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Impact Of Physicians, Nurse Practitioners, And Physician Assistants On Utilization And Costs For Complex Patients

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ABSTRACT Because of workforce needs and demographic and chronic disease trends, nurse practitioners (NPs) and physician assistants (PAs) are taking a larger role in the primary care of medically complex patients with chronic conditions. Research shows good quality outcomes, but concerns persist that NPs' and PAs' care of vulnerable populations could increase care costs compared to the traditional physician-dominated system. We used 2012–13 Veterans Affairs data on a cohort of medically complex patients with diabetes to compare health services use and costs depending on whether the primary care provider was a physician, NP, or PA. Case-mix-adjusted total care costs were 6–7 percent lower for NP and PA patients than for physician patients, driven by more use of emergency and inpatient services by the latter. We found that use of NPs and PAs as primary care providers for complex patients with diabetes was associated with less use of acute care services and lower total costs.

Growth in the number of Americans living with multiple chronic conditions is a major driver of health care costs.[1–3] One-fourth of all Americans have two or more chronic conditions, but these people account for about two-thirds of health care spending.[1] This money is not consistently spent well, as the US health care system fragments care into specialty silos and single-disease management programs.[4] Unified care coordinated by high-functioning primary care could better address the needs and preferences of medically complex patients with multiple chronic conditions.[3,4]

Diabetes is a useful condition for evaluating health care because its optimal management requires the full range of primary care services. Patients with diabetes receive most of their diabetes care from primary care providers, as opposed to specialists.[5,6] Care for the range of problems faced by individual patients, with attention to the interaction of multiple comorbidities, and

coordination of care provided by both specialists and generalists are central features of comprehensive, patient-centered primary care. Diabetes care also requires significant self-management on the part of patients, which may be supported by primary care providers.[6,7] The ability to successfully manage diabetes indicates that many facets of a health care organization function well independently and in concert, and that the organization will likely also be able to manage care for patients with other chronic conditions.[8]

The burden of managing complex patients with chronic conditions in community settings further strains a primary care system already stretched by an aging population and growth in chronic disease prevalence. Because of primary care physician shortfalls and the rapid expansion of the nurse practitioner (NP) and physician assistant (PA) supply, NPs and PAs are taking on a larger role in the care of these patients.[9]

Previous studies have demonstrated that quality of care is maintained with the use of NPs and

PAs,[10–15] but research on their effect on costs of care is less consistent and robust.[12,13,16,17] In particular, there are questions about whether NPs and PAs might use more diagnostic tests, specialty referrals, and return visits than physicians do.[12,18,19] If, as some critics suggest,[18] NPs and PAs are less able to handle acute illness exacerbations, this could lead to expensive emergency department (ED) visits or hospital admissions, to which medically complex patients are particularly vulnerable.[2] Traditionally, it has been assumed that NPs and PAs should be assigned to care for the least complex patients, and it is possible that differences in health care use and costs by provider type are evident only in care for the most medically complex patients.

Research on NPs and PAs presents unique challenges. First, since NPs and PAs are used in myriad roles, even within organizations,[20] it is often difficult to ascertain their precise clinical roles. Although they are often lumped together in research, NPs and PAs are trained in distinctive education models, may take different clinical approaches, and might not be equally effective or efficient in particular roles.[21] Additionally, in administrative sources such as Medicare and Medicaid data, it can be difficult to tease out the patient care contributions of NPs and PAs from those of physicians because NP and PA services are often billed "incident to" physicians with whom they work. It has been estimated that over two-thirds of NPs who work with physicians bill at least a portion of care as "incident to" the collaborating physician.[22] This "incident to" care is not visible in the data, which leads to the undercounting of NP and PA care and misattribution of this care to physicians.

The Veterans Affairs (VA) health care system provides a setting that allowed us to minimize these research barriers. Since VA primary care uses a patient-centered medical home model in which a physician, NP, or PA leads a team responsible for the care of a panel of veterans,[23] we were able to analyze outcomes of the three provider types as they functioned in comparable primary care provider roles. The VA's large patient population and advanced electronic data system allowed us to analyze NPs and PAs as separate professions, avoid misattribution of patient care introduced by "incident to" billing, better account for potential selection bias by applying statistical adjustment for a large number of veteran medical and social complexity factors,[24] and analyze health care use and costs over a time period (two years) long enough to reflect the impact of a primary care provider's care.

