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<tr>
<th>Author</th>
<th>Year</th>
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<tr>
<td><strong>Certification Exam</strong></td>
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<tr>
<td>Bushardt RL</td>
<td>2012</td>
<td>Bushardt, R.L., Booze, L.E., Hewett, M.L., Hildebrandt, C., Thomas, S.E. (2012). Physician assistant program characteristics and faculty credentials on physician assistant national certifying exam pass rates. <em>Physician Assist Educ.</em> 3(1):19-23.</td>
<td>Results from this study suggest that if a program is seeking to increase its student performance on the PANCE, it may be more helpful to focus resources on improving student-to-faculty ratio, regardless of whether or not the faculty are doctoral level.</td>
</tr>
<tr>
<td>Langen WH</td>
<td>2011</td>
<td>Langen, W.H., Hanson, D., Fien, R., Parkhurst, D. (2011). The evaluation of physician assistant students' history-taking abilities using actors as standardized patients. <em>J Physician Assist Educ.</em> 22(4):34-7.</td>
<td>The value of professional actors as standardized patients (SPs) was evaluated in an exercise that normally uses students for SPs. PA students perceived the actor SPs as more similar to real patients than peers simulating patients, developed greater confidence in history-taking ability, and believed that they significantly enhanced their history-taking skills.</td>
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<td>Author(s)</td>
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### Characteristics of PAs


- Attitudes and behaviors toward alcohol and other drug use were assessed among a subgroup of allied health and physician assistant students within two university-based health professions educational institutions in a Midwestern state in 1999.


- Interviews with 57 self-employed PAs (93% male) found they had an average of 19 years clinical experience and 8 years owning their own business. All had a professional relationship with a physician and were highly satisfied with the arrangement.


- The purpose of this study was to examine the attitudes of the referral specialist physician toward direct referral of patients from primary care PAs.

The objective of this 6-year retroactive chart review is to compare outcomes between chemically dependent physicians and physician assistants under contract with the North Carolina Physicians Health Program (NCPHP). Of 233 physicians 91% had a good outcome, compared to only 59% of 34 physician assistants in this sample.


This study suggests that mid-level providers such as PAs and NPs have relatively low avoidance and high empathy toward people living with AIDS and are willing to care for HIV-infected individuals.


Healthy personality characteristics predict high levels of self-reported professionalism according to this study. Conversely, unhealthy personality characteristics will predict a low level of self-reported professionalism. Personality profiles can be incorporated into the admission process to select a higher percentage of candidates who value and emulate professionalism, producing better practitioners.


The aim of this study was to explore what values and beliefs play a role in physician assistant students' opinions on Plan B and whether or not they will prescribe it in the future. The results showed that the strongest factor influencing students to prescribe Plan B in the future is the individual patient scenario, while the strongest factor influencing them to not prescribe Plan B is religious beliefs.

Survey of providers attending HIV conferences in 6 large US cities found 48.6% of non-physician providers were interested in prescribing buprenorphine. Compared to infectious disease specialists, non-physician providers and generalist physicians were significantly more interested in prescribing buprenorphine.

### Cost


Although the physician assistant’s collections do not cover their costs, the indirect economic and patient care impacts are clear. By increasing emergency room pull through and decreasing times to OR, operative times, lengths of stay and complications, their existence is clearly beneficial to hospitals, physicians and patients as well.


Examination of staff composition and number of beds in ICUs in 2004 at three Mayo clinic sites found use of residents and fellows is more cost-efficient than use of non-physician providers.


Found ICU telemedicine program using intensivists and physician extenders was associated with improved clinical outcomes and hospital financial benefits.
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<tr>
<th>Author</th>
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<tr>
<td>Greenberg GA</td>
<td>2006</td>
<td>Trends in professional mix and cost of outpatient mental health care.</td>
<td><em>Journal of Mental Health Policy and Economics.</em> 9(3), 133-136.</td>
<td>Compared outpatient mental health services provided at Veterans Health Administration and found greater use of non-physician providers at facility level was associated with greater per capita outpatient cost.</td>
</tr>
<tr>
<td>Grzybicki DM</td>
<td>2002</td>
<td>The economic benefit for family/general medicine practices employing physician assistants.</td>
<td><em>American Journal of Managed Care.</em> 8(7), 613-620.</td>
<td>OBJECTIVE: To measure the economic benefit of a family/general medicine physician assistant (PA) practice. CONCLUSIONS: Family/general medicine PAs are of significant economic benefit to practices that employ them.</td>
</tr>
<tr>
<td>Hooker RS</td>
<td>2000</td>
<td>The economic basis of physician assistant practice.</td>
<td><em>Physician Assistant.</em> 24, 51-66, 71.</td>
<td>A review of literature found that a PA can safely assume at least 83 percent of all primary care visits without direct physician supervision, and that using the substitution ratio, a PA can perform at least 75% of a physician's tasks at a cost of 44 percent of the physician's salary.</td>
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<tr>
<td>Hooker RS</td>
<td>2000</td>
<td>The economics of physician assistant employment.</td>
<td><em>Physician Assistant.</em> 24, 67.</td>
<td>Examined 12,782 medical office visits made by patients to a non-profit, prepaid group practice and found every medical condition managed by PAs had a lower total episode cost than similar episodes managed by a physician.</td>
</tr>
<tr>
<td>Hooker RS</td>
<td>2002</td>
<td>A cost analysis of physician assistants in primary care.</td>
<td><em>JAAPA.</em> 15(11), 39-43.</td>
<td>This study examines the cost associated with employing PAs from the employers perspective. Analysis of data on record for episode, patient characteristics, health status, etc., found that for every medical condition managed by PAs, the total episode cost was less than similar episode managed by a physician.</td>
</tr>
<tr>
<td>Hooker RS</td>
<td>2004</td>
<td>How do they compare to occupational physicians?</td>
<td><em>Occupational Medicine.</em> 54, 153-158.</td>
<td>Analysis of administrative data found physicians saw a mean of 2.9 patients/hr compared to 2.5 patients/hr for PAs, but PAs worked more hours and saw more patients in a year than physicians. Average charge per patient visits and total charge per episode were similar. Salary for physicians was approximately twice as much per hour as a PA.</td>
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Mitchell CC 2007


Used computer model to predict future staffing needs due to the impact of changes in resident work hours and service growth. The study estimates in the next 5 years the hospitals will need to hire 10 physician assistants at the cost of $1,134,000, which is $441,000 cheaper than hiring hospitalists.

