

POSITION PAPER:

COST EFFECTIVENESS ARTICLE SUMMARIES

Original Research

Aiken, L. H., Sloane, D. M., Brom, H. M., Todd, B. A., Barnes, H., Cimiotti, J. P., ... & McHugh, M. D. (2021). Value of nurse practitioner inpatient hospital staffing. *Medical Care*, 59(10), 857.

To understand the impact of staffing nurse practitioners (NPs), the 2015-2016 RN4CAST-US data was evaluated using logistic regression. Hospitals were divided into having <1 NP/100 beds, 1-2.99 NPs/100 beds and 3+ NPs/100 beds. Hospitals with the highest number of NPs per bed spent 5% less per Medicare beneficiary than hospitals with <1 NP/100 beds. Hospitals with more NPs/100 beds reported lower odds of patient readmission and shorter lengths of stay, contributing to lower costs.

Buerhaus, P., Perloff, J., Clarke, S., O'Reilly-Jacob, M., Zolotusky, G., & DesRoches, C. M. (2018). Quality of primary care provided to Medicare beneficiaries by nurse practitioners and physicians. *Medical Care*, 56(6), 484-490.

Buerhaus et al. used Medicare Part A and Part B beneficiary data from 2012-2013, which was evaluated for quality of care and utilization between NPs and physicians. Primary care NP-attributed beneficiaries had fewer preventable hospitalizations, emergency department (ED) visits, hospital readmissions, inappropriate ED use and low value MRIs. These findings suggest that hiring NPs can result in lower costs by having reduced utilization of limited medical resources.

Liu, C. F., Hebert, P. L., Douglas, J. H., Neely, E. L., Sulc, C. A., Reddy, A., ... & Wong, E. S. (2020). Outcomes of primary care delivery by nurse practitioners: Utilization, cost, and quality of care. *Health Services Research*, 55(2), 178-189.

Liu et al. used Veterans Affairs (VA) data to examine differences in utilization, cost and clinical outcomes between patients of NPs and those of physicians between 2010 and 2012. A difference-in-difference approach was used to analyze participants who were reassigned from an MD to an NP. Patients of NPs and physicians had similar rates of utilization, except for greater specialty care among patients of physicians. No significant differences in cost were found between NPs and physicians.

Morgan, P. A., Smith, V. A., Berkowitz, T. S., Edelman, D., Van Houtven, C. H., Woolson, S. L., ... & Jackson, G. L. (2019). Impact of physicians, nurse practitioners, and physician assistants on utilization and costs for complex patients. *Health Affairs*, 38(6), 1028-1036.

Morgan et al. analyzed VA data from 2012 to 2013 to compare costs between NPs and physicians among medically complex patients with diabetes. Using multiple-case-mixed adjusted totals and stepwise models, the authors found patients of NPs and PAs were less likely than physicians to incur a hospitalization or visit the ED, and they had lower outpatient, pharmacy and total expenditures. NPs were associated with \$1,300 less in inpatient costs, \$400 less in outpatient costs and \$300 less in pharmacy costs, as compared to physicians.

Muench, U., Guo, C., Thomas, C., & Perloff, J. (2019). Medication adherence, costs, and ER visits of nurse practitioner and primary care physician patients: Evidence from three cohorts of Medicare beneficiaries. *Health Services Research*, 54(1), 187-197.

Data from Medicare beneficiaries from 2009 to 2010 was analyzed to evaluate medication adherence, cost and utilization between NPs and primary care physicians. Propensity score-weighted analyses and generalized estimating equations tested for differences between groups. There were no differences in patient medication adherence between NPs and primary care physicians, except when statins were prescribed (NPs 74.6% vs PCP 75.5%). However, patients of NPs were less likely to experience an emergency room (ER) visit, and they had lower non-office-based (\$86-\$100) and office-based costs (\$187-\$195). These findings show NPs provide cost-saving care that is still high-quality.

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Smith, V. A., Morgan, P. A., Edelman, D., Woolson, S. L., Berkowitz, T. S., Van Houtven, C. H., ... & Jackson, G. L. (2020). Utilization and costs by primary care provider type: Are there differences among diabetic patients of physicians, NPs, and PAs? *Medical Care*, 58(8), 681.

Smith et al. examined outcomes and cost savings for patients with diabetes using 2012 Veteran Health Administration data (N=279,009). Patients of NPs had lower odds of ED use, compared to patients of physicians. Additionally, NPs had significantly lower inpatient, outpatient and pharmacy costs for patients, saving \$563 for patients who saw NPs. Findings indicate NPs provide care that reduces hospital visit costs.

Perloff, J., DesRoches, C. M., & Buerhaus, P. (2016). Comparing the cost of care provided to Medicare beneficiaries assigned to primary care nurse practitioners and physicians. *Health Services Research*, 51(4), 1407-1423.