We used VA electronic health record (EHR) data to identify a large cohort of medically complex veterans with diabetes and a high illness burden. Our previous work that used this cohort of patients found that care quality was similar among physician, NP, and PA primary care providers.[10] For the present study, we examined health care use and the total costs of care among these medically complex veterans with diabetes, comparing physician, NP, and PA primary care providers.

Study Data And Methods

This study used data that originated in the VA EHR. It was approved by the Institutional Review Board of the Durham VA Medical Center.

DATA SOURCES AND SAMPLE CONSTRUCTION Cohort construction is summarized in the online appendix[25] and was similar to that in our previously published work.[10,24,26] In brief, this study included pharmaceutically treated diabetes patients who received primary care from the same VA primary care provider in fiscal years 2012 and 2013. The VA facility most frequently visited for primary care in FY 2012 was considered the patient's "home" facility. Patients were assigned to individual physical "home" clinic locations, including those located at VA hospitals and community-based outpatient clinics. The provider most visited within the home facility was considered the patient's primary care provider, and we retained only patients with consistent primary care provider assignment from FY 2012 to FY 2013. Patients with physician resident providers were excluded because of the dual responsibility of care held by the resident and the attending physician.

To select the most medically complex diabetes patients for the present analysis, we used global health status estimated via the prospective Diagnostic Cost Group score, calculated by the VA. This score is a validated measure of medical complexity in the VA population[27,28] and is normalized so that the average Medicare patient has a score equal to 1.[29] To be included in the present analyses, patients had to have a score above 2, or at least twice the medical complexity of the average Medicare patient. When we applied the score cutoff, the remaining cohort was limited to the 47,236 most complex patients from the previously identified group of 368,481 (12.8 percent).

OUTCOMES We examined the association between provider type and health care utilization and cost outcomes, determined a priori and occurring in FY 2013. Utilization outcomes included any VA-purchased or -provided inpatient hospitalization and number of days with ED visits, VA-provided primary care visits, VA-provided endocrinology visits, and VA-provided nonendocrinology specialty care visits. Cost outcomes included VA-provided or -purchased inpatient, out-

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patient, pharmacy, and total health care expenditures. Total expenditures summed inpatient, outpatient (including ED), and pharmacy expenditures. Post hoc, we examined inpatient visits attributed to ambulatory care–sensitive conditions, as defined by the Agency for Healthcare Research and Quality,[30] to better understand how the nature of inpatient visits could differ by provider type. These conditions are defined as those for which hospitalizations could be avoided through optimal outpatient care.

STATISTICAL ANALYSIS To adjust for differences in the case-mix of patients assigned to different provider types, the association between provider type and utilization and cost outcomes was examined via multivariable logistic, negative binomial, truncated negative binomial, or marginalized zero-inflated negative binomial regression models;[31] log-skew-normal marginalized two-part models; or generalized linear models using a gamma distribution, as appropriate for each outcome.[32,33] Regression models with covariate adjustment, as opposed to inverse probability of treatment weighted models, were used for consistency because weighted versions have not yet been developed for use with marginalized zero-inflated models and marginalized two-part models. These regression models were used for key outcomes related to endocrinology use and inpatient hospitalization expenditures. Each model adjusted for the same covariates, which included demographic characteristics, social complexity measures, health status, access to services, and primary care facility characteristics. Demographic characteristics included sex, age, race, and ethnicity. Social complexity measures included marital status, homelessness, and mental health diagnoses. Health status measures were the Diagnostic Cost Group score and body mass index, calculated based on height and weight information in the VA EHR. Access measures included VA copayment status and travel distance from home to the VA. Facility characteristics included the availability of specialized diabetes services at the facility, the rurality of the facility based on the ZIP code version of the Rural-Urban Commuting Area codes,[34] and US region. To account for potential differences in continuity of care, we also included a variable that represented the proportion of visits to the patient's assigned primary care provider. Since our previous work found that provider assignment was not associated with state scope-of-practice regulations, we did not include a variable for scope of practice.[24] All covariates were centered so that the estimates could be interpreted as the effect of a provider type, holding other covariates constant at their mean values. All patient-level variables were obtained from VA

This study suggests that NPs and PAs can effectively manage primary care for complex patients with diabetes without increasing total care costs.