Morgan PA 2008


Analysis of MEPS data found adult patients who saw physician assistants for a large portion of their yearly office visits had, on average, 16 percent fewer visits per year, than patients who saw only physicians. These findings account for adjustments for patient complexity.

Phillips VL 2000


Analysis of administrative data from a large community teaching hospital for patients admitted to internal medicine service found PAs used fewer total ancillary resources for patients with pneumonia, and fewer laboratory resources for patients with stroke, pneumonia, and congestive heart failure than did residents. No significant differences were found in LOS or use of radiology resources. However, significantly higher mortality among pneumonia cases were detected for PAs.

Rhee JV 2002

Data from twenty-six primary care practices and approximately 2 million visit records found PAs/NPs attended to 1 in 3 adult medicine visits and 1 in 5 pediatric medicine visits. The likelihood of PA/NP visits are higher among patients presenting with minor acute illness and lower than average among older patients. Practitioner labor costs per visit and total labor costs per visit were lower among practices with greater use of PAs/NPs.


This descriptive comparative study assessed PAs' knowledge of drug costs and attitudes about prescribing prescription medications. Forty percent of the sample population were able to accurately identify the correct cost of medications. Most of the sample population considered costs when making a prescriptive decision. There were significant differences in the prescribing attitudes of PAs in various practice settings and medical specialties.

**Impact of Training**


ED providers, including physician extenders, were surveyed before and after. The authors found that 3 month follow-up scores for utilization of SBIRT skills improved significantly over the baseline.

Pre- and post-test found an asthma management program improved clinician knowledge of guidelines. Pretest scores for physicians was higher than for midlevel practitioners. Scores increased significantly in post-test for physicians and midlevel practitioners; in follow-up tests 18 months later, improvements for factual and guideline responses disappeared but were sustained for applied questions for 78% of physicians and 65% of midlevel practitioners.


Purpose: To evaluate the effectiveness of medical Spanish instruction by assessing Spanish language comprehension in physician assistant (PA) education. Conclusions: Medical Spanish instruction to PA students provides a basis for the development of foreign language competency for use in the clinical setting.


Using a specially designed instrument, the authors examined physician assistant students’ multicultural sensitivity at four points before, during, and after the 30 months of a master's degree program. The students (n = 19) were found to have become more multiculturally sensitive by the end of the program.

**Job Satisfaction**


Using the Maslach Burnout Inventory (a device used in prior studies on emergency physicians) and the EMPA Demographic, Work, and Lifestyle Characteristics Survey, we assessed the burnout levels of emergency medicine physician assistants (EMPs) and the presence of characteristics associated with higher burnout levels. 59% had moderate or high burnout levels on the Emotional Exhaustion subscale; 66% on the Depersonalization subscale; and only 34% on the Personal Accomplishment subscale.
Physician assistants (PAs) are known to be highly satisfied with their vocational choices, but the reasons for this high degree of satisfaction are not known. From qualitative data, 21 factors for vocational satisfaction and 29 factors for dissatisfaction were identified.

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### Models of Care

**Deb P** 2009


Data from the Community Tracking Survey (1996-1998) show enrollees in plans with networks of physicians have fewer office-based visits to non-physician medical professionals but more ER visits and hospital stays. Individuals in plans requiring signup w/primary care provider have more visits to non-physician providers of care, more surgeries and hospital stays, but fewer ER visits.

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**Englert CJ** 2011


The addition of a Mid-Level Practitioner (MLP) can address many of the impending changes in healthcare, while increasing the quality and profitability of the practice. This article outlines the initial steps to take when adding an MLP to your practice.

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**Johnson GP** 2002


A literature review to determine civilian staff and group model HMO primary care provider staffing found average of 1,473 members per primary care physician. When physician extenders are considered, average enrollment is 1,156 members per primary care provider.

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**Hayman AV** 2012


The public expects the medical community to produce safe, experienced surgeons, while demanding they are well rested and directly supervised at all times. The ability to meet these expectations can be challenging. The most common solution chosen by the VA centers was hiring physician extenders (37%). The most common type of extender was a nonphysician extender, that is, nurse practitioner or physician assistant (70%).

METHODS: This study is a descriptive analysis of reactions to the implementation of a Medical Team Training (MTT) program for OR and ICU staff at 32 Veterans Health Administration facilities. RESULTS: "...Improved teamwork was reported by 84% of OR and 75% of ICU implementation teams. Efficiency improvements were reported by 94% of OR implementation teams. Almost all facilities (97%) reported a success story or avoiding an undesirable event." CONCLUSIONS: Sites are implementing MTT with a positive impact on patients and staff...implementation was facilitated through follow-up support. This may have contributed to the early success of MTT.


Study of strategies to reduce ED overcrowding in Rochester in the last decade found a transition team (mid-level provider along with an RN or LPN) who cared for inpatients boarded in ED among successful strategies.

**PA Education**


Survey of PA students at Wichita State University found all respondents reported at least one type of interaction with a pharmaceutical industry representative, and majority reported they would be less likely to be influenced by marketing strategies than would their colleagues.


Purpose: This study explored the reliability and credibility of a standardized patient (SP)-based performance exam in physician assistant (PA) education with passing standards set using the Angoff method. Conclusions: The Angoff method proved to be a reliable and credible method for setting a passing cut-off score for the exam.
Coplan B 2008


The primary goals of this project were to examine the extent of standardized patient (SP) use during the didactic and clinical phases of physician assistant (PA) programs and to determine how many programs use various SP activities to teach as well as assess clinical skills. The results show a broad reliance on standardized patients to assess various aspects of clinical skills training in PA education.

Evans TC 2006


A survey of 880 graduates from the University of Washington PA program found respondents who had no academic degree when entering the PA program were significantly more likely than those who started the program with a degree to work in primary care, nonmetropolitan areas, and to self-report they work with the medically underserved.

Forister JG 2009


Purpose: To evaluate the effectiveness of medical Spanish instruction by assessing Spanish language comprehension in physician assistant (PA) education. Conclusions: Medical Spanish instruction to PA students provides a basis for the development of foreign language competency for use in the clinical setting.

