



Impact of nurse practitioners on health outcomes of Medicare and Medicaid patients

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ARTICLE INFO

Article history:

Received 25 April 2014

Revised 7 July 2014

Accepted 20 July 2014

Keywords:

Medicaid

Medicare

Nurse practitioners

ABSTRACT

Strengthening health care overall is essential to the health of our nation and promoting access to health care as well as controlling health care costs in a quality cost-effective manner. Nurse practitioners have demonstrated to be effective and cost-effective providers in prior research; however, many states restrict their practice. We examined for a statistically significant relationship between the level of advanced practice registered nurse (APRN) practice (full, reduced, or restricted) allowed and results of recent nationwide, state level analyses of Medicare or Medicare-Medicaid beneficiaries of potentially avoidable hospitalizations, readmission rates after inpatient rehabilitation, and nursing home resident hospitalizations and then compared them with state health outcome rankings. States with full practice of nurse practitioners have lower hospitalization rates in all examined groups and improved health outcomes in their communities. Results indicate that obstacles to full scope of APRN practice have the potential to negatively impact our nation's health. Action should be taken to remove barriers to APRN practice.

Cite this article: Oliver, G. M., Pennington, L., Revelle, S., & Rantz, M. (2014, ■). Impact of nurse practitioners on health outcomes of Medicare and Medicaid patients. *Nursing Outlook*, ■(■), 1-8. <http://dx.doi.org/10.1016/j.outlook.2014.07.004>.

Over 2 years have passed since the Institute of Medicine (IOM) released their report on the future of nursing with the number one recommendation to remove scope of practice barriers for advanced practice registered nurses (APRNs) (IOM, 2011). In March 2014, the Federal Trade Commission released a policy paper regarding the competition and regulation of APRN practice (Gilman & Koslov, 2014). Within this document, the question of legitimacy of barriers to APRN practice was raised (Gilman & Koslov, 2014). This question is particularly important in the current health care environment where issues of access to cost-effective, quality health care are key.

Further raising the question of barriers to APRN practice are the recent findings that the 2012 state health rankings reported by the United Health Foundation are significantly related to the level of nursing practice (full, reduced, or restricted as defined by the American Association of Nurse Practitioners) allowed in states (Oliver, Pennington, & Revelle, 2014). Three recent studies also ranked state performance of additional health outcomes, specifically those of Medicare or Medicare-Medicaid beneficiaries (U.S. Department of Health and Human Services [DHSS], 2013; Ottenbacher et al., 2014; Segal, Rollins, Hodges, & Roozeboom, 2014). These findings set the stage for

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<http://dx.doi.org/10.1016/j.outlook.2014.07.004>

additional exploration of the effect of APRN practice on this large group of health services users. The purpose of this article was to explore if there is a statistically significant relationship between the level of APRN practice and health outcomes in those Medicare or Medicare-Medicaid beneficiaries (the population of interest in this study). Although there are four different APRN roles (certified nurse midwife, certified registered nurse anesthetist, clinical nurse specialist, and nurse practitioner), the focus is on the nurse practitioner (NP) role because this is the role that has been traditionally prepared to function in primary care settings, including nursing homes, where many Medicare or Medicaid beneficiaries reside. The term APRN and NP are used interchangeably.

Background

The U.S. DHHS develops and continually refines a strategic plan to meet the health care needs of the American people. Within the current strategic plan, there are five overarching goals, with the first goal being strengthening health care overall. Key components of this goal include promoting access to health care as well as controlling the growth of health care costs in a quality cost-effective manner (U.S. DHHS, 2014). In 2012, there were about 49.5 million Medicare beneficiaries (Kaiser Family Foundation, 2014), and they accounted for 21% of the total health care spending in the United States (California Health Care Foundation, 2014). There are current studies underway funded by the Centers for Medicare and Medicaid (CMS) Innovations Center and the Medicare-Medicaid Coordination Office to explore ways to control these costs (Rantz et al., 2013). There is an urgent need to address high costs and improved care outcomes for beneficiaries. According to the U.S. DHHS, the Affordable Care Act will offer an opportunity for those who have been uninsured to access affordable health insurance. This represents approximately 15% of the total American population or approximately 41.3 million lives (U.S. DHHS, 2013). In addition to this population, we have a rapidly aging populace with the baby boomers as well as an obesity epidemic resulting in increasing rates of diabetes (Centers for Disease Control and Prevention, 2013). Finding providers to care for these populations becomes of increasing importance, particularly in light of anticipated physician shortages (Peterson et al., 2012).