EHR data for FY 2012.

For descriptive purposes, we tabulated a count of chronic conditions for each patient, based on an algorithm published by the VA Health Economics Resource Center.[35]

To interpret model results, we set a priori thresholds for clinical significance of model-estimated differences at 0.3 percent for probability of inpatient admission, 5.0 percent for number of ED visits, and 10.0 percent for each outpatient utilization type. Any difference in per person annual health care spending was considered meaningful a priori because of the potential cumulative effect on the health care system.

LIMITATIONS Several features of the VA patient-centered medical home model may have contributed to our findings and might thus limit their generalizability. First, the VA is an integrated health system with a highly structured patient-centered medical home model of care, salaried primary care providers, extensive experience using NPs and PAs, and relatively permissive practice regulations for NPs and PAs. These factors could have mitigated potential differences among provider types and limited the generalizability of our findings. However, since many other health systems are incorporating strategies such as patient-centered medical home approaches and advanced scope of practice for NPs and PAs,[36] NPs and PAs in other settings could have similar impacts upon costs of care.

Second, VA patient demographic characteristics could limit generalizability. VA users are predominantly male and, on average, more socially and medically complex than their non-veteran counterparts.[37] However, we find it difficult to hypothesize why NPs and PAs would perform less well with women or with patients who had fewer social and health challenges.

A third limitation, not related to generalizability, is that our study did not assess the numbers of patients cared for by each provider type. However, other recent research in the VA found that, on average, NPs and PAs had approximately 15 percent smaller patient panels than physicians did.[17] Smaller panels could facilitate access to care for patients of NPs and PAs and might partially explain our findings. If NP and PA primary care providers are responsible for fewer patients, they may have more time to care for each patient. Smaller patient loads could also allow NPs and PAs more time for other patient care activities, such as care coordination, and could make them easier for patients to contact for consultations about whether symptoms they are having warrant an ED visit. However, past research has found an inconsistent association between higher patient loads and use of acute care settings.[38]

Fourth, as in all secondary data analyses, it is possible that in spite of our statistical adjustment, differences were due to the patients of physicians being sicker in some way than those of NPs and PAs. There may also be unmeasured confounders among providers: Our data did not support the analysis of provider characteristics such as years of experience. Although we controlled for facility-level characteristics to minimize selection bias, it is possible that differences in facility hospital admission rates could contribute to differences in the outcomes we assessed. Facility differences could also lead to some patients being more likely to use health services paid for by other payers, but we were unable to measure health care services billed to and costs incurred by payers other than the VA.

Finally, our analysis did not address some factors pertinent to the overall costs of using NPs or PAs. We did not account for time that physicians spend consulting with NPs and PAs, although other research suggests that this is minimal in the VA setting.[39] We were not able to assess whether our results would have been different if different provider types worked in isolation from each other. An additional implication of the smaller panels of NPs and PAs is that the labor costs of the four people who make up each care team would be spread across fewer patients. The resulting higher per patient personnel costs would be partially offset by the lower salaries of NPs and PAs, compared to those of physicians, but our study did not analyze the balance of these factors.

Study Results

The sample included 47,236 medically complex patients from 566 VA facilities. Of the sample,

78.1 percent (36,894) had a physician as their primary care provider, while 16.0 percent (7,536) had an NP and 6.0 percent (2,806) had a PA. Patients saw their identified provider at 70.6 percent of their primary care visits.

PATIENT, FACILITY, AND REGIONAL CHARACTERISTICS The patients in this cohort were, on average, quite medically complex. Approximately half were older than age sixty-five, and over one-fourth had mental health diagnoses (exhibit 1). The mean Diagnostic Cost Group score was 3.7 for physician patients, 3.5 for NP patients, and 3.6 for PA patients (exhibit 1). This indicates that the average patient in this analysis was over 3.5 times as medically complex as the average Medicare patient. On average, physician patients had 6.9 chronic conditions, NP patients had 6.7, and PA patients had 6.8.

