ORIGINAL RESEARCH

Telemedicine versus in-Person Primary Care: Impact on Visit Completion Rate in a Rural Appalachian Population

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Introduction: **The use of telemedicine increased during the global Coronavirus disease 2019 (COVID-19) pandemic. Rural populations often struggle with adequate access to care while simultaneously experiencing multiple health disparities. Yet, telemedicine use during the COVID-19 pandemic has been understudied on its effect on visit completion in rural populations. The primary purpose of this study is to understand how telemedicine delivery of family medicine care affects patient access and visit completion rates in a rural primary care setting.**

Methods: **We performed a retrospective cohort study on primary care patient visits at an academic family medicine clinic that serves a largely rural population. We gathered patient demographic and visit type and completion data on all patients seen in the West Virginia University Department of Family Medicine between January 2019 and November 2020.**

Results: **The final sample included 110,999 patient visits, including 13,013 telemedicine visit types. Our results show that telemedicine can increase completion rates by about 20% among a sample of all ages and a sample of adults only. Working-aged persons are more likely to complete telemedicine visits. Older persons with higher risk scores are more likely to complete their visits if they use telemedicine.**

Conclusions: **Telemedicine can be a tool to improve patient access to primary care in rural populations. Our findings suggest that telemedicine may facilitate access to care for difficult-to-reach patients, such as those in rural areas, as well as those who have rigid work schedules, live longer distances from the clinic, have complex health problems, and are from areas of higher poverty and/or lower education. (J Am Board Fam Med 2022;35:475–484.)**

Keywords: **COVID-19, Family Medicine, Health Services Accessibility, Pandemics, Primary Health Care, Retrospective Studies, Rural Health, Telemedicine**

Introduction

The use of telemedicine increased during the worldwide Coronavirus disease 2019 (COVID-19) pandemic,[1–6] aided by sweeping policy changes that relaxed regulatory requirements concerning barriers to reimbursement for telemedicine in the United States.[7] As the Centers for Medicare & Medicaid Services defines, "telemedicine seeks to improve a patient's health by permitting 2-way, real-time interactive communication between the

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patient and the physician or practitioner at the distant site. This electronic communication means using interactive telecommunications equipment that includes, at a minimum, audio and video equipment."[8] The expanded use of telemedicine has been described during the COVID-19 pandemic in pediatric and adult subspecialty populations with various medical issues.[9–14] However, primary care use of telemedicine, especially in rural US settings, has not been thoroughly studied.

Before and during the COVID-19 pandemic, studies have examined various aspects of telemedicine use in the primary care and specialist clinical setting, yielding several notable findings. For example, health policy changes allowed telemedicine to deliver medications for opioid use disorder (MOUD) during the COVID-19 pandemic. Studies show that the number of visits for MOUD and the size of a primary care's MOUD catchment area increased compared with pre-COVID-19 pandemic numbers, with a comparatively greater impact on rural patients.[15] One study explored the impact of video visits in the Veteran's Affairs Health system and noted some benefits from environmental surveillance and access.[16] Rural primary care physicians have also found additional benefits to telemedicine in improving their professional isolation, expanding their scope of practice, and connecting with specialists about patient care.[17] Concerning specialty care, a pre-COVID-19 pandemic retrospective study of telemedicine use in a cardiology practice demonstrated cost reduction and reduced travel time.[9] A retrospective study of an orthopedic trauma clinic at a level 1 trauma center showed similar no-show rates between telemedicine patients and historic in-person controls.[18]

The current quality of most telemedicine research studies is low, consisting of reviews and single-institution anecdotal experiences and lessons learned,[19,20] and more research is required.[21] Iyengar et al and Ray et al have suggested establishing pathways for enhanced telemedicine care to maximize its utilization and impact;[22,23] however, these require systematic study.

Rural and other underserved populations often struggle with adequate access to care while simultaneously experiencing multiple health disparities.[24–27] However, little is known about whether the increased availability of telemedicine health delivery during the COVID-19 pandemic has changed access to care in rural populations. Increased understanding of the primary care use of telemedicine in these populations may drive the development processes to improve accessibility and acceptability of telemedicine and to target populations that can particularly benefit from its use. The primary purpose of this study is to understand how primary care use of telemedicine affects patient access and visit completion rates for specific demographic populations in a rural setting, where a visit is considered "complete" if a patient completes checks in procedures for a visit. We will also evaluate which diagnoses may be particularly amenable to primary care use of telemedicine.

