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Physician Assistants and Nurse Practitioners Perform Effective Roles on Teams Caring for Medicare Patients with Diabetes

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Abstract

Redesigning healthcare systems to deliver team-based care is considered important to improving care for chronically ill patients. Including physician assistants and/or nurse practitioners on primary care teams is one approach to the patient-centered medical home. However, understanding of the impact of team structure on outcomes is limited. Using Medicare claims and electronic health record data from a large physician group, we compared multiple patient outcomes for older patients with diabetes between patient panels receiving physician only care and panels where primary care physician assistants/nurse practitioners served in different roles. Specific roles were associated with different quality of diabetes care and health service utilization patterns and no role was best for all outcomes. Findings suggest multiple potential approaches to implementing roles on primary care teams exist; however, local factors, including the characteristics of the patients served and prioritization of goals may be important considerations when implementing roles.

INTRODUCTION

Implementation of team-based care is considered essential to the redesign of a fragmented and inefficient US Healthcare system.[1] Patients with chronic illnesses especially experience costly care with suboptimal access and quality.[2] Accountable care organizations and patient-

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centered medical homes aim to improve care delivery through coordinated clinician teams with common goals and defined roles[3,4] Team-based care involving physician assistants and nurse practitioners is one recommended strategy for improving chronic illness care in the patient-centered medical home.[5]

Evidence regarding primary care physician assistant/nurse practitioner effectiveness in chronic disease management is limited. Studies typically examine patients with diabetes as it is a prevalent condition, patients have a range of clinical complexity, and physician assistants/nurse practitioners commonly participate in care delivery.[5–7] Three studies report diabetes control is similar for patients treated by physician assistants/nurse practitioners and physicians.[8–10] However, other studies demonstrate improvements in diabetes control when nurse practitioners are involved in patient care.[11,12] Hence, the evidence generally supports physician assistant and nurse practitioner involvement in diabetes care, but provides limited understanding of appropriate team-based roles.

The variation in study findings may be partly explained by the range of roles these professionals perform. It is estimated that physician assistants and nurse practitioners can perform 85–90 percent of primary care services traditionally provided by physicians.[13] Although these clinicians are trained to provide a similar range of primary care services, individual roles are negotiated with collaborating physicians and, therefore, vary considerably across and within settings.[14,15]

Primary care physician assistant/nurse practitioner team roles are defined in three dimensions: level of involvement (usual provider, supplemental provider, or no participation); type of patient care provided (chronic care or no chronic care); and patient complexity. Role implementation may reflect prioritized goals in the situation at hand.[16] For example, accountable care organizations may employ primary care physician assistants/nurse practitioners to perform a supplemental role, such as chronic disease management[12] if the highest priority is to improve quality measures. A chosen role may meet the primary goals identified, but it may also have unintended consequences for other aspects of care. Thus, understanding the impact of team roles on a variety of outcomes is necessary.

No study has compared the effectiveness of a range of physician assistant/nurse practitioner roles with physician only care for patients with chronic illness. Using data for older diabetes patients treated in a single multi-specialty physician group, we evaluate the impact of primary care physician assistant/nurse practitioner roles on diabetes care quality and health service utilization.

While findings fail to identify an optimal role for these clinicians in team-based care of diabetes patients, the results suggest there is role flexibility. Determining when and how to place them on teams may require consideration of situation-specific goals and patient characteristics.

STUDY DATA AND METHODS

Data

The providers and patients in the study are associated with a large, Midwestern, multi-specialty physician group. Organizational policies regarding payment and practice differed between clinicians at the time of the study. Physicians received salaries with production bonuses, while physician assistants/nurse practitioners were salaried only. Additionally, physician assistants/nurse practitioners were provided the same job description and prohibited from being the named, usual primary care provider.

The results are based on visits delivered by 210 attending physicians, 24 physician assistants, 28 nurse practitioners, and 51 resident physicians in 32 internal medicine, family practice, and geriatric clinics. The clinics are located in a single county with urban and rural locations. The Minimal Risk Institutional Review Board approved this study with a waiver of HIPAA authorization. (See Technical Appendix for full details on all aspects of data and methods.[17])

Methods

Medicare data were linked to the provider group's electronic health records. We identified 2,576 adult Medicare patients with diabetes managed by the provider group in 2008. A patient panel is defined by determining which provider each patient saw most frequently and grouping patients according to this "usual" provider (physician, physician assistant or nurse practitioner).