Patient characteristics were descriptively similar across primary care provider professions. About 5 percent of NP patients were female, compared to about 3 percent of physician and PA patients. Among physician patients, 5 percent were Hispanic, compared to 4 percent among NP and PA patients (exhibit 1). Larger differences were seen among facility and regional characteristics. For example, 40 percent of physician patients were located in the South, compared to 38 percent for PA patients and 26 percent for NP patients (exhibit 2). Sixty-five percent of physician patients were in facilities with endocrinology referral capacities, compared to 58 percent and 52 percent for PA and NP patients, respectively. Eighty percent of physician patients lived in core metropolitan areas, compared to 70 percent and 77 percent for PA and NP patients, respectively.

UTILIZATION The people in this cohort were high users of care. Regardless of the type of primary care provider, at least 36 percent had a hospital admission in FY 2013 (exhibit 3). On average during the year, the patients had at least 1.8 days with ED visits, four days with primary care visits, five days with nonendocrinology specialty visits, and almost half a day with endocrinology or specialty diabetes visits during the year.

Patients of NPs and PAs were less likely than those of physicians to incur a hospitalization (NP versus physician odds ratio: 0.89, 95% confidence interval: 0.85, 0.94; PA versus physician OR: 0.92, 95% CI: 0.846, 0.997), while no difference was seen between NP and PA patients (exhibit 4). An estimated 39 percent of physician patients, 36 percent of NP patients, and 37 percent of PA patients incurred hospitalizations in FY 2013 (exhibit 3). Patients of NPs and PAs were also less likely than those of physicians to incur a hospitalization related to an ambulatory care–

EXHIBIT 1

Characteristics of the cohort of Veterans Affairs (VA) patients with diabetes, by primary care provider type, 2012

Characteristic	NP (n = 7,536)		PA (n = 2,806)		Physician (n = 36,894)	
	No. or mean	% or SD	No. or mean	% or SD	No. or mean	% or SD
Male	7,192	95.4%	2,737	97.5%	35,861	97.2%
Mean age (years)	65.3	9.7	65.9	9.5	65.7	9.5
Race						
White	5,374	71.3%	2,108	75.1%	25,808	70.0%
Black	1,526	20.2	496	17.7	8,079	21.9
Native Hawaiian	73	1.0	21	0.7	407	1.1
American Indian	56	0.7	29	1.0	263	0.7
Asian	30	0.4	6	0.2	131	0.4
Unknown	477	6.3	146	5.2	2,206	6.0
Hispanic ethnicity	291	3.9	102	3.6	1,679	4.6
Marital status						
Currently married	3,964	52.6%	1,558	55.5%	19,918	54.0%
Previously married	2,569	34.1	937	33.4	12,408	33.6
Never married	996	13.2	309	11.0	4,512	12.2
Unknown	7	0.1	2	0.1	56	0.2
Homeless during the year 2012	333	4.4%	101	3.6%	1,437	3.9%
Mean miles from primary care clinic	19.4	40.3	20.9	41.3	20.4	43.1
Copayment status						
No copay due to disability	4,357	57.8%	1,589	56.6%	21,698	58.8%
No copay due to low income	2,286	30.3	864	30.8	11,116	30.1
Must pay copay	769	10.2	319	11.4	3,570	9.7
Unknown	124	1.6	34	1.2	510	1.4
Mental health diagnoses						
Mood disorder	771	10.2%	293	10.4%	4,115	11.2%
Posttraumatic stress disorder	1,344	17.8	501	17.9	6,762	18.3
Dementia	437	5.8	187	6.7	2,628	7.1
Substance abuse	1,282	17.0	418	14.9	6,150	16.7
Other	2,055	27.3	710	25.3	10,262	27.8
Mean DCG risk score	3.5	1.9	3.6	2.0	3.7	2.0
No. of chronic conditions	6.7	2.4	6.8	2.3	6.9	2.4
Mean baseline BMI	32.5	7.1	32.3	7.1	32.2	7.0
Mean baseline HbA1C	7.6	1.5	7.6	1.5	7.6	1.5
Mean baseline systolic blood pressure	132.6	13.4	132.5	13.2	132.8	13.5
Mean baseline LDL	84.3	29.6	82.9	29.4	82.4	29.5
Mean percent of visits to primary care provider	72.1	25.1	72.3	24.7	70.2	25.7