APRNs are frequently discussed as a solution to meeting these anticipated shortages (Auerbach et al., 2013; Robert Wood Johnson Foundation, 2013). Previous research has indicated that APRNs provide equivalent quality care compared with other health care providers, including physicians, in similar primary care practice settings (Lenz, Mundinger, Kane, Hopkins, & Lin, 2004; Mundinger et al., 2000; Newhouse et al., 2011; Naylor & Kurtzman, 2010). One

of the issues that negatively affects APRN practice is the wide level of restriction placed on the practice, which varies across states because of differences in state licensing laws; some areas are quite independent, whereas others are very restrictive (O'Grady, 2008; Robert Wood Johnson Foundation, 2013). Oliver et al. (2014) found a statistically significant relationship between improved overall state health outcomes in states where full practice for NPs is allowed. The regulation of APRN practice varies greatly from state to state (IOM, 2011). Safriet (1992), in a classic legal article, recognized the need for the removal of regulations that restrict APRN practice. She argued that such barriers do not protect the health of the public but instead hinder access to the high-quality, cost-effective care provided by APRNs.

Recently, the calls for the removal of regulatory restrictions on APRN practice have become more frequent. The APRN Joint Dialog Group (2008) developed a model of APRN regulation that promotes standardizing laws and reducing practice barriers across states; this model is promoted by the National Council of State Boards of Nursing. The IOM (2011) recognizes that changes must be made in scope of practice laws to allow APRNs to practice to the full extent of their education. The National Governor's Association Center for Best Practices (2012) calls for reducing scope of practice restrictions as a method of encouraging more NPs to work in primary health care. Dower, Moore, and Langelier (2013) argue that scope of practice regulations need to be reformed for all health care professions in order to have a more efficient and effective health workforce. Such regulations should be flexible, acknowledge professional competence, and recognize the overlap among the scopes of practice of different health professions.

The medical profession counters that reducing APRN practice regulation is not safe. Because of this stated concern, the American Medical Association (2009) developed an information module to assist physicians in challenging attempts to reform scope of practice regulations for NPs. The American Academy of Family Physicians (2012) stated that the quality of health care would decrease if NPs were allowed to lead a patient-centered medical home. Donelan, DesRoches, Dittus, and Buerhaus (2013) found that when asked if physicians provided higher quality of care in the primary care setting, 66% of physicians concurred, whereas 75% of NPs did not. Research evidence does not support the medical community's concern of unsafe practice by APRNs (Lenz et al., 2004; Mundinger et al., 2000; Newhouse et al., 2011; Naylor & Kurtzman, 2010).

As early as 1986, a review of the research showed that the quality of care by APRNs was comparable with that of physicians and that APRNs were better with patient communication and management of chronic health conditions (U.S. Congress Office of Technology Assessment, 1986). Several systematic reviews published since then have supported this early finding.

Two separate systematic reviews covering literature from 1966 to 2002 found equivalent quality of care and patient outcomes between APRNs and physicians in primary care settings (Horrocks, Anderson, & Salisbury, 2002; Laurant et al., 2005). Newhouse et al. (2011), in a systematic review covering literature from 1990 through 2008 on the four APRN roles, found that patient outcomes for NPs and certified nurse midwives were equal to or in some cases better than outcomes for care provided by physicians alone. The review also found that clinical nurse specialists help to reduce hospital costs and length of stay. None of the studies found for certified registered nurse anesthetists met the review criteria for inclusion.

Some reviews of evidence in the literature have focused on specific patient outcomes. Konetzka, Spector, and Limcangco (2008) reviewed literature from 1990 through 2005 on reducing hospitalizations from long-term care (LTC) facilities. From this review, they identified evidence-based interventions to reduce the number of unnecessary hospitalizations from LTC facilities that included the employment of NPs and physician assistants to deliver comprehensive primary care in the LTC setting.