Perloff et al. used Medicare Part A and Part B data between 2009 and 2010 to examine the cost difference between NPs and physicians. Using propensity score weighting, 370,241 beneficiaries were assessed. NPs cost on average \$2,474, which was \$522 less than physicians for Part A and Part B. The NP dollar adjusted relative value units (RVUs), a cost measure composed of work, practice and malpractice expenses, was \$1,629 less, as compared to physicians. Thus, beyond the cost of labor, NPs provide more affordable care than physicians when considering work, practice and malpractice expenses.

Rajan, S. S., Akeroyd, J. M., Ahmed, S. T., Ramsey, D. J., Ballantyne, C. M., Petersen, L. A., & Virani, S. S. (2021). Health care costs associated with primary care physicians versus nurse practitioners and physician assistants. *Journal of the American Association of Nurse Practitioners*, 33(11), 967-974.

VA data from 2012 to 2013 was assessed for cost differences between NPs and physicians. One cohort with diabetes, and one with cardiovascular disease (CVD), was analyzed. Patients of NPs with diabetes and CVD saved \$2,626 and \$924, as compared to like patients of physicians. These differences can result in a total of \$19 million savings per year, per VA center.

Razavi, M., O'Reilly-Jacob, M., Perloff, J., & Buerhaus, P. (2021). Drivers of cost differences between nurse practitioner and physician attributed Medicare beneficiaries. *Medical Care*, 59(2), 177.

Medicare claims from 2009 to 2010 were analyzed to understand the cost difference between NPs and primary care physicians. The costs of primary care physicians were 34%, 26% and 21% higher than that of NPs for low-, moderate- and high-risk beneficiaries. These differences result in a cost difference of \$368, \$550 and \$1,297 between primary care physicians and NPs. For low- and moderate-risk beneficiaries, service volume, the proportion of unique claims for each service, was the largest contributor to the difference in cost. However, the cost difference among high-risk patients was most explained by payment rate (9%), followed by service volume (7.2%) and service mix (4.6%). These results indicate the cost savings by NPs comes from ordering fewer services, not just lower reimbursements.

Wall, S., Scudamore, D., Chin, J., Rannie, M., Tong, S., Reese, J., & Wilson, K. (2014). The evolving role of the pediatric nurse practitioner in hospital medicine. *Journal of Hospital Medicine*, 9(4), 261-265.

Wall et al. analyzed 2009-2010 electronic medical records from Children's Hospital Colorado to compare cost and pediatric outcomes between a pediatric NP team, a combined pediatric NP (PNP)/MD team and two resident teams without NPs. No differences between length of stay were found. However, cost of care per encounter among the PNP team was significantly less than the PNP/MD team and the resident teams. PNP-led teams saved \$332 among bronchiolitis patients, \$556 and \$1,131 for asthma patients, and \$837 and \$837 for pneumonia patients, as compared to resident teams. Compared to MD teams, PNP-led teams saved \$882 among bronchiolitis patients, \$1,131 for asthma patients and \$837 for pneumonia patients. NP-led teams can reduce costs for patients, compared to physician- and resident-led teams.

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Yang, B. K., Idzik, S., Nelson, H. W., & McSweeney-Feld, M. H. (2023). Nurse practitioner employment in relation to nursing staff turnover and resident care outcomes in U.S. nursing homes. *Journal of the American Medical Directors Association*.

Data on 13,966 nursing homes and claim-based quality measures from Medicare and Medicaid services during 2021-2022 was analyzed. Yang et.al. used inverse probability weighting to identify how NPs affected staff turnover and hospital utilization. Nursing homes with NPs had lower nurse and certified nurse anesthetist turnover rates and reduced hospital utilization, compared to nursing homes with no NPs. Thus, NPs can decrease nursing staff turnover and lower health care costs through reduced use of hospital services.

Systematic Reviews and Meta-Analysis

Martin-Misener, R., Harbman, P., Donald, F., Reid, K., Kilpatrick, K., Carter, N., ... & DiCenso, A. (2015). Cost-effectiveness of nurse practitioners in primary and specialized ambulatory care: Systematic review. *BMJ Open*, 5(6), e007167.

A systematic review and meta-analysis of domestic and international randomized control trials were conducted to examine the cost-effectiveness of NPs. A total of 11 trials were found. Patients of NPs and physicians were found to have equal ED and urgent care use, but NPs had lower health services costs per consultation. Additionally, NPs had lower annual family costs per child and higher antidepressant cost of care because of better medication adherence.

Woo, B. F. Y., Lee, J. X. Y., & Tam, W. W. S. (2017). The impact of the advanced practice nursing role on quality of care, clinical outcomes, patient satisfaction, and cost in the emergency and critical care settings: A systematic review. *Human Resources for Health*, 15, 1-22.

Woo et.al. conducted a systematic review to review the impact of advanced practice nursing in emergency and critical care settings. The review included 15 studies published between 2006 and 2016. Three studies addressed cost savings with NPs and found cost savings consistently occurred when NPs were included in care. Additionally, patients managed by NPs had faster care, lower mortality in the ICU and a typically lower length of stay. Overall, involving NPs in care can result in better cost-effectiveness without reducing quality of care.