Foster AM 2006


OBJECTIVE: This study was undertaken to examine the inclusion and extent of abortion education in accredited nurse practitioner (NP), physician assistant (PA) and certified nurse-midwifery (CNM) programs in the United States. CONCLUSION: Abortion education is deficient in NP, PA and CNM programs in the United States.

Jibaja ML 2000


Using a specially designed instrument, the authors examined physician assistant students' multicultural sensitivity at four points before, during, and after the 30 months of a master's degree program. The students (n = 19) were found to have become more multiculturally sensitive by the end of the program.
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<th>Journal</th>
<th>Pages</th>
<th>Summary</th>
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<tbody>
<tr>
<td>Jones, P.E.</td>
<td>2007</td>
<td>Physician Assistant Education in the United States</td>
<td><em>Academic Medicine</em></td>
<td>Vol. 82, No. 9, 882-887</td>
<td>An overview of PA education in the US. Topics include growth in the number of PA education programs over time, commitment to the physician-dependent relationship, curriculum design, demographics of the typical student, and future challenges to quality PA education.</td>
</tr>
<tr>
<td>Knight, D., Higgins, R., Moser, S., &amp; Groh, C.</td>
<td>2009</td>
<td>A pilot study assessing PA students' self-assessment of professionalism</td>
<td><em>Journal of Physician Assistant Education</em></td>
<td>20(1), 24-29</td>
<td>PURPOSE: This was a pilot project to develop a survey tool to measure students' self-perception of professionalism and to measure change in their perception over the course of their didactic year of study. CONCLUSIONS: It appears that some aspects of professionalism actually decrease during educational training, according to our results and at least one other study.</td>
</tr>
<tr>
<td>Kuhn, L., Kranz, P. L., Koo, F., Cossio, G., &amp; Lund, N. L.</td>
<td>2005</td>
<td>Assessment of Stress in Physician Assistant Students</td>
<td><em>Journal of Instructional Psychology</em></td>
<td>32 (2), 167-178</td>
<td>27 full-time students within the Physician Assistant Studies Program at The University of Texas - Pan American were anonymously surveyed to determine their levels of stress while enrolled in their first semester. The majority of respondents reported that their stress levels at this point in the program fell within the moderate to considerable range.</td>
</tr>
<tr>
<td>Lipstreuer, E., D'Eramo, A., Ewing, L., &amp; Rose, J.</td>
<td>2002</td>
<td>A Pilot Project on Ethnogeriatrics and Cultural Competency Training for Physician Assistant Students</td>
<td><em>The Gerontologist</em></td>
<td>42(1), 109</td>
<td>In a model pilot training program, two methods were used to introduce concepts of ethnogeriatrics to first year PAS (N=25).</td>
</tr>
<tr>
<td>Lloyd, L.F., Simon, B., Dunn, L.R., &amp; Isberner, F.R.</td>
<td>2007</td>
<td>The status of complementary and alternative medicine education in U.S. physician assistant programs</td>
<td><em>Teaching and Learning in Medicine</em></td>
<td>19(2), 174-179</td>
<td>PURPOSE: This study was designed to identify the content, methods, purpose, and orientation to complementary and alternative medicine (CAM) education in PA curricula. CONCLUSION: Most PA programs have incorporated CAM instruction into their curricula.</td>
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The purpose of this study was to investigate whether the standard OSCE would differentiate performance of subjects with different levels and/or types of training. **CONCLUSIONS:** The differences among group performance appeared to reflect the level of experience of the learners, with PAs scoring quite close to both surgical residents and medical students.


The purpose of this study was to investigate the predictive relationship between student self-efficacy beliefs, achievement expectations, perceived outcome values, and subsequent clinical performance. The results reveal that self-efficacy, and not just academic performance, is a significant predictor of a student's clinical performance.


Member programs of the Physician Assistant Education Association (PAEA) were surveyed in 2008. Demographic characteristics, sponsorship, and administrative structure were probed. **Conclusions:** Substantial variation exists among institutions sponsoring PA programs.

**PAs and the Underserved**


A survey of 880 graduates from the University of Washington PA program found respondents who had no academic degree when entering the PA program were significantly more likely than those who started the program with a degree to work in primary care, nonmetropolitan areas, and to self-report they work with the medically underserved.
Cross-sectional analysis with phone and mail surveys of Wisconsin Longitudinal Study found participants without insurance or with public insurance other than Medicare more likely than those with private insurance to utilize PAs/NPs. Patients of PA/NPs more likely to be women, younger, and have lower perceived access than those utilizing doctors. No significant difference in self-rated health or delays receiving care.

An analysis of 1998 administrative and survey data on primary care clinicians in California and Washington found PAs ranked first or second in each state in proportion of their members practicing in rural areas or Health Professional Shortage Areas (HPSAs). In California, PAs also had the largest proportion of their members working in vulnerable population areas.

Qualitative exploratory study in 8 rural towns found major factors contributing to retention of autonomous rural PAs to include confidence in ability to provide adequate health care, desire for small town life, residing in community, being involved with the community.

Enhanced curricular instruction such as exploring cultural assessment methods and controversies in health care differences, combined with increased clinical experiences with diverse cultures, are recommended to help move students past the minimization stage to gain greater cultural competency.

Cultural competency training has traditionally been viewed as addressing race and ethnicity and its influence on health care disparity. There are many aspects of culture or diversity that have been overshadowed in physician assistant education but are equally as important. These cultural elements include socioeconomic status, religion, sexual orientation, and disability. This article will briefly discuss the importance of these elements and how each can affect the medical care of patients in these diverse populations.


Semi-structured interviews with 55 with nurse practitioners, PAs and nurse anesthetists in New York and Pennsylvania found family and community ties played a key role in influencing practice location. Men were drawn to the broad scope of practice and autonomous nature of rural practice, where women in rural areas enjoyed the more personable environment and greater respect from colleagues and patients.


To learn more about PAs in rural and urban settings and their willingness to practice in underserved areas, the author conducted a census of all PAs who hold a Pennsylvania license.