Patient satisfaction is also an important aspect of primary care. In a review of literature of home-delivered primary care for frail elderly patients, patients who received care in their homes from NPs were well satisfied with their care (Duckworth, Repede, & Elliot, 2013). Although some policy and reimbursement changes will be needed, Duckworth et al. believe NPs could provide quality primary care services in the homes of frail homebound elderly patients, a similar population of Medicare or Medicare-Medicaid beneficiaries of those living in nursing homes.

With the preponderance of the evidence supporting that NPs and other APRNs provide high-quality health care, how does the current regulatory environment affect not only APRN practice but also health care outcomes? Because NPs are considered to be one method of addressing the nation's primary care provider shortage, Kuo, Loresto, Rounds, and Goodwin (2013) considered the effect of state regulations on NP practice. Between 1998 and 2010, they found a large increase in the number of Medicare beneficiaries who received primary care from NPs; the greatest increase in Medicare patients receiving primary care from NPs in 2010 occurred in the states with the fewest restrictions on practice. From this finding, they concluded that the removal of practice restrictions on NPs will increase their ability to help fill the primary care need.

Traczynski and Udalova (2013) studied health outcomes compared with NP independence. For health outcomes, they used data from Medical Expenditure Panel Survey Full Year Consolidated Data Files covering 1996 to 2010 that contained details on health care visits as well as ease of access to care, patient-perceived health status, and quality of care. They compared state laws and regulations from 1970 to the

time of the study based on data from State Boards of Nursing. The study found that greater independence granted to NP practice correlated with more appropriate health care use and better patient outcomes.

Finally, Oliver et al. (2014) compared the level of state restrictions on NP practice with 2012 state health outcome rankings. This study found that full NP practice was related to higher state health outcome rankings ($p = .0018$). When two levels of restrictive practice were compared with state health outcomes, there was no difference found based on the level of restriction (i.e., reduced or restricted). This seems to indicate that any level of restriction is problematic.

Sparked by these findings, we wanted to examine for a statistically significant relationship between the level of APRN practice allowed and the following areas with recent nationwide, state-level analyses of Medicare or Medicare-Medicaid beneficiaries: preventable hospitalization rate in the dually enrolled Medicare-Medicaid recipient, hospitalization readmission rates for Medicare recipients who have had postacute rehabilitation stays, and hospitalization rates from the nursing home setting.

Methods

Data analyzed to determine the impact of the level of practice (full, reduced, or restricted) of NPs throughout the United States on Medicare and Medicaid patients were obtained from multiple sources. Measures of the level of NP practice were compared with state rankings of potentially avoidable hospitalizations, readmission rates after inpatient rehabilitation, and nursing home resident hospitalizations of Medicare/Medicaid beneficiaries. These data were then compared with the state health outcome rankings (United Health Foundation, 2012) used in the analysis by Oliver et al. (2014).

Data Sources

Recent studies of populations of Medicare or Medicare-Medicaid recipients were identified in a literature review. For inclusion in the analysis, studies had to be national in scope, have state by state ranking and scoring of the ranking system used available, and use data collected in each state within 2 to 4 years of the 2012 health ranking and the state categorization of full, reduced, or restricted practice for NPs. Although publication dates may match, it is important for dates of the data sets used in the primary data analyses that resulted in state rankings to be as near to each other as possible. [Note: a Table of additional details of the studies used as data sources (purpose, population and sample, data source, variables measured, data analysis, findings, and data used in this study as a data source) is included as an optional Appendix for inclusion online with the manuscript, at the discretion of the editor.]

NPs

The American Association of Nurse Practitioners (2013) categorizes the state regulatory levels of NPs as full, reduced, or restricted. Categories are updated as changes occur; those from 2013 were used in the analyses. (Note: the state map can be found at the following link: <http://www.aanp.org/legislation-regulation/state-legislation-regulation/state-practice-environment>). Full practice is an absolute independent practice in which an NP is responsible exclusively to a state board of nursing. A collaborative practice agreement between a physician and an NP specifying the scope of practice allowed is mandated under a reduced practice. Restricted practice requires a physician to oversee all care provided by an NP. In this study, we used these categories to ascertain the effect of the levels on the other four data sources. In addition, we divided the levels into states with full practice and states without full practice (reduced and restricted) to further assess the effect.

