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Understanding Advanced Practice Registered Nurse Distribution in Urban and Rural Areas of the United States Using National Provider Identifier Data

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Background

Information on the distribution of advanced practice registered nurse (APRN) workforce supply is needed to effectively address current and anticipated future shortages. This study examined APRN distribution using the 2010 Centers for Medicare and Medicaid Services (CMS) National Provider Identifier (NPI) data. For APRN roles whose numbers in the NPI data appeared to be sufficiently complete, the study described national and state-level rural and urban distribution and identified factors associated with rural practice.

Key Findings

- The 2010 NPI data set included 106,113 nurse practitioners (NPs) and 35,973 certified registered nurse anesthetists (CRNAs). The numbers of certified nurse-midwives and clinical nurse specialists in the data set were too small to accurately represent those APRN populations and were dropped from further analyses.

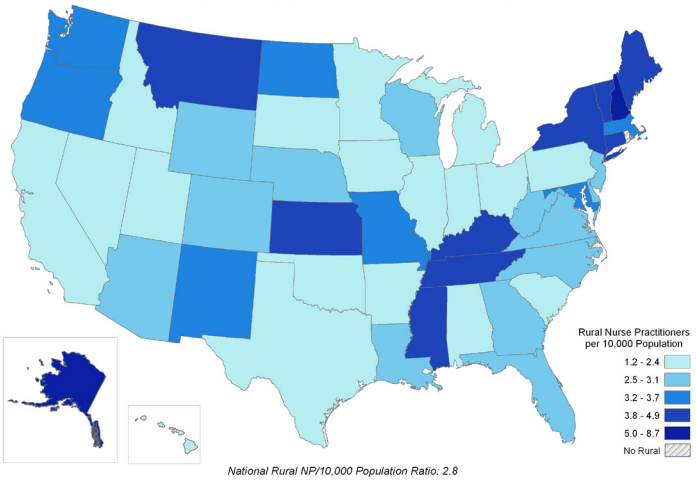
NPs:

- There were 3.6 urban and 2.8 rural NPs per 10,000 U.S. population, based on NPI data.
- The relative risk of an NP being in a rural location was higher (but not significantly) in states with the most autonomous practice regulations (RR 1.5, $P = 0.075$) compared with states requiring physician delegation or supervision.
- The likelihood of rural location was higher for male NPs (RR 1.2, $P < 0.0001$): 8.9% of rural NPs were male compared with 6.8% of urban NPs.

CRNAs:

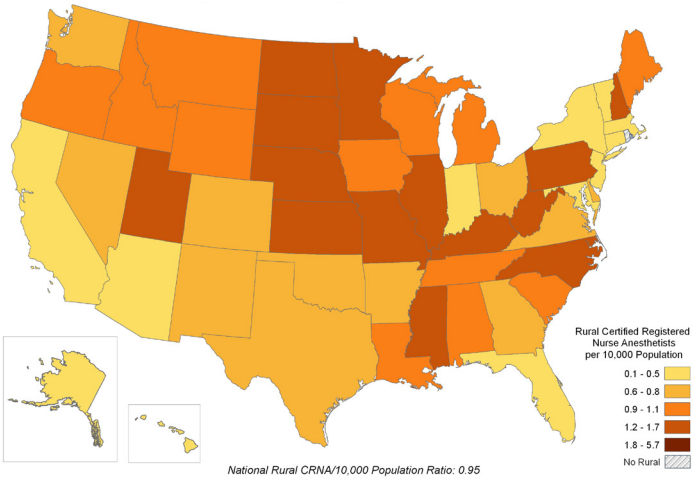
- There were 1.2 urban and 0.9 rural CRNAs per 10,000 U.S. population, based on NPI data.
- The relative risk of a CRNA being in a rural location was higher in states with the most autonomous practice regulations (RR 2.0, $P < 0.001$) compared with states with no prescriptive authority.
- The likelihood of rural location was higher for male CRNAs (RR 1.9, $P < 0.0001$): 60.9% of rural CRNAs were male compared with 38.5% of urban CRNAs.

Rural NPs per 10,000 State Population, 2010 NPI Data



National Rural NP/10,000 Population Ratio: 2.8

Rural CRNAs per 10,000 State Population, 2010 NPI Data



National Rural CRNA/10,000 Population Ratio: 0.95

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Policy Implications

- CRNAs were more likely to practice in rural locations in states with greater practice autonomy. For NPs the findings were similar but of borderline statistical significance. These findings imply that practice autonomy should be considered as a state-level strategy to encourage rural practice by CRNAs and NPs.
- Male NPs and CRNAs were more likely than females to be in rural locations. Efforts to encourage more men to choose careers as NPs or CRNAs would likely benefit rural communities.
- The NPI could become an even more valuable tool for national health workforce planning if all relevant providers obtained an NPI and if all were to update their records regularly.
- Further research is needed to more fully understand factors that influence NPs' and CRNAs' decisions to practice in rural areas.

NP and CRNA Practice Autonomy Categories by State

Practice Autonomy Categories*	States
NPs	
Autonomous	AK, AZ, DC, ID, IA, ME, MT, NH, NM, OR, RI, UT, WA, WY
Collaboration	AL, AR, CA, CO, CT, DE, HI, IN, KS, KY, LA, MD, MS, ND, NJ, NV, NY, OH, PA, SD, VT, WV
Delegation/supervision	GA, IL, FL, MA, MI, MN, MO, NE, NC, OK, SC, TN, TX, WI, VA
CRNAs	
Autonomous	AZ, DC, IA, MT, NH, NM, RI, WA, WY
Collaboration, supervision, or delegation	AK, CO, CT, DE, ID, IL, KY, MN, MO, NJ, OK, TN, TX, VT, WV, WI
No prescriptive authority/authority not used	AL, AR, CA, FL, GA, HI, IN, KS, LA, ME, MA, MD, MI, MS, NE, NC, ND, NV, NY, OH, OR, PA, SC, SD, UT, VA

*Extent to which collaboration, supervision, or delegation is required by state law or regulation.

Methods

This study analyzed individual NPI records from the 2010 CMS National Plan and Provider Enumeration System to identify the urban and rural location in the United States of all APRNs, including NPs, CRNAs, CNMs, and CNSs. Per capita provider supply was determined using 2011 Neilson/Claritas population estimates based on U.S. census data. Rural-urban APRN location was determined by linking Rural-Urban Commuting Area codes to NPI provider ZIP codes. States were classified into three autonomy groups for NPs and for CRNAs based on state laws and regulations in 2010 (see table). Chi-square testing examined provider supply by geographic locations. Multivariate hierarchical regression testing identified whether rural location was related to practice autonomy, per capita provider supply, or gender.

This study was funded through a contract with the American Nurses Association.

Findings are more fully described in WWAMI RHRC Final Report #137: Skillman SM, Kaplan L, Fordyce MA, McMenamin PD, Doescher MP. Understanding Advanced Practice Registered Nurse Distribution in Urban and Rural Areas of the United States Using National Provider Identifier Data. February 2012. Http://depts.washington.edu/uwrhrc/uploads/RHRC_FR137_Skillman.pdf.