Quality of diabetes care was measured by receipt of 2 or more HbA1c tests in the year and mean HbA1c (an indicator of glycemic control). Mean HbA1c was categorized per clinical guidelines: good (less than 7.0 percent (reference group)), fair (7.0 to 9.0 percent), and poor (greater than 9.0 percent). Two health service utilization outcomes were examined.[18] A high number of emergency department visits is an indicator of limited access to primary care and is costly.[19] The number of hospitalizations served as an indicator of quality of primary care and cost.[20]

Physician assistant/nurse practitioner role was defined by 3 factors: level of involvement, delivery of chronic care services, and complexity of patients (Exhibit 1-left column). Involvement level was categorized as: physician-only (no physician assistant/nurse practitioner involvement), usual provider (physician assistants/nurse practitioners providing the majority of primary care), and supplemental provider (physician assistants/nurse practitioners providing a minority of care). Supplemental roles were categorized by visits with the most complex patients (yes/no) and delivery of chronic care services (yes/no). High Complexity patients were defined by The Johns Hopkins ACG® System Predictive Model. This model produces a patient risk score based on previous utilization and diagnoses to predict the use of healthcare resources in the future.[21] Panels with physician assistants/nurse practitioners as supplemental providers that provided care to at least one patient with risk score of 2.0 or greater (i.e., twice the average predicted utilization) were categorized as providing care to high complexity patients.

Physician assistants and nurse practitioners roles were combined in this study for several reasons. The primary care job descriptions are the same for both professions in the physician group under study. Both are required to work in a team with physician collaboration/supervision in most states and they provide similar primary care services.[14,22] Despite differences in their philosophy and training, the scope – although not the distribution – of the services they deliver is similar.[23,24] Observed differences in service delivery patterns in national studies may be due to differences in geographic location, organizational characteristics, or roles within care teams, rather than differences in professional capacities.[25–27]

To evaluate the relationship between physician assistant/nurse practitioner role and patient outcomes, multivariable regression models were fit with all patient sociodemographic variables (age, race/ethnicity, gender, Medicaid dual-eligibility status, and whether the patient was originally entitled for Medicare due to disability), clinical characteristics (patient risk score,[21] 16 medical conditions, and 3 diabetes complications), number of primary care visits, 1 or more endocrinology visits, healthcare utilization (emergency department visits, hospitalizations), and panel characteristics (usual provider specialty, number of patients on

the panel, and percent of women on the panel). The type of regression model reflected the outcome variable. Logistic regression was used to examine the receipt of 2 or more HbA1c tests, multinomial logistic regression was used to examine HbA1c category, and negative binomial models were used to examine the number of emergency department visits and hospitalizations. Ninety-five percent confidence intervals were obtained using a robust estimate of the variance taking into account clustering within clinics.

Limitations

Findings are based on a small subset of patients, which impacts their interpretation and generalizability. Adult Medicare patients with diabetes do not represent the entire primary care population, or even the entire population of patients with diabetes, and findings may not generalize to those with other conditions. Similarly, the patients and providers are from a single organization with limited geographic distribution and variation in patient characteristics such as race.

Several methodologic issues could impact the validity of the study. Assignment of physician assistant/nurse practitioner role is not random. The number of patients experiencing some roles was small and the patients experiencing different roles may differ, resulting in potentially biased results. Additional provider, team, and clinic level characteristics also likely impacted results but were not considered in the study. Total number of emergency department visits was used as a measure of access to primary care, but that figure includes all visits rather than just those that could have been addressed in primary care during normal business hours. (See Limitations section of the Technical Appendix for full discussion of limitations.[17])

RESULTS

Data were available on 2576 patients with average age of 72 years. Ninety-one percent (91%) were Caucasian and 55 percent were female. The mean risk score was 1.5, indicating 50 percent higher predicted service utilization than the average older patient (Exhibit 2 and Appendix Exhibit 1[17]).

There were 261 primary care panels. Fifty-five percent had physician assistants/nurse practitioners providing care, and for these, an average of 24 percent of visits were to PA/NPs. The most frequent physician assistant/nurse practitioner role was “No Role” (39 percent of patients), and the least frequent role was “Usual Provider” (5 percent). Sixty-two percent of patients received 2 or more HbA1c tests and 50 percent had good control. The mean number of emergency department visits and hospitalizations was less than one (Appendix Exhibit 2[17]).