West Virginia presents a good case study for exploring the impact of telemedicine in rural and distressed settings. It has the third-lowest urban population in the United States, and lower population density, higher levels of poverty, and lower levels of broadband access compared with the nation.[28,29] The population is also older and more likely to be on disability than the rest of the US population. In a ranking of US states, West Virginia ranked 50th in terms of infrastructure, with internet access and road quality among the worst in the nation.[30]

Methods

Clinical Sites

WVU Medicine, Clark K. Sleeth Department of Family Medicine Center is an Appalachian academic family medicine practice consisting of 3 clinical practice site locations within Morgantown, West Virginia. The practice consists of 22 faculty, 4 advanced practice providers, 18 residents, and 2 licensed behavioral health professionals. The clinic provides primary care services to approximately 18,000 patients.

Patient Sample

We gathered patient data on all patients seen in person, by phone, or by video by WVU Department of Family Medicine between January 2019 and November 2020 to explore who is using telemedicine and how it can reduce cancellations of appointments. We included patients throughout West Virginia and the surrounding region who saw a provider at 1 of the 3 WVU Department of Family Medicine locations. We excluded patients whose mailing address was outside driving distance, which we defined as 60 miles outside the state line of West Virginia. In most of our analysis, telephone visits and video visits were considered together for the purposes of this analysis as both exemplify telemedicine modalities; about 58% of the scheduled telemedicine visits were telephone visits, and the remainder were video visits.

Data

A report was generated using EPIC Electronic Health Record (EHR) reporting workbench. Visits included those that were scheduled, canceled, completed, and no-showed in the Department of Family Medicine at all 4 locations as well as the department's behavioral medicine division. The authors submitted an Institutional Review Board proposal to use this dataset for the study. Names, complete addresses, date of birth, medical record number, and other identifying information were removed to protect the patients. We combined the patient-level data with zip code-level community attributes using data from the US Census's American Community Survey, the US Census,[31] and the Federal Communications Commission (FCC). Table 1 includes a list of the data used in our analysis.[32]

Table 1. Data

Individual Data from EPIC
Gender
Age at visit
Race/Ethnicity
Marital Status
Education Level
Zip Code
Date of Appointment
Department
Provider
Primary Care Provider (PCP)
LACE score (a readmission risk score based on hospital admission information, the Charlson Comorbidity index, and emergency department visits within the last 6 to 12 months)
Hospital or emergency department admission risk
Zip-Code Level Regional Data (2019)
Poverty Rate, American Community Survey (ACS)
Median Household Income, ACS
Unemployment Rate, ACS
Percent of population 25 + with various education levels, ACS
Broadband Speed, the Federal Communications Commission (FCC)

Note: the full patient dataset from EPIC also includes information on the following, however, some of the data points were missing for many of our patients or the information was redacted for confidentiality reasons: medical record number (MRN), patient name, full address, phone, date of birth, date the appointment was made, the location of the appointment, type of appointment, appointment cancellation reason, no show count, payor/insurance type, financial class, bad debt, reason for the visit/chief complaint, last PCP visit, next PCP visit, next appointment and provider in the department, health maintenance topics due, problem list, primary encounter diagnosis, all encounter diagnoses, patient employer, employer state/zip, urgent care visits/year and in the past 90 days days, emergency department visits in the last year and past 6 months, number of emergency department visits, and number of inpatient admissions.

Data Analysis

Using the data described above, we estimated a series of regression models using STATA software via ordinary least squares (OLS) based on the following 3 equations:

$$\text{Telemed}_{\text{i}} = \beta_0 + \beta_1 \text{X}_{\text{i}} + \gamma + \theta + \varepsilon_{\text{i}} \qquad (1)$$

$$\text{Complete}_{\text{i}} = \beta_0 + \beta_1 \text{telemed}_{\text{i}} + \beta_2 \text{X}_{\text{i}} + \gamma + \theta + \varepsilon_{\text{i}} \qquad (2)$$