In 1996, found 370 midlevel practitioners were serving obligations to state programs providing financial support in exchange for service in defined underserved areas, excluding programs receiving federal support. This number of midlevel practitioners was comparable to those in federal programs. There were 82 such programs in 41 states in 1996, more than double the 39 that existed in 1990.
Staton, F.S., Bhosle, M.J., Camacho, F.T., Feldman, S.R., & Balkrishnan, R. (2007). How PAs improve access to care for the underserved. *JAAPA*. 20(6), 32, 34, 36. The objective of this study was to test the hypothesis that poorer patients in outpatient clinics are more likely to see PAs than physicians. CONCLUSION: Considerable use is made of PAs in all settings, and they tend to be utilized in otherwise underserved, rural populations who do not have health insurance.

Patient Satisfaction

Counselman, F. L., Graffeo, C. A., & Hill, J. T. (2000). *Patient Satisfaction with Physician Assistants in an ED Fast Track*. *American Journal of Emergency Medicine*. 18(6), 661-665. A survey of patients seen by a PA in an emergency department fast track found patients to be very satisfied with their care, with the mean patient satisfaction score of 93 out of 100 possible points. Twelve percent of patients indicated they would be willing to wait longer to be seen primarily by an emergency physician rather than a PA.

Cipher, D.J., Hooker, R.S., & Sekscenski, E. (2006). Are older patients satisfied with physician assistants and nurse practitioners? *JAAPA*. 19(1), 36, 39-40, 42-44. OBJECTIVE: To determine how satisfied older American consumers are with physician assistant (PA) and nurse practitioner (NP) care. CONCLUSION: Findings suggest that patients are generally satisfied with their medical care and do not distinguish preferences based on types of providers.

Dehn, R. W. (2007). *Patient attitudes toward physician assistants*. *JAAPA*. 20(10), 58-70. Patients of physicians using physician assistants in their practices were surveyed to determine attitudes toward these assistants. Eighty-seven percent of the patients who received physical examinations from physician's assistants were very satisfied.
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<tr>
<td>Hooker RS</td>
<td>2005</td>
<td>Objective: To assess the extent to which the experiences of older patients vary according to type of primary care provider (i.e., physician assistant [PA], nurse practitioner [NP], or physician). Conclusion: Medicare beneficiaries are generally satisfied with their medical care and do not distinguish preferences based on type of provider. PAs and NPs may be a workforce that could be expanded to care for the rising needs of the elderly.</td>
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<tr>
<td>Nyberg SM</td>
<td>2007</td>
<td>The purpose of this cross-sectional study was to assess the level of satisfaction of patients, physicians and nurses, and ancillary providers with the care provided by the midlevel providers (MLPs) who are utilized as house officers in a Level I trauma service. CONCLUSION: Trauma patients and healthcare team members of the trauma service at Wesley Medical Center, an accredited Level I trauma center, are generally satisfied with care provided by MLPs.</td>
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<tr>
<td>Roblin DW</td>
<td>2004</td>
<td>OBJECTIVE: The objective of this study was to evaluate the association of patient satisfaction with type of practitioner attending visits in the primary care practice of a managed care organization. CONCLUSIONS: Averaged over many primary care visits provided by many physicians and midlevel practitioners, patients in this MCO were as satisfied with care provided by PAs/NPs as with care provided by MDs.</td>
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Survey of surgical residents in Mount Sinai Surgical Residency Program found NPP and residents have similar perceptions about NPP function, both believe NPP on service decreases resident workload. More NPPs than residents feel NPPs contribute to residents' clinical education and that NPPs provide better continuity of care. 75% of NPPs believe they function at senior resident level or above, where 90.5% residents believe NPPs function at intern level or below.


The purpose of this study was to investigate and compare differences, if any, between rural and urban primary care physicians' perceptions of the role and practice of non-physician providers.


Focus groups of low-income parents on redesigning a well-child care program found most parents endorsed non-physician providers and alternative locations and formats as desirable adjuncts to usual physician-provided, clinic-based well-child care. Non-physician providers were viewed as potentially more expert in behavioral/developmental issues than physicians and more attentive to the parent-provider relationship.
Survey of patients in the waiting room of an academic general medicine practice in 2005 found 93% (n=354) affirmed that either requiring primary care provider involvement in preventive services is not always needed, or is an inconvenience or unnecessary expense. Over 70% were open to non-PCP centered method of receiving preventive services.

Survey of emergency medicine residents asked them about their preferences if they were a patient found 54% would agree to be seen by a resident, 17% willing to be seen by a CRNP and 24% willing to be seen by a PA. 34% viewed mid-level providers as a professional threat, with males 2.25 more likely and those with higher household incomes 1.94 times more likely to have this perception.

In this study, a survey was conducted of primary care physicians to determine physician use and amenability to use of nonphysician health care providers to perform skin cancer screening in comparison with other cancer screening examinations. CONCLUSIONS: Primary care physicians are currently utilizing nonphysician health care providers to perform cancer screening examinations and the majority of those surveyed are amenable to the use of these providers for such examinations.
Cipher DJ 2006


Analysis of data from the National Ambulatory Medical Care Survey database sampled 99,346 primary care visits over a 6 year period where prescriptions were written. NP or PA was provider for 5% of primary care visits in the database. PAs were more likely to prescribe controlled substances for a visit than a physician or NP. In rural areas, NPs wrote significantly more prescriptions than physicians or PAs.

Diemer D 2012


PAAs with a rural background and those that completed rural clerkships have a greater propensity towards rural practice after graduation. It is possible, for programs with an interest or a mission of increasing the number of their graduates who choose rural practice, that knowledge of factors that influence their graduates' practice choices may prove beneficial.

Duryea WR 2000


This study describes the phenomenon of a rising number of elder PAs in the ranks of the nation's health providers and their patterns of practice.

EMRs of patients seen at Veterans Affairs Connecticut Health Care system in a 6 month period with disease codes of CAD, diabetes or hypertension compared those seen by physicians, mid-level practitioners and residents. Mid-level practitioners were more likely to see patients who were younger, had alcohol or drug disorders or severe mental illness, hypertension, but less likely to see patients with diabetes compared to physicians. Mid-level practitioners were significantly more likely to attain A1C goals compared to residents. Physicians were more likely to attain blood pressure goals, but no significant difference was noted for blood pressure control between mid-level practitioners and residents.