SOURCE Authors' analysis of data from the VA electronic health record system. **NOTES** The primary care provider—a nurse practitioner (NP), physician assistant (PA), or physician—was the provider the patient saw most often at the patient's home facility (explained in the text) in fiscal years 2012–13. The continuous variables for mean age, mean miles from the primary care clinic, mean Diagnostic Cost Group (DCG) risk score, and mean body mass index (BMI) were not included as variables in regression equations. They are included in this table for descriptive purposes only. The categorical representations of these factors were included in regression equations. The number of chronic conditions and the mean baseline hemoglobin A1c (HbA1C), systolic blood pressure, and low-density lipoprotein (LDL) cholesterol were not included as variables in regression equations and are presented for descriptive purposes only. SD is standard deviation.

sensitive condition (NP versus physician OR: 0.90, 95% CI: 0.86, 0.96; PA versus physician OR: 0.92, 95% CI: 0.8446, 0.9997), and no difference was observed between NPs and PAs (exhibit 4). The majority of inpatient admissions were related to ambulatory care–sensitive conditions, and those hospitalizations were experienced by an estimated 35 percent of physician patients and 32 percent of NP and PA patients (exhibit 3).

Patients of physicians also visited the ED more frequently in the year than patients of NPs or PAs

(NPs versus physicians rate ratio: 0.90, 95% CI: 0.87, 0.94; PAs versus physicians rate ratio: 0.94, 95% CI: 0.88, 0.99). Patients of PAs had 10 percent more primary care visits than patients of physicians (rate ratio: 1.10; 95% CI: 1.07, 1.13). No clinically meaningful utilization differences (per our a priori established limits) were observed for endocrinology or nonendocrinology specialty visits or between NP and physician primary care visits.

COSTS AND SPENDING Patients of physicians incurred greater outpatient, pharmacy, and total

EXHIBIT 2

Number of patients seen by Veterans Affairs (VA) facilities used by the cohort of VA patients with diabetes, by facility characteristics and primary care provider type, 2012

	NP		PA		Physician	
Characteristic	No.	%	No.	%	No.	%
Endocrinology referral capacity	3,933	52.2	1,624	57.9	23,983	65.0
Rural-Urban Commuting Area code						
Core metropolitan area	5,831	77.4	1,978	70.5	29,549	80.1
Noncore metropolitan area	590	7.8	399	14.2	4,198	11.4
Core micropolitan area	804	10.7	334	11.9	2,544	6.9
Small town or rural area	311	4.1	95	3.4	603	1.6
Region						
South	1,925	25.5	1,060	37.8	14,845	40.2
Midwest	2,330	30.9	841	30.0	10,168	27.6
Northeast	1,609	21.4	571	20.3	5,406	14.7
West	1,672	22.2	334	11.9	6,475	17.6

SOURCES Authors' analysis of data from the VA electronic health record system. Rural-Urban Commuting Area codes are from the Department of Agriculture (see note [34] in text). **NOTES** Sample sizes by provider are in exhibit 1. The primary care provider—a nurse practitioner (NP), physician assistant (PA), or physician—was the provider the patient saw most often at the patient's home facility (explained in the text) in fiscal years 2012–13. Endocrinology referral capacity is defined as either present (endocrinology or other diabetes mellitus specialty clinics provided 500 or more visits to cohort patients in FY 2012) or absent (fewer than 500 visits were provided to cohort patients).

expenditures compared to patients of NPs or PAs (exhibit 5). Physician patients also had higher inpatient spending than those of NPs. While the difference between inpatient spending for PA and physician patients did not reach statistical significance, the result was trending in the same direction. Patients of NPs and PAs had nearly identical mean per patient expenditures in all categories. Specifically, patients of NPs incurred 9 percent (95% CI: 4, 14) lower inpatient expenditures than patients of physicians. PA patients had nonsignificantly lower inpatient expenditures (6 percent; 95% CI: 14 percent lower, 2 per-

cent higher), compared to physician patients. This translated to a mean per patient annual difference in inpatient expenditures of $1,328 and $914 for NPs and PAs, respectively, compared to physicians. Patients of PAs and NPs incurred lower annual per patient pharmacy expenditures than patients of physicians (9 percent, 95% CI: 4, 13 percent; 8 percent, 95% CI: 1, 14, respectively), translating to a mean per patient annual difference of approximately $300 in pharmaceutical expenditures. Smaller differences were seen in outpatient expenditures between provider types: Compared to patients of