$$\text{Completed Using Telemed}_{\text{i}} = \beta_0 + \beta_1 \text{X}_{\text{i}} + \gamma + \theta + \varepsilon_{\text{i}}$$

where equation (1) measures the factors that influence individuals to choose telemedicine; where equation (2) measures how telemedicine affects the completion rate (patient has checked in for the visit) of patient visits; and where equation (3) examines the factors that affect higher completion rates for those patients that use telemedicine. The variable telemed indicates a telemedicine appointment (either phone or video); X is a vector of individual and community level characteristics that vary by model; γ is a month fixed effect; θ is a fixed effect indicating whether or not a visit was on a weekday; ε are standard errors which we adjust for heterodasticity using robust standard errors.

For each equation, we estimate a series of models to test the sensitivity of our results to the inclusion of additional factors. We include a continuous age variable in some models and, in others, use age groups to look at the impact on older, potentially more at-risk patients. In some models using equation (1), we also interact our measure of health risk (using the LACE score) with age groups to explore this further. Finally, we interact our age groups and health risk with telemedicine in some models using equation (2) to see if telemedicine can induce those with higher health risks to complete their appointments.

Results

The final sample included 110,999 patient visits, of which 13,013 were telemedicine visit types, and 97,987 were in-person visit types. The average age for the entire sample was 47.8 years, predominantly male (60.7%), and listed their race as white (92.1%). One-tenth of these visits were new patient visits (10.5%), and the patients were mostly seen on weekdays (98.8%). The census data linked to patient zip codes show that the average median household income for the entire sample was 50,160 dollars per year, the average local unemployment rate was 5.99%, and 17.27% of the population in the study area had bachelor's degree or higher. Broadband speed average for the zip codes across the sample was adequate for telemedicine (69.46 megabits per second).

The results of the empirical analysis are presented in Tables 2, 3, and 4, corresponding to the equations 1, 2, and 3, respectively. The first column includes results for the full sample of patients (including children) for completeness. However, we focus on the results for those patients 18 and older in the remaining columns as they are more likely to make their own decisions about use of telemedicine or about attending appointments.

Table 2 suggests that there are some key differences in who is willing to use telemedicine and when. New patients were less likely to use telemedicine. Compared with younger adults, older adults are less likely to use telemedicine. We also see weak evidence that sicker individuals (those with a higher LACE score or higher hospital admission risk) may be less likely to use telemedicine. However, in columns 4 and 5, the interaction of older individuals with the risk scores indicates that older, sicker patients may be more likely to use telemedicine; thus, telemedicine may be a way to reach these patients. However, none of our other individual or community factors were found to have statistical significance in affecting the use of telemedicine.

Table 3 illustrates the completion rates of all visits and the impact of telemedicine use. For those who do not complete their visit, about 20% of them are no shows, while the rest are cancellations. Our results suggest that the use of telemedicine can increase completion rates by about 20% for both all ages and adults only. We found that, in general, completion rates are higher for return primary care visits and lower for new patient visits. We also found that visit completion rates are lower for older adults (aged 65 years and older). However, the interaction between access to telemedicine and those from 35–64 years in column 4 suggests that the use of telemedicine can increase the visit completion rate of working-age adults. We also found some evidence that telemedicine may provide access to care for those who live farther away from the facility, as distance was associated with lower levels of completion. Results for the community characteristics were mixed (not shown), although some models suggested lower visit completion rates for those from places with higher poverty and unemployment rates. In addition, while sicker and more at-risk individuals (those with a higher LACE score or higher hospital admission risk) are less likely overall to complete their visits, the interaction with telemedicine in column 5 suggests they are more likely to complete their visits if they use telemedicine. Finally, we separately examine the impact of phone and video encounters, finding that both are positively associated with completion (results not shown).

Table 4 shows the completion rates of telemedicine-only visits, focusing on the community factors. Unlike in Table 3, we no longer see any evidence of economic differences in the completion of visits. This suggests that telemedicine may be helping to overcome these barriers and is consistent with Table 2, which found no differences in the use of telemedicine based on educational levels or economic conditions.

Finally, as shown in Appendix A, which contains the results for the diagnosis codes corresponding to column 5 in Table 2, there are some clear differences in the types of ailments that lead patients to choose telemedicine – especially those related to mental health such as anxiety and depression, COVID-19 exposure, and endocrinologic complaints requiring surveillance such as diabetes and hypothyroidism.