The objective of this study was to describe the characteristics of providers, patients, and the type of prescriptions written by PAs and NPs and to compare these activities to those of physicians in metropolitan and nonmetropolitan settings. Overall, PAs and NPs are prescribing in a manner similar to physicians in the type of medications used in their patient management.


Encounter data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) were used to examine patterns of nurse practitioner (NP) and physician assistant (PA) practice styles. Overall practice by NPs and PAs accounted for nearly 10% of outpatient visits.


Study of computerized medical records over 10 years for 2,242 randomly selected women aged 40-69 with no history of breast cancer and at least one screening for breast cancer at a large New England HMO found internists and nonphysician providers more likely to teach at least half their patients than were Ob/Gyns.

Patients with diabetes referred to an endocrinology services at a VA tertiary facility found number of referrals from physicians and midlevel providers approximately equal, but the mean HbA1c significantly higher in patients referred from PCPs compared to patients referred from specialists.

Certain US rural areas have inadequate access to health care providers. Health care educational institutions have made nationwide efforts to recruit students from rural areas, in the hope that they will return upon graduation. This 2009 study focused on the physician assistant (PA) profession's endeavors in this effort.

Questionnaire to random sample of Colorado physicians, NPs, and PAs found NPs and pediatricians most likely to report testing sexually active adolescent females for Chlamydia, and PAs and internal medicine specialists were least likely. Female providers were more likely to test.

Survey of staff provider and resident physicians found staff provider more likely than resident physicians to discuss advance care planning (ACP) and also more likely to believe that non-physician members of the care team should counsel patients about ACP.


This descriptive comparative study assessed PAs' knowledge of drug costs and attitudes about prescribing prescription medications. Forty percent of the sample population were able to accurately identify the correct cost of medications. Most of the sample population considered costs when making a prescriptive decision. There were significant differences in the prescribing attitudes of PAs in various practice settings and medical specialties.


Review of records found DRE underutilized when screening for prostate cancer across all health care providers, but female providers and physician extenders outperformed male providers and physicians.
Brook C 2012


In the ED, PAs saw 1.16 patients and generated 2.35 RVUs per hour. The length of the shift did not affect productivity. Productivity did not fluctuate significantly with changing departmental volume.

Hooker RS 2000


A review of literature found that a PA can safely assume at least 83 percent of all primary care visits without direct physician supervision, and that using the substitution ratio, a PA can perform at least 75% of a physician’s tasks at a cost of 44 percent of the physician’s salary.

Larson EH 2001


Analysis of productivity data from a nationally representative sample of physician assistants showed PAs performed 61.4 outpatient visits per week compared with 74.2 visits performed by physicians, for an overall physician full-time equivalent (FTE) estimate of 0.83.

Larson EH 2003


The objective of this study was to quantify the total contribution to generalist care made by nurse practitioners (NPs) and physician assistants (PAs) in Washington State. Analysis of licensure renewal survey data found nurse practitioners and physician assistants make up 23.4% of the generalist provider population and provide 21.0% of the generalist outpatient visits in Washington State.

**Quality**
OBJECTIVES: To determine whether the quality of tube thoracostomies performed by advanced practice providers (PAs & NPs) is comparable to that performed by trauma surgeons and to ascertain whether complication rates differ as to who performed the procedure. RESULTS: Differences between practitioner type...were not significant. CONCLUSION: Use of advanced practice providers provides consistent and quality tube thoracostomies. Employment of these practitioners may be a reasonable solution for staffing trauma centers.

Found ICU telemedicine program using intensivists and physician extenders was associated with improved clinical outcomes and hospital financial benefits.

This study sought to identify differences in the ability of rural and urban PAs to diagnose skin disorders. Average quiz score was higher for rural PAs than for urban PAs.
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<tr>
<td>Dhuper S</td>
<td>2009</td>
<td>Replacing an academic internal medicine residency program with a physician assistant-hospitalist model: a comparative analysis study.</td>
<td>Journal of Medical Quality. 24(2), 132-139.</td>
<td></td>
<td>This study describes a comparative analysis of replacing medical residents with physician assistants and hospitalists on patient outcomes in a community hospital. Quality of care provided by the physician assistants-hospitalists model was equivalent.</td>
</tr>
<tr>
<td>Federman DG</td>
<td>2005</td>
<td>Relationship between provider type and the attainment of treatment goals in primary care.</td>
<td>American Journal of Managed Care. 11(9), 561-566.</td>
<td></td>
<td>EMRs of patients seen at Veterans Affairs Connecticut Health Care system in a 6 month period with disease codes of CAD, diabetes or hypertension compared those seen by physicians, mid-level practitioners and residents. Mid-level practitioners were more likely to see patients who were younger, had alcohol or drug disorders or severe mental illness, hypertension, but less likely to see patients with diabetes compared to physicians. Mid-level practitioners were significantly more likely to attain A1C goals compared to residents. Physicians were more likely to attain blood pressure goals, but no significant difference was noted for blood pressure control between mid-level practitioners and residents.</td>
</tr>
<tr>
<td>French D</td>
<td>2002</td>
<td>The effects of absence of emergency medicine residents in an academic emergency department.</td>
<td>Academic Emergency Medicine. 9(11), 1205-1210.</td>
<td></td>
<td>Study of quality indicators comparing emergency medicine resident care with an alternative model using mid-level providers found no measurable difference for most quality indicators studied. Model without residents was less efficient in admitting patients.</td>
</tr>
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</table>
Goldman MB 2004


**OBJECTIVE:** This article compared complication rates after surgical abortions performed by physician assistants with rates after abortions performed by physicians. **CONCLUSIONS:** Surgical abortion services provided by experienced physician assistants were comparable in safety and efficacy to those provided by physicians.

Gunneson TJ 2002


**OBJECTIVE:** This article reports on the complication rate and efficiency of ultrasound-assisted percutaneous liver biopsy performed by an experienced physician assistant. **CONCLUSION:** Outpatient percutaneous liver biopsy can be safely and effectively performed by a trained physician assistant.

Intrator O 2004


A cross-sectional prospective study using Minimum Data Set assessments, CMS inpatient claims and eligibility records, Online Survey Certification Automated Records, and Area Resource File data on nursing homes found facilities with NP/PAs were associated with lower hospitalization rates for ACS conditions.