Patients with physician assistants/nurse practitioners in several roles received different diabetes care quality from those experiencing physician-only care (Exhibit 1). Patients with supplemental physician assistants/nurse practitioners that did not treat high complexity patients and provided chronic care more often received 2 or more outpatient HbA1c tests (Odds Ratio = 1.4 versus those with no physician assistants/nurse practitioners; CI-0.47–1.19) (Appendix Exhibit 3[17]). The associations with HbA1c categories demonstrated a different pattern. Patients with supplemental physician assistants/nurse practitioners that did not treat high complexity patients and provided no chronic care had only 0.46 times the odds (CI-0.22–0.97) of having poor versus good glycemic control. In contrast, patients with supplemental physician assistants/nurse practitioners that did treat high complexity patients and provided no chronic care, had 1.8 times the odds (CI-1.21–2.67) of poor glycemic control. Patients with supplemental physician assistants/nurse practitioners that did treat

high complexity patients and provided chronic care had 0.70 times the odds (CI-0.58–0.83) of having fair glycemic control compared to good glycemic control (Appendix Exhibit 4[17]).

The association between physician assistant/nurse practitioner role and healthcare utilization demonstrated a pattern different from above (Exhibit 1). Patients with supplemental physician assistants/nurse practitioners that did not see high complexity patients and provided no chronic care experienced a 0.7 times lower rate of emergency department visits (CI=0.56–0.93). In contrast, patients on panels with physician assistants/nurse practitioners in usual provider roles experienced a 1.5 times greater rate (CI=1.06–2.03) (Appendix Exhibit 5[17]). Patients with supplemental physician assistants/nurse practitioners that did treat high complexity patients and provided chronic care experienced higher hospitalization rates (Incidence Rate Ratio=1.2, CI=1.04–1.45) (Appendix Exhibit 6[17]).

DISCUSSION

Findings from this and previous studies offer encouragement that physician assistants/nurse practitioners can successfully fill a range of roles on primary care teams typically assumed by physicians, even for older patients with clinically challenging conditions such as diabetes.[8–12,28] However, selection of an appropriate role may require consideration of context-specific factors. In particular, organizations may need to prioritize patient and organization goals, as well as consider characteristics of the population served. Therefore, implementing primary care teams and evaluating subsequent impact on outcomes may require nuanced understanding and balancing of a range of local factors.

Inclusion of physician assistants/nurse practitioners in a variety of roles on primary care teams within a single organization resulted in encouraging outcomes more often than not. Older patients with diabetes on panels with physician assistant/nurse practitioners in any role did the same or better for most outcomes than those with physician-only care (Exhibit 1). They did worse for only a few outcomes. With anticipated increased demand for services paired with primary care physician shortages, these and past study findings suggest that primary care teams with physician assistants/nurse practitioners could be designed to meet at least some improvement goals.

Overall, the findings suggest that local factors, including the characteristics of patients served and prioritization of goals, may be important considerations when selecting roles. Physician assistant/nurse practitioner roles demonstrated unique patterns of association with specific patient outcomes, and no physician assistant/nurse practitioner role was consistently associated with the best outcomes on all measures (Exhibit 1). The complexity of patients served appeared to influence the patterns of patient outcomes. This may explain some of the variation in findings between previous studies of the effectiveness of physician assistants/nurse practitioners in diabetes care. Patients with supplemental physician assistants/nurse practitioners that did not treat high complexity patients consistently experienced similar or better outcomes to patients receiving physician-only care. In constrast, patients with supplemental physician assistants/nurse practitioners that did treat high complexity patients experienced several worse outcomes. This raises the question whether a primary care team approach will work for all patient populations, particularly the most clinically complex. Such patients may be best served through integrated care, within a continuous relationship with a single primary care clinician.[29]

Selection of physician assistant/nurse practitioner role on a primary care team may also require prioritization of goals.[16] Improving quality and access while reducing costs is important, but it may not be feasible for a single redesign feature to accomplish this goal. For example, if the goal is more frequent testing of diabetes control, then the addition of

supplemental physician assistants/nurse practitioners that do not treat high complexity patients and deliver chronic illness care may be appropriate. However, such a design may not reduce emergency room visits, at least in the short-term. Alternatively, an organization may be faced with a shortage of providers in its rural clinics for which it is difficult to recruit physicians. In such cases, inclusion of a physician assistant/nurse practitioner on the primary care team as a usual provider may meet a need, but has the potential to indirectly increase costs through greater emergency department utilization. In the absence of population-based studies that evaluate multiple outcomes, organizations cannot weigh the costs and benefits of each potential approach.

Perhaps the most important contribution of this investigation is the finding that answering questions regarding the “best” role and primary care team designs will require an even more nuanced approach than taken in the current analysis. The present study, which examined a single organization, could not evaluate a variety of potentially important factors that tend to vary among organizations and populations.[30] One example is the influence of clinician payment practices.[31] The study organization paid physicians based on volume of services delivered, and physician assistants/nurse pracitioners a salary. Such differences and others may influence how patients and services are divided between provider types, and ultimately access, quality, and cost. In the absence of multi-organization studies, evidence-based decision-making on the implementation of primary care teams must be accomplished by each organization individually. This also suggests that determining the optimal workforce to deliver care within a team setting will become challenging on the national level.