Potentially Avoidable Hospitalizations for Medicare-Medicaid Beneficiaries

In 2014, the CMS released a report examining data from the years 2007 to 2009 for all beneficiaries who were dually enrolled for both Medicare and Medicaid services and rates of preventable hospitalizations ranked by state. Preventable hospitalization was determined following an algorithm developed by a Technical Expert Panel convened by the CMS of 16 conditions that could be handled in other institutional settings, Medicare home health, or Medicaid home- and community-based waiver services, therefore avoiding hospitalization. Results indicated that 26% of all hospitalizations that occurred in this dually enrolled population were preventable, with an estimated cost of \$5.4 billion (Segal et al., 2014).

To obtain the state rankings, fee-for-service Medicare and full Medicaid beneficiary claims records and data from the CMS Chronic Conditions Data Warehouse for 2007 to 2009 were analyzed using the algorithm for potentially avoidable hospitalizations in Medicare/Medicaid dual beneficiaries (Segal et al., 2014). Data were reported by state as the number per 1,000 person-years and then rank ordered; these 2009 rates and ranking were used in the analysis.

Readmission Postdischarge Rehabilitation

Using CMS files from 2006 to 2011, Ottenbacher et al. (2014) examined 30-day readmission to hospitals from postacute rehabilitation. For the Medicare population, 5.8% to 18.8% of readmission rates were measured for each state. The average readmission rate was 11.8%. Data used in this analysis were obtained on Medicare fee-for-service patients from Medicare Provider Analysis and Review, Inpatient Rehabilitation Facility-Patient Assessment Instrument, Beneficiary Summary file, and Inpatient Rehabilitation Facility Rate settings. Thirty-day hospital readmission rates for Medicare beneficiaries discharged from inpatient

rehabilitation facilities were calculated and reported by state as a percent rate and ranking. Original data were obtained from the study authors for more precise rate values to be used in our analysis than the rounded numbers in the publication. Rates and ranking were used in the analysis.

Nursing Home Resident Hospitalization

In November, 2013, U.S. DHHS released a study from the Office of the Inspector General revealing that, in fiscal year 2011, there was a total of one quarter of the Medicare population living in Medicare- or Medicaid-certified nursing homes who required inpatient hospitalization. The bill for these hospitalizations totaled \$14.3 billion. Using Medicare national claims data, states were ranked according to their hospitalization rates.

The average annual hospitalization rates were calculated for Medicare nursing home residents for states for fiscal year 2011 (U.S. DHHS Office of Inspector General, 2013). Rates were calculated using CMS data files of nursing home residents from the Minimum Data Set, Medicare beneficiary data from the Enrollment Database, and hospital claims from the National Claims History. Nursing homes having swing beds or those with less than 30 admissions were not included in the study. Data were reported as a percent rate by state, and states were rank ordered according to their hospitalization rates; these were used in the analysis.

State Health Outcomes

As in the prior analysis (Oliver et al., 2014), overall health outcome rankings for each state were retrieved from the United Health Foundation report on America's health rankings (2012). Four health determinants including behaviors, community and environment, policy, and clinical care were used to determine the overall relative health of each state. All states were then ranked based on the calculated score related to the national norm.

Statistical Analysis

Two-sampled t-tests were performed on all four sets of the data to determine the significance of full practice by NPs. This was followed by one-way analysis of variance to note the impact of the level of NP practice (i.e., full, reduced, or restricted) on the four data sets. A Tukey test for pair-wise comparisons was then completed on all sets of analysis of variance data to note differences between full and reduced practice, full and restricted practice, and reduced and restricted practice (Hayes, 1988).