EXHIBIT 3

Estimated utilization per patient, by primary care provider type, fiscal year 2013

	NP		PA		Physician	
Utilization	Patients (%) or days (no.)	95% CI	Patients (%) or days (no.)	95% CI	Patients (%) or days (no.)	95% CI
Any inpatient visit	36%	(35, 37)	37%	(35, 38)	39%	(38, 39)
Any ambulatory care–sensitive condition inpatient visit	32%	(31, 34)	32%	(31, 34)	35%	(34, 35)
Days with an ED visit	1.81	(1.75, 1.88)	1.88	(1.78, 1.99)	2.01	(1.98, 2.04)
Days with a VA primary care visit	4.30	(4.22, 4.38)	4.41	(4.28, 4.54)	4.01	(3.97, 4.04)
Days with a VA nonendocrinology specialty care visit	5.37	(5.22, 5.52)	5.35	(5.12, 5.59)	5.54	(5.47, 5.61)
Days with a VA endocrinology or specialty diabetes visit	0.43	(0.41, 0.46)	0.46	(0.42, 0.51)	0.44	(0.43, 0.46)

SOURCE Authors' analysis of data from the Department of Veterans Affairs (VA) electronic health record system. **NOTES** Sample sizes by provider are in exhibit 1. The primary care provider—a nurse practitioner (NP), physician assistant (PA), or physician—was the provider the patient saw most often at the patient's home facility (explained in the text) in fiscal years 2012–13. Adjusted for sex, age, race, ethnicity, marital status, homelessness, mental health diagnoses, Diagnostic Cost Group risk score, body mass index, VA copayment status, travel distance from home to the VA, proportion of visits to the assigned primary care provider, availability of endocrinology referral services at the facility, rurality of the facility, and region the facility was located in. CI is confidence interval. ED is emergency department.

Estimated differences in patient utilization, by primary care provider type, fiscal year 2013

	NPs versus physicians	PAs versus physicians	NPs versus PAs
ESTIMATED ODDS RATIO			
Patients with any inpatient visit	0.89****	0.92**	0.97
Patients with any ambulatory care–sensitive condition inpatient visit	0.90****	0.92**	0.98
ESTIMATED RATE RATIO			
Days with an ED visit	0.90****	0.94**	0.96
Days with a VA primary care visit	1.07****	1.10****	0.97
Days with a VA nonendocrinology specialty care visit	0.97**	0.97	1.00
Days with a VA endocrinology or specialty diabetes visit	0.98	1.05	0.94

SOURCE Authors' analysis of data from the Department of Veterans Affairs (VA) electronic health record system. **NOTES** The primary care provider—a nurse practitioner (NP), physician assistant (PA), or physician—was the provider the patient saw most often at the patient's home facility (explained in the text) in fiscal years 2012–13. Adjusted for sex, age, race, ethnicity, marital status, homelessness, mental health diagnoses, Diagnostic Cost Group risk score, body mass index, VA copayment status, travel distance from home to the VA, proportion of visits to the assigned primary care provider, availability of endocrinology referral services at the facility, rurality of the facility, and region the facility was located in. Rate ratios are sometimes referred to as incidence density ratios. ED is emergency department. **$p < 0.05$ ****$p < 0.001$

physicians, patients of NPs incurred 3 percent lower (95% CI: 0.04, 6) outpatient expenditures in the year, and patients of PAs incurred 5 percent lower (95% CI: 1, 9) outpatient expenditures.

The cumulative effect led to a reduction in total per patient health care costs for patients of NPs and PAs, compared to those of physicians. Overall, patients of NPs incurred 6 percent lower expenditures compared to those of physicians (95% CI: 3, 9), while patients of PAs incurred 7 percent lower expenditures (95% CI: 2, 11). This translated to a difference of $2,005 and $2,300 in per patient annual total health care costs, respectively.

