LITERATURE ON NP COST EFFECTIVENESS
DISCUSSION PAPER

AANP
American Association of NURSE PRACTITIONERS®

Nurse practitioners (NPs) represent a vital solution to the growing need for cost-effective, high-quality, accessible care. Evidence of NP cost-effectiveness is supported by systematic reviews (Section I) and individual studies (Section II). Both sections contain studies that are also included in the American Association of Nurse Practitioners® review of literature on NP quality of care because they examine both cost and quality outcomes. Summaries of the studies in this review focus on cost-related findings. The list of studies in each section is ordered according to the publication date, starting with the most recent.

The majority of cost-focused studies included in systematic reviews find that NP care is cost-effective compared to care provided by physicians while producing similar outcomes (McMenamin et al., 2023; Woo et al., 2017). Individual studies that examine cost typically focus on specific conditions or settings. Studies focused on conditions have found that the cost of NP care is lower than physician care for asthma, diabetes, cardiovascular disease, bronchitis and pneumonia (Harrison et al., 2023; Rajan et al., 2021; Wall et al., 2014). Research on inpatient, outpatient and pharmacy costs has also consistently found that NP care is more cost effective than physician care (Smith et al., 2020; Morgan et al., 2019; Perloff et al., 2016). Lower hospital readmissions and shorter hospital stays, less emergency department (ED) use and lower malpractice expenses are among the factors that drive cost savings from NP care, although studies vary in their findings on specific metrics (Aiken et al., 2021; Liu et al., 2020; Smith et al., 2020; Muench et al., 2019; Woo et al., 2017). Employing NPs has also been found to reduce costly staff turnover (Yang et al., 2023).

Section I. Systematic reviews

1. McMenamin, A., Turi, E., Schlak, A., & Poghosyan, L. (2023). A Systematic Review of Outcomes Related to Nurse Practitioner-Delivered Primary Care for Multiple Chronic Conditions. *Medical Care Research and Review, 80*(6), 563-581.
McMenamin et al. reviewed 15 studies on outcomes of NP care among primary care patients with multiple chronic conditions. Four studies compared the cost of NP and physician care. Two of those studies found lower costs associated with NP care, as reflected in lower annual expenditures for Veterans Health Administration patients and lower ED and hospital charges for Medicaid patients. One study found no difference in cost between NP and physician care, and one study reported slightly higher costs of NP care compared to physician care, driven by higher payments to long-term care and skilled nursing facilities for patients of NPs.

2. 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.
The authors reviewed 15 studies on the impact of advanced practice nursing on quality of care, clinical outcomes, patient satisfaction and cost in emergency and critical care settings. Two studies examined cost and were based in the U.S. One study found cost savings for trauma patients seen by teams that included NPs versus other providers, and the other study found comparable intensive care unit (ICU) charges for patients cared for by NP-physician teams and physician-only teams, despite longer ICU stays for the NP-physician group.

Section II. Individual studies

1. Harrison, J. M., Kranz, A. M., Chen, A. Y. A., Liu, H. H., Martsolf, G. R., Cohen, C. C., & Dworsky, M. (2023). The impact of nurse practitioner-led primary care on quality and cost for Medicaid-enrolled patients in states with pay parity. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing, 60*, 00469580231167013.
Harrison et al. examined 2012 and 2013 Medicaid claims for cost differences between NPs and physicians in states that reimburse NPs at the Medicaid fee-for-services physician rate. The authors found nearly $300 lower fee-for-service costs for NP care for children with asthma compared to physician care, and similar costs of care from NPs and physicians for adults with diabetes.

2. 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*.
Yang et al. analyzed payroll and claims data from 2021-2022 for 13,966 nursing homes. They applied "doubly

robust" inverse probability weighting and regressions to identify the impact of NPs on staff turnover, hospital utilization, infection control and patient satisfaction. Nursing homes that employed NPs had fewer hospitalizations per 1,000 resident days among long-stay residents. Nursing homes that employed NPs who worked at least 20 hours per week also had fewer ED visits among long-stay residents. Nursing homes with NPs also had lower registered nurse and certified nursing assistant turnover rates, fewer infection control citations and fewer complaints than nursing homes without NPs.