Limitations

Data for the NP levels per state were obtained from a 2013 report. This differs slightly from the years that

data were obtained for the four additional sets of data sources used regarding patient outcomes ranging from 2006 to 2011. A legislative update in 2008 noted that there were 12 states with full APRN practice (Phillips, 2008) compared with 17 states in 2013 (American Association of Nurse Practitioners, 2013). Other limitations to be considered include many other factors other than APRN practice that can be related to and potentially influence state health outcomes as well as the hospitalization of frail elders.

Findings

Results of the two-sampled t-tests comparing states with and without full practice of NPs with (a) potentially avoidable hospitalizations of Medicare-Medicaid patients, (b) readmission rates of Medicare rehabilitation patients, (c) annual hospitalizations of nursing home patients, and (d) overall state health outcomes were all statistically significant as noted in Table 1. In summary, states that have full practice of NPs also have improved health outcomes in their communities. In addition, hospitalization rates decrease in the multiple populations tested.

One-way analysis of variances of the levels of NP practice (i.e., full, reduced, or restrictive) were also all statistically significant when compared with the same four data sets, as noted in Table 2. States with the highest level of practice showed decreased hospitalizations and better health outcomes. The Tukey test of pair-wise comparison found statistically significant differences between full practice and reduced practice as well as between full and restricted practice in all four of the data sets as noted in Table 3. There was no statistical difference found between reduced and restricted practice in any of the four data sets. This indicates that any type of barriers to APRN practice that

do not allow NPs to practice within their full scope and knowledge is inversely related to the positive effect on hospitalizations of Medicare beneficiaries and state health outcomes.

Discussion and Recommendations

Our study found a significant relationship between full practice of NPs and decreased hospitalization rates of Medicare and Medicaid beneficiaries in the United States and improved health outcomes of states. Although causality cannot be confirmed, the results of better health outcomes and fewer hospitalizations should be examined closely from the point of view of the impact on frail elderly patients as well as from the financial impact on our country.

Our findings support the increasing call of facilitating APRNs to fulfill their full scope of practice in providing access and care to patients without direct or indirect supervision from physicians. The outcomes support the IOM recommendation that APRNs practice to their full scope of practice including functioning as primary care providers. The evidence from this study and others provides strong impetus to further change public policies to ensure that APRNs have full practice across the nation. With unrestricted practice, there is much evidence that APRNs can improve health outcomes of our citizens and reduce health care costs.

Suggestions to facilitate this change begin at the national level with combining resources from the American Nurses Association, the National Council of States Boards of Nursing, and national APRN associations such as the American Association of Nurse Practitioners and the National Association of Clinical Nurse Specialists to move the political agenda forward to continue to positively impact health care policy with unified practice language that can be implemented at

Table 1 – Outcomes of Full Practice by Nurse Practitioner on Selected Medicare-Medicaid Beneficiaries

	States with Full Practice		States without Full Practice		
	n = 17		n = 33		
	M	SD	M	SD	
Potentially avoidable hospitalizations for Medicare-Medicaid beneficiaries*	100.18	22.9	145.85	33.0	p < .0001
Hospital readmission within 30 days discharge from rehabilitation†	10.46	0.77	11.68	0.88	p < .0001
Annual hospitalizations of nursing home patients‡	18.1	2.9	25.9	4.7	p < .0001
Overall health Outcomes§	16.82	10.96	29.9	14.3	p = .0018

SD, standard deviation.

* Rates per 1,000 person-years for 2009 by state for all states in the United States (rank ordered).

† State readmission rates for 2006 to 2009 adjusted for age, sex, race, ethnicity, living situation, rehabilitation impairment category, reimbursement tier, and admission motor and cognitive functioning (rank ordered).

‡ Average annual rate of nursing home residents' hospitalization for fiscal year 2011 by state for all states in the United States (rank ordered).

§ Rank order of states for 2012.