Discussion

After adjusting for differences in patients' medical and social complexity factors, we found meaningfully lower total health care costs for patients of NPs and PAs in a large sample of medically complex VA primary care patients with diabetes, compared to patients of physicians. This difference was driven by more ED visits and more hospitalizations for patients whose primary care provider was a physician. This might be important for reasons other than costs, since use of acute services is associated with adverse impacts on overall health and quality of life.[40,41]

These results combine with our previous findings to provide additional support for the use of PAs and NPs in the primary care of complex patients. Our past research using this same data

Estimated annual medical expenditures per patient and mean ratio for difference in expenditures, by primary care provider type, fiscal year 2013

	Estimated annual medical expenditures			Estimated mean ratio for difference in expenditures		
	NPs	PAs	Physicians	NPs versus physicians	PAs versus physicians	NPs versus PAs
Inpatient	$13,808	$14,222	$15,136	0.91***	0.94	0.97
Outpatient	15,320	14,936	15,785	0.97**	0.95**	1.03
Pharmacy	3,304	3,347	3,626	0.91****	0.92**	0.99
Total	32,645	32,350	34,650	0.94****	0.93***	1.01

SOURCE Authors' analysis of data from the Department of Veterans Affairs (VA) electronic health record system. **NOTES** The primary care provider—a nurse practitioner (NP), physician assistant (PA), or physician—was the provider the patient saw most often at the patient's home facility (explained in the text) in fiscal years 2012–13. Adjusted for sex, age, race, ethnicity, marital status, homelessness, mental health diagnoses, Diagnostic Cost Group risk score, body mass index, VA copayment status, travel distance from home to the VA, proportion of visits to the assigned primary care provider, availability of endocrinology referral services at the facility, rurality of the facility, and region the facility was located in. **$p < 0.05$ ***$p < 0.01$ ****$p < 0.001$

set found that physician, NP, and PA primary care providers achieved similar control of blood glucose, blood pressure, and cholesterol among complex veterans with diabetes.[10,24] The present study addressed a long-standing question about whether NPs or PAs might drive up health care costs; we found no evidence to support this concern in a sample of medically complex people with diabetes. Other researchers have found similar patterns regarding care quality and health services use among VA patients not selected for medical complexity,[17] but our project is the first to examine total costs of care among the most complex veterans seen in primary care settings.

Beyond the limitations mentioned above, other potential explanations for our findings warrant future investigation. VA patient-centered medical home teams consist of a primary care provider, a nurse, a clinical assistant, and a clerk. It is possible that NPs or PAs are more comfortable with team care and thus able to effectively delegate responsibility or mobilize the skills of their team members, compared to physicians. Other potential differences include effectiveness of in-person or electronic communication with patients. If practice style differences that explain our results are elucidated, these findings could inform primary care provider training.

Policy Implications

This study, combined with previous findings that diabetes care quality in the VA did not differ by primary care provider type, suggests that NPs and PAs can effectively manage primary care for medically complex patients with diabetes without increasing total care costs. It provides further evidence that NPs and PAs may be appropriately used as primary care providers, as opposed to being limited to supplementing the care of physicians within primary care settings.

Lower utilization and expenditures for patients with PA or NP primary care providers could contribute to large aggregate cost savings. In the cohort of 47,236 VA patients that we studied, approximately $74 million could have been saved during the study year if utilization patterns of the entire cohort had more closely approximated those of the NP and PA patients. This analysis did not account for labor cost savings due to lower salaries of NPs and PAs, compared to physicians, but it also did not account for the larger average panel sizes of physicians. To extend these findings to garner potential cost efficiencies, it will be important to further elucidate the causes for these cost differences.

Conclusion

In a large national sample of medically complex people with diabetes, when we controlled for important patient- and facility-level factors, we found greater rates of hospitalizations and ED visits and higher health care expenditures among primary care patients of physicians compared to those of NPs or PAs. These findings are notable particularly because we studied NPs and PAs in relatively expansive primary care provider roles analogous to those of physicians in the same system and because we analyzed the total cost of care over a one-year period. ∎

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25 To access the appendix, click on the Details tab of the article online.

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