3. McHugh, M. D. (2021). Value of nurse practitioner inpatient hospital staffing. *Medical Care*, *59*(10), 857.
Aiken et al. examined the impact of NP staffing on Medicare beneficiary costs using 2015 and 2016 data. Hospitals were categorized as having <1 NP/100 beds, 1-2.99 NPs/100 beds and 3+ NPs/100 beds. Hospitals with the highest NP-to-bed ratio 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 overall cost reductions.

4. 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.
This study used 2012 to 2013 Department of Veteran Affairs (VA) data to assess the differences in health care costs between care provided by NPs and physician assistants (PAs) versus care provided by physicians. Rajan et al. analyzed total VA costs and combined VA and Medicare costs for patients with diabetes or cardiovascular disease (CVD). Compared to physician care, NP and PA care resulted in average cost savings of $2,626 per patient with diabetes and $924 per patient with CVD. The authors estimate that switching to NP and PA care could save the VA $19 million per year.

5. 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.
Razavi et al. analyzed Medicare claims from 2009 to 2010 to estimate the difference between NP and primary care physician costs. Primary care physician costs were $368, $550 and $1,297 higher than NP costs for low-, moderate and high-risk beneficiaries, respectively. The authors conducted a decomposition analysis and found that service volume, or the number of services ordered by NPs and physicians, was the largest driver of cost differences. Payment differences and service mix (the intensity of services or treatments provided) played smaller roles.

6. Liu, C. F., Hebert, P. L., Douglas, J. H., Neely, E. L., Sulc, C. A., Reddy, A., Sales, A. E., & 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 VA data to examine differences in utilization, cost and clinical outcomes between patients of NPs and those of physicians between 2010 and 2012. They used a difference-in-difference approach to analyze cost and utilization of care between patients assigned to a physician or NP primary care provider. Patients of NPs used less primary and specialty care and had fewer hospitalizations. There were no significant differences in cost between NPs and physicians.

7. Smith, V. A., Morgan, P. A., Edelman, D., Woolson, S. L., Berkowitz, T. S., Van Houtven, C. H., Hendrix, C. C., Everett, C. M., White, B. S., & 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 VA data. Patients of NPs had lower odds of ED use, compared to patients of physicians. NP patient costs were $563 lower than physician costs, driven by lower inpatient, outpatient and pharmacy costs.

8. Morgan, P. A., Smith, V. A., Berkowitz, T. S., Edelman, D., Van Houtven, C. H., Woolson, S. L., Everett, C. M., White, B. S., & 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. compared the costs of primary care provided by NPs and physicians to medically complex patients using 2012-2013 VA data. Patients of NPs and PAs had fewer hospitalizations or ED visits — and lower outpatient, pharmacy and total expenditures — than patients of physicians. NP care reduced inpatient, outpatient and pharmacy costs by $1,300, $400 and $300, respectively, compared to physicians.

9. 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.
Muench et al. analyzed 2009-2013 Medicare claims data to evaluate medication adherence, cost-effectiveness and utilization of care differences between patients of NPs and primary care physicians. They used propensity score-weighted analyses to test for differences between groups. NP care lowered non-office-based costs ($86-$100) and office-based costs ($187-$195) compared to physicians.

10. 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. examined the cost differences between NPs and physicians in 2009 and 2010 Medicare Part A and Part B data using propensity score weighted regression models. They found that the cost of care provided by NPs was consistently lower than the cost of care provided by physicians: Part A inpatient care cost $2,474 less, Part B office visits cost $522 less and evaluation and management (E&M) services cost $207 less. The NP dollar-adjusted work relative value units (RVUs) and E&M RVUs — a cost measure composed of work, practice and malpractice expenses — was $1,629 and $585 less than for physicians.

11. 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 nurse practitioner (PNP) team, a combined PNP/medical doctor (MD) team and two resident teams without NPs. The 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 $882 among bronchiolitis patients, $1,131 for asthma patients and $837 for pneumonia patients compared to PNP/MD teams. PNP-led teams saved $332 among bronchiolitis patients, $556 and $1,131 for asthma patients and $837 for pneumonia patients compared to resident teams.