Discussion

The use of telemedicine has increased during the COVID-19 pandemic [33] but is understudied, especially for primary care medicine and in rural US settings. This study attempts to address that gap by examining telemedicine use among rural primary care medicine patients and identifying which patients may be more likely to schedule or complete

Table 2. Factors Affecting Use of Telemedicine

	All Ages	Aged 18 Years and Older Only			
	(1)	(2)	(3)	(4)	(5)
New patient	−0.041***	−0.047***	−0.046***	−0.046***	−0.047***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Primary care visit	0.003	0.003	0.002	0.002	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
LACE/Risk score	−0.000***	−0.000	−0.000*	−0.000***	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hospital admission risk	0.000***				
	(0.000)				
Sex = Male	0.020***	0.019***	0.019***	0.019***	0.016***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Race = White	0.012***	0.011***	0.011***	0.011***	0.009**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Age, years	0.002***	−0.002***			
	(0.000)	(0.000)			
Married	0.003	−0.005***	−0.007***	−0.007***	−0.004**
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Persons aged 35 years and older but younger than 65 years = 1			−0.024***	−0.029***	−0.021***
			(0.003)	(0.004)	(0.004)
Persons aged 65 years or older = 1			−0.024***	−0.040***	−0.029***
			(0.003)	(0.007)	(0.007)
Persons aged older than 35 years but younger than 65 years interacted with LACE score				0.000**	0.000
				(0.000)	(0.000)
Persons aged 65 years or older interacted with LACE score				0.001***	0.001**
				(0.000)	(0.000)
Constant	−0.118***	−0.029	−0.067**	−0.065**	−0.067**
	(0.029)	(0.030)	(0.028)	(0.029)	(0.028)
Observations	110,991	105,988	106,025	106,025	106,025
R-squared	0.067	0.068	0.068	0.068	0.083
Adjusted R-squared	0.0666	0.0680	0.0678	0.0679	0.0822

***$P < .01$, **$P < .05$, *$P < .1$.
Models also control for whether the visit was on a weekday, the month of the visit, distance of the patient from the clinics in Morgantown, and community-level factors at the zip code level including the poverty rate, median household income, the unemployment rate, the percentage of persons with a bachelor's degree or higher and with a high school diploma. Model 5 also include diagnosis codes.
Robust standard errors in parentheses.
Abbreviations: LACE score, a readmission risk score based on hospital admission information, the Charlson Comorbidity index, and emergency department visits within the last 6 to 12 months.

telemedicine visits than in-person visits and what characteristics may indicate an increased likelihood to use telemedicine and complete telemedicine visits. While the data for the use of telemedicine is all from after the start of the COVID-19 pandemic, with the prolonged course of the pandemic, these results should remain relevant in the future.

Telemedicine utilization has previously been associated with patients with specific characteristics such as sex, age, marital status, and geographic residence in a national US survey dataset,[34] raising concerns of widening health disparities because of using telemedicine-based care. Haynes demonstrated similar findings in a sample of patients receiving telemedicine

Table 3. Factors Affecting Completion of Primary Care Visits

	All Ages	Aged 18 Years and Older Only			
	(1)	(2)	(3)	(4)	(5)
Telemedicine = 1	0.243***	0.245***	0.243***	0.231***	0.171***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)
New patient	−0.033***	−0.027***	−0.029***	−0.030***	−0.028***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Primary care visit	0.010***	0.011***	0.014***	0.014***	−0.067***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LACE/Risk score	0.001***	0.000***	0.000	−0.000	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hospital admission risk	−0.001***	−0.001***			
	(0.000)	(0.000)			
Sex = Male	−0.020***	−0.020***	−0.023***	−0.023***	−0.016***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Race = White	0.014**	0.012**	0.010*	0.010*	0.006
	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)
Age, years	−0.003***	−0.001***			
	(0.000)	(0.000)			
Married	0.004	0.005	0.035***	0.035***	0.037***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Distance in miles to the facility	−0.001***	−0.001***			
	(0.000)	(0.000)			
Persons aged older than 35 years but younger than 65 years = 1			0.004	0.004	−0.052***
			(0.004)	(0.004)	(0.004)
Persons aged 65 years or older = 1			0.056***	0.056***	−0.040***
			(0.005)	(0.005)	(0.005)
LACE score interacted with use of telemedicine				0.001**	
				(0.000)	
Persons aged older than 35 years but younger than 65 years interacted with use of telemedicine					0.052***
					(0.009)
Persons aged 65 years or older interacted with use of telemedicine					0.013
					(0.010)
Constant	0.582***	0.544***	0.598***	0.600***	0.560***
	(0.045)	(0.047)	(0.045)	(0.045)	(0.038)
Observations	110,991	105,988	106,025	106,025	106,025
R-squared	0.037	0.038	0.036	0.036	0.317
Adjusted R-squared	0.0369	0.0381	0.0361	0.0362	0.316