POLICY IMPLICATIONS

Identifying appropriate roles for primary care team members such as physician assistants and nurse practitioners is challenging, and the results of the current attempt to meet that challenge highlights points of particular relevance to policymakers. The capacity of these professionals to easily shift roles argues for increased support for new and exisiting state and federal policies that encourage flexible approaches to provider roles and team design. Additional funding for programs that encourage generalist training in physician assistant and nurse practitioner education programs would produce additional clinicians capable of role flexibility. Policies that encourage novel approaches to reimbursing team-based care that account for a range of possible professional roles would encourage innovative team designs. Finally, policies encouraging collection of additional population, organizational, team, and provider information from exisiting accountable care and patient-centered medical home evaluations would assist in identifiying additional factors that could influence role implementation and outcomes.

CONCLUSIONS

In an era of health system redesign with the goal of improving access and quality while reducing cost, team-based care is frequently offered as a solution. While the present results generally support the contention that inclusion of physician assistants and nurse practitioners on primary care teams can be effective, they also indicate that there may be notable exceptions. This suggests that implementation of roles may require thoughtful consideration of local factors such as the population served and identified goals. Our findings suggest that policies related to system redesign and workforce should preserve the capacity for flexibility in team implementation and role definition. This would allow for innovative approaches to addressing workforce constraints and provide the opportunity for identification of additional factors that may influence team design, role implementation, and the full complement of relevant outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Exhibit 1

Physician Assistant/Nurse Practitioner Roles Predicting Diabetes-specific Patient Outcomes and Healthcare Utilization

Physician Assistant/Nurse Practitioner Role in Primary Care			Patient Outcome Measure			
PA/NP Level of Involvement, Number of patients (%)	**Treat High Complexity Patients?**	**Deliver Chronic Care?**	**2 or More HbA1c Tests**	**Glycemic Control**	**Number of Emergency Department Visits**	**Number of Hospital Visits**
No Role - Physician Care Only 1009 (39%)	No Role - Physician Care Only	No Role - Physician Care Only	**(Reference)**	**(Reference)**	**(Reference)**	**(Reference)**
Supplemental 401 (16%)	No	Yes	+	=	=	=
Supplemental 165 (6%)	No	No	=	+	+	=
Supplemental 736 (29%)	Yes	Yes	=	+	=	−
Supplemental 138 (5%)	Yes	No	=	−	=	=
Usual Provider 127 (5%)	Yes/No	Yes	=	=	−	=

Source: Physician group electronic health data linked with Medicare claims Notes:

+ Better outcome than physician-only care

=Equivalent outcome to physician-only care

− Worse outcome than physician-only care

PA/NP = physician assistant/nurse practitioner

Findings reflect p≤0.05

Adjusted for patient sociodemographic variables (age, race, Medicaid dual-eligible, disability entitlement), clinical characteristics (risk score, 16 medical conditions, and 3 diabetes complications), healthcare utilization, and panel characteristics (specialty of usual provider, number of patients on panel, and percent of women on panel)

Exhibit 2

Characteristics of Adult Patients with Diabetes (N=2576 patients)

Characteristic	Overall Percent
Sociodemographics	
Age, mean (SD)	72 (11)
<50	5.0
50–59	7.2
60–69	21
70–79	41
≥80	26
Race - Caucasian	91
Black	5.1
Other race/ethnicity	3.7
Female	55
Medicaid	16
Entitlement due to disability	19
Comorbid conditions	
Ambulatory Care Group Risk Score, Mean (SD)	1.5 (1.0)
Ambulatory Care Group Chronic Condition Count, Mean(SD)	5.2 (3.2)
Cardiovascular disease - none	47
Ischemic heart disease only	23
Congestive heart failure	29
Hypertension	82
Chronic kidney disease or end-stage renal disease	23
Stroke/transient ischemic attack	8.3
Obesity	22
Depression	22
Dementia	8.7
Diabetes complications	
Ulcers	12
Amputation	1.5
Eye disease	22
Peripheral vascular disease	37

Source: Physician group electronic health data linked with Medicare claims

Notes: Ambulatory Care Group = Johns Hopkins Adjusted Clinical Groups (ACG)® Case-Mix System. The risk score is relative to the average predicted utilization of older adult populations. Therefore, a risk score of 1.5 represents a 50% increase in predicted utilization compared to that of the average older adult population.