA. Primary care in a new era: disillusion and dissolution? [review]. *Ann Intern Med* 2003; 138: 262-267.
36 Moore G, Showstack J. Primary care medicine in crisis: toward reconstruction and renewal [comment]. *Ann Intern Med* 2003; 138: 244-247.
37 Sox HC. The future of primary care [comment]. *Ann Intern Med* 2003; 138: 230-232.

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