***$P < .01$, **$P < .05$, *$P < .1$.

Models also control for whether the visit was on a weekday, the month of the visit, and community-level factors at the zip code level including the poverty rate, median household income, the unemployment rate, the percentage of persons with a bachelor's degree or higher and with a high school diploma. Model 5 also include diagnosis codes.

Robust standard errors in parentheses.

Abbreviations: LACE score, a readmission risk score based on hospital admission information, the Charlson Comorbidity index, and emergency department visits within the last 6 to 12 months.

Table 4. Community Factors and the Completion of Telemedicine Visits

Poverty rate in patient's zip code of residence, 2019	0.001	0.000	−0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Median household income in patient's zip code of residence, 2019	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate in patient's zip code of residence, 2019	−0.002	−0.002	−0.001	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Percent of the population with a bachelor's degree or higher in patient's zip co	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Percent of the population with only a high school diploma in patient's zip code	0.002	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Broadband Speed in mbps in patient's zip code of residence, 2019	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)

***$P < .01$, **$P < .05$, *$P < .1$.
Models also control for whether the patient was a new patient, whether the visit was on a weekday, to a primary care provider, the age, sex, race, marital status, and health risk of the individual, distance of the patient from the clinics in Morgantown, and the month of the visit. Model 4 also include diagnosis codes.
Robust standard errors in parentheses.

care for diabetes.[35] Our findings add to the existing literature by providing additional information about rural primary care patients. Specifically, we found that new patients are less likely to use telemedicine, which may be unsurprising as they have no previous relationship with the provider. We also found that older patients were less likely to use telemedicine, but older, sicker patients were more likely to use it and more likely to complete their visits using telemedicine compared with in-person visits. Patients with higher health risks were not more likely to use telemedicine, but they were more likely to complete a telemedicine visit than an in-person visit. Therefore, individual primary care physicians interested in initiating or expanding their telemedicine offerings in rural areas may wish to focus on patients with these characteristics, and primary care groups working to improve access to care in rural settings may consider telephone- and video-based telemedicine as a way to improve visit completion in these groups.

In addition, pertinent to primary care physicians is knowing which diagnoses may be most successfully conducted via telemedicine. Our data demonstrate that patients with certain conditions may be more likely to use telemedicine. In particular, we found that patients seeing their primary care provider for mental health complaints such as anxiety and depression were especially likely to choose telemedicine. Similarly, telemedicine was more likely to be used for health maintenance of endocrinologic disorders such as diabetes mellitus and hypothyroidism. New pain complaints and visits requiring specific types of physical exams, such as well-child checks and cervical exams, were more likely to be in-person.

Although research demonstrates that telemedicine has been seen as uniquely useful for rural populations,[36,37] particularly as COVID-19 has impacted rural communities severely,[38] rural communities may also present unique barriers to telemedicine because of social or locational factors. In particular, broadband access has been described as a barrier in rural health systems attempting to implement telemedicine.[39] However, we saw no difference in the use of telemedicine based on average broadband speed within the patient's home location. This lack of difference may be due to 2 factors. First, we included telephone visits in our analysis, which do not depend on broadband access. Second, because the average broadband speed overall for our patient population was sufficient for telemedicine, it is possible that our sample does not capture enough variation in this regard. For our rural population, we saw an increase in visit completion rates by using telemedicine for working-aged people, suggesting that telemedicine allows working people to make appointments without having to miss work. While previous research has suggested that there may be barriers due to income or education concerning telemedicine use, none of our community-level measures are statistically significant in determining the use of telemedicine; thus, it does not seem there are major barriers to telemedicine use in our sample (perhaps due to the option to complete via telephone call). While we found that the visit completion rate (overall) was worse for people living in zip codes with higher poverty and unemployment, these differences were not present in the completion of telemedicine visits. These findings suggest that telemedicine may be an effective tool for increasing access to care for certain rural populations by rendering them better able to complete their visits. This is consistent with a survey by WVU Medicine that found that 92% of patients believed that E-visit availability (a type of telemedicine appointment) increased their ability to access health care.