Diabetes control among primary care patients appeared to benefit from inclusion of NPs, while an analogous association was not found for PAs.

Survey to determine whether providers with different specialty training differ in perception of effectiveness of common diagnostic and therapeutic practices for stroke prevention found wide variations. For example, 65% of surgeons rated angiography as effective for asymptomatic patients compared to 11% of mid-level providers.

OBJECTIVE: To identify published literature on the role of nurse practitioners and physician assistants in acute and critical care settings; to review the literature using non-quantitative methods and provide a summary of the results to date incorporating studies assessing the impact and outcomes of nurse practitioner and physician assistant providers in the intensive care unit; and to identify implications for critical care practice. CONCLUSIONS: Although existing research supports the use of nurse practitioners and physician assistants in acute and critical care settings, a low level of evidence was found with only two randomized control trials assessing the impact of nurse practitioner and PA care.


The purpose of this article is to present a quality improvement initiative designed and implemented to improve patient flow through an ED by redesigning the triage process to increase the efficiency and timeliness of initial patient contact with a licensed medical provider, increasing patient satisfaction, and decreasing the number of patients who leave without being seen.

Level I trauma center found presence of in-house core trauma surgeons and PAs reduced overall mortality and hospital LOS.

Review of mid-level practitioners in absence of a surgical residency between 1985 and 2007 found use of mid-level practitioners allowed establishment of effective and efficient surgery coverage while growing the trauma program.
The purpose of this study was to assess the quality of patient care during transition from resident to PA-assisted trauma program (without residents) and comparative simultaneous support. Substitution of residents with PAs had no impact on patient mortality; however, LOS (from EC to floor), was statistically reduced by one day.

OBJECTIVES: To examine the frequency and reasons for potentially avoidable hospitalizations of nursing home (NH) residents in a sample of Georgia NHs. MEASUREMENTS: Ratings using a structured review of medical records by expert NH clinicians. RESULTS: The availability of the medical director, physicians, and PAs/NPs was greater in NHs with low-hospitalization rates. Availability of an on-site PA or NP was among the most highly rated factors necessary to reduce avoidable hospitalizations.

Medicare Part A and B reimbursement data gathered from billing records found teams of geriatricians and physician extenders can reduce hospitalization rates and overall expenditures.

At Alaska Native Medical Center in Anchorage, colorectal cancer screening rates improved dramatically with the initiations of a dedicated flexible sigmoidoscopy screening program staffed by mid-level providers.


OBJECTIVE: To evaluate the quality and efficiency of patient care on a physician assistant/hospitalist service compared with that of traditional house staff services. CONCLUSIONS: For general medicine inpatients admitted to an academic medical center, a service staffed by hospitalists and physician assistants can provide a safe alternative to house staff services, with comparable efficiency.


Observation of nurses, physicians and mid-level practitioners using computerized clinical reminders found barriers to effective use, including lack of coordination between nurses and providers.


Analysis of National Hospital Ambulatory Medical Care Survey ED data in 2000 looked at inappropriate medications for patients >= 65 and found that being seen by a resident or physician extender was not significantly associated with inappropriate medication prescription.

Objective: To compare the quality of care provided by NPs and PAs with that provided by physicians. Conclusions: For the measures examined, the quality of HIV care provided by NPs and PAs was similar to that of physician HIV experts and generally better than physician non-HIV experts.

Laurant, M., Harmsen, M., Wollersheim, H., Grol, R., & Sibbald, B. The Impact of Non-physician Clinicians: Do They Improve the Quality and Cost-Effectiveness of Health Care Services? Medical Care Research and Review. 66(6), 36S-89S.

The implementation of a post acute coronary syndromes clinic run by a physician extender applying disease management algorithm did not measurably improve adherence to treatment goals.

The evidence suggests that non-physician clinicians working as substitutes or supplements for physicians in defined areas of care can maintain and often improve the quality of care and outcomes for patients. The effect on health care costs is mixed, with savings dependent on the context of care and specific nature of role revision.

OBJECTIVES: To determine whether the quality of tube thoracostomies performed by advanced practice providers (PAs & NPs) is comparable to that performed by trauma surgeons and to ascertain whether complication rates differ as to who performed the procedure. RESULTS: Differences between practitioner type...were not significant. CONCLUSION: Use of advanced practice providers provides consistent and quality tube thoracostomies. Employment of these practitioners may be a reasonable solution for staffing trauma centers.


Survey of surgical residents in Mount Sinai Surgical Residency Program found NPP and residents have similar perceptions about NPP function, both believe NPP on service decreases resident workload. More NPPs than residents feel NPPs contribute to residents' clinical education and that NPPs provide better continuity of care. 75% of NPPs believe they function at senior resident level or above, where 90.5% residents believe NPPs function at intern level or below.


Literature review using MEDLINE and EMBASE found 54 articles on impact of work hour reduction on residents lives and found physician extenders among interventions used to decrease resident work hours.
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<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Title</th>
<th>Details</th>
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<tbody>
<tr>
<td>Frankel HL</td>
<td>2006</td>
<td>Amelioration of Increased Intensive Care Unit Service Readmission Rate after Implementation of Work-Hour Restrictions. The Journal of Trauma, Injury, Infection and Critical Care. 61, 116-121.</td>
<td>Physician assistant support in an urban teaching hospital was found to reduce the rate of SICU readmissions that had initially risen after the implementation of resident work hour restrictions.</td>
</tr>
<tr>
<td>Moote M</td>
<td>2011</td>
<td>Physician assistant and nurse practitioner utilization in academic medical centers. Am J Med Qual. Nov-Dec;26(6):452-60.</td>
<td>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%).</td>
</tr>
<tr>
<td>Nuckols TK</td>
<td>2005</td>
<td>Residency work-hours reform. A Cost analysis including preventable adverse events. Journal of General Internal Medicine. 20(10), 873-8.</td>
<td>Cost analysis using published literature estimated reform's net cost in 2001 dollars and found transferring excess work to lowest level providers appropriate would cost $673 million, to mid-level providers would cost $1.1 billion. Large drop in adverse events is needed to make reform cost neutral for teaching hospitals.</td>
</tr>
<tr>
<td>Orlando CK</td>
<td>2007</td>
<td>Analysis of patient volume in 2005 in a 867 bed urban hospital (116 are surgical beds) looked at workload staffing index and found 4 services that benefited from addition of new midlevel practitioners.</td>
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2005 survey of orthopedic program directors, chairs and members of Resident Leadership Forum on effect of work hour restrictions on residents found departments have adapted by hiring additional physician extenders.