Table 2 – Outcomes of Nurse Practitioner Levels of Practice on Selected Medicare-Medicaid Beneficiaries

N	NP Levels of Practice						
	Full		Reduced		Restricted		
	17		21		12		
	M	SD	M	SD	M	SD	
Potentially avoidable hospitalizations for Medicare-Medicaid beneficiaries*	100.18	22.9	149.76	36.49	139.0	25.81	$p < .0001$
Hospital readmission within 30 days discharge from rehabilitation†	10.46	0.77	11.66	0.94	11.72	0.79	$p < .0001$
Annual hospitalizations of nursing home patients‡	18.1	2.9	25.7	5.7	26.1	2.5	$p < .0001$
Overall health outcomes§	16.82	10.96	8.09	15.47	33.08	11.93	$p = .0048$

NP, nurse practitioner; SD, standard deviation.

* Rates per 1,000 person-years for 2009 by state for all states in the United States (rank ordered).

† State readmission rates for 2006 to 2009 adjusted for age, sex, race, ethnicity, living situation, rehabilitation impairment category, reimbursement tier, and admission motor and cognitive functioning (rank ordered).

‡ Average annual rate of nursing home residents' hospitalization for fiscal year 2011 by state for all states in the United States (rank ordered).

§ Rank order of states for 2012.

the state level. State boards of nursing can then modify state practice acts to align practice laws and allow APRNs to practice to the level at which they are educated.

In addition, state and national nursing groups should work with government entities to use ideal language in health care policies. Acknowledging both physicians and advanced practice nurses as primary care providers has the potential to meet the burgeoning needs of our health care system. The body of research on the safe, quality health care provided by APRNs is undeniable and is increasing in magnitude yearly.

In addition, we should develop coalitions with stakeholders who would benefit from increased access to care of APRNs including but not limited to nursing home associations, hospital associations, hospital systems, primary care systems, rural health centers, or other businesses. An example of this would be the

current collaboration occurring with the Robert Wood Johnson Foundation and the AARP in their "Campaign for Action: Future of Nursing" to improve nursing and meet the IOM recommendations to improve access, quality, and cost of health care. These partnerships can combine forces to improve health in our communities and nation using the knowledge and expertise of advanced practice nurses.

Conclusion

There is a strong and recurrent pattern of statistical significance that emerges when comparing full practice of NPs and preventable hospitalization rates in the dually enrolled Medicare-Medicaid population, the readmission rate in those recently having postacute hospital care for rehabilitation, hospitalization rates

Table 3 – Tukey Pair-wise Comparisons of Nurse Practitioner Level of Practice on Selected Medicare-Medicaid Beneficiaries

	NP Levels of Practice		
	Full with Reduced	Full with Restricted	Reduced with Restricted
Potentially avoidable hospitalizations for Medicare-Medicaid beneficiaries*	$p < .0001$	$p = .0036$	$p = .5863$
Hospital readmission within 30 days discharge from rehabilitation†	$p = .0002$	$p = .0008$	$p = .9773$
Annual hospitalizations of nursing Home patients‡	$p < .0001$	$p < .0001$	$p = .9713$
Overall health outcomes§	$p = .0324$	$p = .0059$	$p = .5565$

NP, nurse practitioner.

* Rates per 1,000 person-years for 2009 by state for all states in the United States (rank ordered).

† State readmission rates for 2006 to 2011 adjusted for age, sex, race, ethnicity, living situation, rehabilitation impairment category, reimbursement tier, and admission motor and cognitive functioning (rank ordered).

‡ Average annual rate of nursing home residents' hospitalization for fiscal year 2011 by state for all states in the United States (rank ordered).

§ Rank order of states for 2012.

from the nursing home setting, and overall health outcomes as noted by Oliver et al. (2014). The stated goal of U.S. DHHS in their strategic plan is to increase access to care as well as to control the growth of health care costs in a quality, cost-effective manner. This research shows that the utilization of full practice of NPs is associated with decreased hospitalization rates in multiple populations and, thus, can effectively impact quality and cost of health care. As recommended by both the IOM and Federal Trade Commission, investigation and action need to be taken to remove barriers to APRN practice. With the results of this research and others already in the literature, it seems logical to expect that barriers to APRN practice be removed without further delay in order to facilitate another method of providing quality, cost-effective health care nationwide.

Supplementary data

Supplementary data related to this article can be found online at <http://dx.doi.org/10.1016/j.outlook.2014.07.004>

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