We recognize that this study has limitations. Most notably, our study involves observational data from a single institution, limiting generalizability. This study also does not address individual-level barriers to telemedicine use in rural populations. One example of an individual-level barrier is if a health practitioner discourages telemedicine use. A qualitative analysis would help provide more detailed understanding of telemedicine use in the sample population. In addition, this study was limited by incomplete patient-level data about specific demographics such as education level, income level, unemployment rate, and broadband speed, so our analysis proxies for these factors using zip code-level estimates constructed using data from the US Census and FCC. In addition, since visit completion was defined as a visit in which a patient completed check in procedures, we might be including a small subset of visits in which the visit did not continue past the check-in process. Future telemedicine research with other rural populations using more rigorous methodologies would be helpful in further understanding the role of telemedicine in expanding access to primary care in a rural setting.

Conclusion

Telemedicine can be a tool to improve patient access to primary care in rural populations with significant health disparities. Our findings suggest that telemedicine may facilitate access to care for difficult-to-reach patients, such as those in rural areas, as well as those who have rigid work schedules, live longer distances from the clinic, have more complex health problems, and are from areas of higher poverty or lower education. We found evidence that these factors may be associated with an increased likelihood to use telemedicine, and, perhaps more importantly, an increased likelihood of completing a telemedicine visit as compared with a traditional in-office visit. Infrastructure disparities, such as broadband availability did not seem to impact our patient sample, but this may be due to the inclusion of telephone visits in our sample. However, we found evidence that both phone and video visits were associated with higher completion rates. Further research is needed to understand health outcomes, effectiveness, and acceptability of telemedicine in similar populations.

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Appendix

Appendix Table 1: Diagnosis Code Results

Anemia	0.008
	(0.014)
Angina	0.026***
	(0.009)
Anxiety	0.132***
	(0.008)
Arthritis	0.002
	(0.007)
Carcinoma	0.047**
	(0.021)
Cervix	−0.085***
	(0.010)
Cholesterol	0.004
	(0.007)
Congestive	−0.015
	(0.020)
Coronary	−0.009
	(0.011)
Degenerative	0.054***
	(0.021)
Depression	0.075***
	(0.005)
Diabetes Mellitus	0.011***
	(0.004)
Disability	−0.019
	(0.023)
Edema	0.018
	(0.012)
Exposure	0.323***
	(0.033)
Fibrillation	0.007
	(0.010)
Headache	0.017
	(0.014)
Hyperactivity	0.084***
	(0.012)
Hyperglycemia	0.016
	(0.013)
Hyperlipidemia	−0.005
	(0.004)
Hypertension	−0.004
	(0.003)
Hypothyroid	0.040**
	(0.016)
Impairment	0.005
	(0.025)
Incontinence	0.000
	(0.017)
Infection	0.033***
	(0.008)
Libido	0.054
	(0.057)
Myelopathy	0.082**
	(0.033)
Nicotine	−0.027
	(0.022)
Pacemaker	−0.071
	(0.044)
Pain	−0.008**
	(0.003)
Pneumonia	−0.021
	(0.018)
Polyneuropathy	0.024
	(0.016)
Posttraumatic	0.127***
	(0.022)
Radiculopathy	0.048**
	(0.020)
Restless	−0.005
	(0.034)
Retardation	−0.102***
	(0.012)
Stone	0.020
	(0.026)
Tendinitis	−0.046**
	(0.023)
Thyroid	0.001
	(0.006)
Ulcer	−0.021
	(0.015)
Weakness	0.013
	(0.027)

***$P < .01$, **$P < .05$, *$P < .1$.
Results are from Model 7 in Table 2.