The purpose of this study was to evaluate our 30 years of experience with the use of physician assistants (PAs) on a cardiothoracic surgery (CTS) service. CONCLUSIONS: The addition of PAs to our CTS university service has allowed us to resolve many problems of work assignment and coverage and enabled us to establish effective and efficient surgical teams without increasing the number of categorical CTS residents.

DESIGN: Surgical resident survey. CONCLUSIONS: Physician assistants can have a positive influence on graduate surgical education programs. Physician assistants can help decrease surgery resident work hours and improve resident work outlook.

Washington practices have embraced advanced practitioners. Given the diversity of practice patterns, practices can learn from one another how to maximize ANP/NP roles. Practices need to promote practice-based educational opportunities to attract ANPs/PAs to medical oncology.


Non-physician providers (NPPs) including nurse practitioners (NPs) and physician assistants (PAs) are important members of CF care teams, but limited data exist about the extent NPPs are involved in CF care. A subcommittee was established by the CF Foundation to gather information about current involvement of NPPs. CONCLUSIONS: NPPs are working with physicians in many centers and have the potential to help meet the increasing clinical workforce demands. Further evaluation of financial issues is indicated to continue the support of NPP jobs in CF.


Key informant interviews with providers and administrators at nine MCOs and multispecialty clinics found the shortage of women health care providers as an important contributing factor in why institutions began to hire NPs and PAs. Many women patients prefer to see same-sex providers but there are not enough female physicians to meet this demand. NPs and PAs were more interested in preventive care than were physicians, and therefore came to play a central role in delivery of women's primary care.

This article describes the role of PAs and NPs in the ED acting as caregivers for admitted ED patients that are waiting for a bed so that MDs can care for more patients.


Survey of Program Directors of Surgery found 30% use physician extenders to help cover ICU during daytime and 11 percent use them during night.


This study examined the predictive abilities of practice attributes with respect to multidimensional aspects of practice autonomy (clinical decision making and prescriptive authority) in primary care PAs.

This study examines the frequency of psychosocial issues seen in primary care PA practice and the degree and manner in which PAs respond to the psychosocial issues seen. Conclusions: A variety of psychosocial issues are frequently seen in primary care PA practice.


OBJECTIVE: To describe the scope of practice and complementary role of physician assistants as physician extenders in the pediatric intensive care unit. CONCLUSIONS: Physician assistants play a complementary role as physician extenders in the pediatric intensive care unit, enabling compliance with New York state and Accreditation Council for Graduate Medical Education resident work hour regulations. Physician assistants perform similar tasks and activities as the pediatric intensive care unit residents and integrate well with them in enhancing bedside patient care.


This cross-sectional study used a computerized self-report survey of 32 targeted nurse practitioners and physician assistants employed in the cancer center of an urban teaching hospital. A model of advanced oncology practice needs to be developed that will empower APPs to provide high-quality patient care at the fullest extent of their knowledge and competence.

In this study, a survey was conducted of primary care physicians to determine physician use and amenability to use of non-physician health care providers to perform skin cancer screening in comparison with other cancer screening examinations. CONCLUSIONS: Primary care physicians are currently utilizing non-physician health care providers to perform cancer screening examinations and the majority of those surveyed are amenable to the use of these providers for such examinations.


Scripted patient telephone calls made to 898 dermatologists in 12 metropolitan areas found 27% of dermatologists employed physician extenders, and 39% of these extenders offered appointments for botulinum toxin with shorter waiting times (median 6 days) than appointments for dermatologists (median 8 days).


Oncology PAs are used in multiple medical settings, and many assume high-level responsibilities. Future research addressing function and factors that limit use of PAs may allow for improved organizational efficiency and enhancement in the delivery of health care.


This article describes physicians' use of nurse practitioners and physician assistants to provide CRC screening with the fecal occult blood test (FOBT), flexible sigmoidoscopy, and colonoscopy, as well as physicians' attitudes toward using these providers to perform flexible sigmoidoscopy. CONCLUSIONS: These results show current involvement of nurse practitioners and physician assistants in the delivery of CRC screening to be limited.
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<th>Author</th>
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<th>Abstract</th>
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<tbody>
<tr>
<td>Dehn RW</td>
<td>2000</td>
<td>Dehn, R.W., &amp; Cawley, J.F. (2000). Looking into tomorrow. Health workforce issues confronting physician assistants. JAAPA. 13(11), 29-32, 35-38, 43-46.</td>
<td>In this article, the authors review and discuss (1) workforce data on physicians, PAs, and nurse practitioners and (2) projections of the number of these clinicians who will be trained in the future. We then analyze (1) data that describe the past 11 years of PA education and (2) data that address the experience of recent graduates of PA education programs who have sought employment.</td>
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PAs or APNs are providing an increasing share of care delivered in OPDs compared with the previous decade. The findings in this report suggest that PAs or APNs continue to provide a critical health care function by providing care in settings with fewer physicians, such as rural locations, small hospitals, and nonteaching hospitals.

Analysis of data from the 2005 and 2006 National Ambulatory Medicare Care Surveys found 11.5 percent of medical practices employed at least one mid-level provider.

In 2001 an estimated 103,612 nurse practitioners (NPs) and physician assistants (PAs) were in clinical employment in the US. The roles of PAs and NPs in providing comparable physician services are similar; they differ in that NPs are predominantly in primary care, while PAs are divided between primary and specialty care.

The federal government is the largest single employer of clinically active PAs in the US. The author presents an overview of how PAs are being used and the critical roles they play in the federal health care system. A centralized recruitment and retention strategy is one suggested option to help the government compete with private sector and civilian opportunities.
In this paper we analyze primary care physician office encounter data from the 1995-1999 National Ambulatory Medical Care Surveys. About one-quarter of primary care office-based physicians used PAs and/or NPs for an average of 11 percent of visits.

The number of clinically active PAs is projected to increase by almost 72% in 15 years. Attrition rates, especially retirement patterns, are not well understood for PAs, and variation could affect future supply. While the majority of PAs are in the medical specialties and subspecialties fields, new policy steps funding PA education and promoting primary care may add more PAs in primary care than the model predicts.

The study tests the hypotheses that facilities in states with higher Medicaid rates, and those in more competitive markets and markets with higher managed care penetration, are more likely to employ NPs or PAs. Facilities in more competitive markets, and in markets with higher managed care penetration, were more likely to employ NPs or PAs.

A descriptive study was undertaken to examine the physician assistant (PA) workforce in Texas as part of an ongoing effort to meet the health needs of Texas residents.


METHODS: This study sought to follow up the large data set collected by the American Academy of Dermatology in 2002; the survey was repeated in 2005 and 2007. PA RELEVANT CONCLUSIONS: In 2007, 23% of practices reported employing a physician assistant and 10% a nurse practitioner (up from 15% and 8% in 2002)

This report describes key elements of change in the demography and distribution of the PA population between 1967 and 2000, as well as the spread of PA training programs. Individual-level data from the American Academy of Physician Assistants, supplemented with county-level aggregate data from the Area Resource File, were used to describe the emergence of the PA profession between 1967 and 2000.

This paper explores the reason for the increase of women in the physician assistant profession in recent decades and whether gender differences exist in how PAs are utilized. Twenty-one qualitative interviews with male and female physician assistants and key informants were conducted to assess the reasons for the influx of women.

Analysis on ED portion of NHAMCS data from 1997-2006 found percent of patients seen by mid-level provider (MLP) increased from 5.5% to 12.7%, and proportion of hospitals using MLPs increased from 28.3% to 77.2%. Younger patients, non-southern geographic region, and triage acuity were associated with increased MLP use.
<table>
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<tr>
<th>Name</th>
<th>Year</th>
<th>Paper Title</th>
<th>Summary</th>
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<tr>
<td>Mitchell CC</td>
<td>2007</td>
<td>Predicting future staffing needs at teaching hospitals: use of an analytical program with multiple variables.</td>
<td>Used computer model to predict future staffing needs due to the impact of changes in resident work hours and service growth. The study estimates in the next 5 years the hospitals will need to hire 10 physician assistants at the cost of $1,134,000, which is $441,000 cheaper than hiring hospitalists.</td>
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<tr>
<td>Morgan PA</td>
<td>2007</td>
<td>Missing in Action: Care by Physician Assistants and Nurse Practitioners in National Health Surveys.</td>
<td>To assess applicability of national health survey data for generalizable research on outpatient care by physician assistants (PAs) and nurse practitioners (NPs). Surveys varied with respect to applicability to PA and NP care.</td>
</tr>
<tr>
<td>Nyberg SM</td>
<td>2010</td>
<td>Acceptance of physician assistants and nurse practitioners in trauma centers.</td>
<td>The purpose of this study is to determine the prevalence of PAs and NPs in US trauma centers, to document their roles, and to identify their potential future utilization by trauma centers. In most trauma centers, PAs/NPs are utilized to complete the traditional duties of a surgical PA/NP, with fewer performing invasive procedures. Finally, 19% of responding trauma centers who do not currently utilize PAs/NPs state that they intend to in the future.</td>
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<td><strong>Archives of Surgery.</strong></td>
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<td><strong>142</strong>(12), 1226. <strong>Morgan, P. A., Strand, J., Østbye, T., &amp; Albanese, M. A.</strong> (2007). <strong>To assess applicability of national health survey data for generalizable research on outpatient care by physician assistants (PAs) and nurse practitioners (NPs). Surveys varied with respect to applicability to PA and NP care.</strong></td>
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<td><strong>Health Services Research. 42</strong>(5), 2022-2037. <strong>To assess applicability of national health survey data for generalizable research on outpatient care by physician assistants (PAs) and nurse practitioners (NPs). Surveys varied with respect to applicability to PA and NP care.</strong></td>
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<td><strong>JAAPA. 2010 Jan;23</strong>(1):35-7, 41. <strong>The purpose of this study is to determine the prevalence of PAs and NPs in US trauma centers, to document their roles, and to identify their potential future utilization by trauma centers. In most trauma centers, PAs/NPs are utilized to complete the traditional duties of a surgical PA/NP, with fewer performing invasive procedures. Finally, 19% of responding trauma centers who do not currently utilize PAs/NPs state that they intend to in the future.</strong></td>
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This study found that in 1996, 370 midlevel practitioners were serving obligations to state programs providing financial support in exchange for service in defined underserved areas, excluding programs receiving federal support. This number of midlevel practitioners was comparable to those in federal programs. There were 82 such programs in 41 states in 1996, more than double the 39 that existed in 1990.


Survey of pediatric pulmonologists found most use physician extenders to provide care.


Survey of practicing dermatologists found use of physician extenders among other measures such as wait times, searches for new employees, etc. as support for the existence of a dermatologist shortage.


More PAs in Indiana are practicing in medical specialties than in primary care. As health care policy and regulatory changes evolve, future studies will be needed to understand the impact on the health care workforce of Indiana PAs. This study will serve as a baseline for those studies.
Stead LG 2003


Similar surveys of academic departments of emergency medicine conducted in 1999, 1998 and 1996. Percentage of departments using mid-level providers remained unchanged (65-68%) and most common use of mid-level providers was for fast-track setting.

Tsang MW 2006


Scripted telephone calls to 851 dermatologists to assess wait times found many dermatologists employed a physician extender, and wait times for extenders were significantly shorter than for physicians.

Zorn J 2009


The purpose of this study was to determine if there was a gender-based difference in starting incomes paid to new graduate physician assistants. The results of the study indicate that female new graduate physician assistants received a lower income than their male counterparts, even when other confounders were considered.

PAs Internationally

Mittman DE 2002


An introduction to the PA profession for an international audience. A brief overview of PA origins is given, PAs are distinguished from NPs, and PA scope of practice is outlined.

PAs and NPs are described for an Australian readership. Topics covered include history, demographics, scope of practice, licensure, specialties, education, productivity, and efficiency, and the benefits of a team model of care.