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# Rural-Urban Differences in Durations of Patient-Physician Visit Time

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## Abstract

This paper compares the outpatient visit duration in urban and rural physician offices. Results show that the length of time a physician spends with a patient is strongly associated with urban-rural physician office setting, which directly affects practice quality. Results also show that the rural physicians order more medications for patients across all age groups. Physicians put less attention to patients when they spend less time for consultation.

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# 1 INTRODUCTION

The quality of health care in urban and rural America is an important aspect of consumer welfare, and it determines the general health status of individuals. But studies like the Rural Health Center Study[1] on health disparity between rural-urban residents shows that rural residents suffer from considerable poor health status than urban residents. Literature shows that there is a considerable shortage of rural physicians in the United States' rural areas (Pusey (1925), Andrus and Fenley (1974)). Medical graduate retention literature shows that medical graduates' interest in both family medicine and rural practice is declining over the years (Cohen (1998), Doescher et al. (2000)). This makes the role of available Primary care physicians (PCPs) in rural areas more critical. PCPs monitor patients' health and ensure the availability of adequate health services. If a physician does not provide adequate health care, third-party providers might not contract with him/her, and consumers will go to other physicians for their medical needs.

PCPs in urban and rural areas face different challenges in providing quality health care to patients. As shown in the above literature the shortage of PCPs adds additional challenge to provide adequate time to patients. Literature uses different measures of outcome variables (like maternity care, mortality rate, etc. ) to estimate the health status (Matthews et al. (2010)) but agrees that urban residents enjoy considerable advantage in health care over rural residents in both developed and developing countries.

Comparison of quality of care between urban and rural physicians will help us understand how consumer welfare is affected in these two regions. But there is no empirical evidence showing the differences between the quality of care provided by urban and rural physicians. Literature shows that the time a physician spends with a patient during an office visit is a good measure of patient satisfaction and preventive health services (Lin et al. (2001) and Gross et al. (1998)). Physicians can increase their productivity by seeing more patients, but it decreases the time they spend with each individual. Therefore, there is a trade-off between productivity and patient visit time; finding a balance is crucial.

Data on PCPs' visit duration and patient satisfaction are not private – physician ratings and reviews are found easily on the internet. The Patient Protection and Affordable Care Act of 2010 requires the Centers for Medicare and Medicaid Services (CMS) to expand its physician directory tool. CMS launched Physician Compare, a tool containing information about physicians, in December 2010. The directory was expanded in 2013 to include patient satisfaction ratings.

Patient satisfaction translates to the quality of care. Literature on quality of care and visit time concludes that shorter visit duration and lower patient satisfaction are acceptable indicators of poorer quality of care (Wilson and Childs (2002)). Another measure of quality of care is volume and rate of prescription of medication. Literature concludes that prescription volume rate is a good measure of quality of care (Bensing et al. (1993), Howie et al. (1991), Hughes (1983), and Heaney et al. (2002)).

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[1] Please see the complete report at http://rhr.sph.sc.edu/report/(7-3)%20Health%20Disparities%20A%20Rural%20Urban%20Chartbook%20-%20Distribution%20Copy.pdf

In this paper, we examine the rural-urban differences in quality of care. We use physician-patient visit duration and prescription volume as measures of quality of care following the literature. We explore a detailed physician patient visit duration database. Detailed data analysis shows that rural physicians spend 8 minutes less with their patients than urban physicians. Further analysis across patient characteristics, physicians' characteristics and regions shows that rural physicians spend less time with patients across all specialties.

The remainder of the paper is organized as follows: the next section reviews the relevant literature. Section 3 presents a description of the data. Section 4 describes estimation and the results, and Section 5 concludes.

# 2 LITERATURE REVIEW

Urban rural health disparity literature study the comparison of health status between rural and urban adults (Mainous and Kohrs (1995)). Mainous and Kohrs (1995) uses the data from a 1993 statewide probability-based telephone survey to compare the health status of adult residents between Metropolitan Statistical Area (MSA) and nonMSA. Multivariate regression analysis shows that rural residents have significantly poorer health status than urban residents. Rural urban [2] Chartbook presents a pattern of poor health behaviors among rural residents. These evidence suggest a prevailing health disparity between rural urban residents. Though the rural-urban health disparity literature establishes the evidence of poor health status among rural residence but there is no clear empirical evidence differentiating the quality of care between rural and urban physicians. It is important to understand the difference between the delivery of care provided by urban rural physicians to improve the quality of care and make important policy judgments. But first we need to accept a measure of quality of care.

Literature investigates the originality of the definition of quality of care (Palmer (1991), Blumenthal (1996a, 1996b), Brook et al. (1996)) and came to the conclusion that patient satisfaction survey is a good indication of quality of care (Health plan employer data (1995), Report card project (1995)). Government is also increasingly relying on consumer reporting system. Patient satisfaction appears to have a positive impact in terms of better disease diagnosis and fewer patient psychosocial problems.

Patient satisfaction is correlated with patient-physician visit duration. Lin et al. (2001) use patient satisfaction survey and show that two determinants of patient satisfaction in an ambulatory internal medicine practice are: (1) perceived ambulatory visit duration; and (2) meeting or exceeding patient expectations of time needed with the physician. Gross et al. (1998) also show that patients' perceptions of the amount of time they spent with the physician help determine ambulatory patient satisfaction. Fiscella et al. (2004) show that patient trust is related to PCPs' patient-centered behavior. Howie et al. (1989) investigated

[2] Please see the complete report at http://rhr.sph.sc.edu/report/(7-3)%20Health%20Disparities%20A%20Rural%20Urban%20Chartbook%20-%20Distribution%20Copy.pdf

patients' psychosocial problems, and they conclude that psychosocial problems decrease as patients spend more time with their doctors. Streja and Rabkin (1999) analyzed the factors associated with implementation of preventive care measures in patients with diabetes mellitus. Streja and Rabkin (1999) uses a patient survey data and implement logistic and univariate regression analysis. Their detailed results show that physicians' consultation time with patients is important in the initial diagnosis and eventual cure of the patient. Nowalk (2004) uses a patient interview and self-administered survey data of office managers in a logistic regression analysis to investigate the effect of patient visit time on adult immunization rates. Nowalk (2004) found similar results for adult immunization rates.

From the above discussion, it is evident that patient-physician visit duration is positively associated with patient satisfaction. And patient satisfaction is positively correlated with the quality of care. Literature shows the evidence that patient visit duration is an indication of higher quality of care. Wilson and Childs (2002) presents a comprehensive study to show that time spent with physician is inversely related with poor quality of care. This paper uses patient physician visit duration as a measure of quality of care.

Literature on patient physician visit duration shows that face-to-face visit time is diminishing over time (Burdi and Baker (1999), Kassirer (1998) and Mechanic (2003)). But there is no empirical research to show the difference in visit duration between urban and rural physicians. This paper investigates the differences of quality of care provided by rural and urban physicians, using the physician-patient visit duration as a proxy for the quality of care.

Another measure of quality of care is volume of prescribed medicine. Bensing et al. (1993) shows that female physicians have longer visit duration and less volume of prescription than male physicians. Hughes (1983) shows that physicians who spend less time with patients prescribe 62.6% more prescriptions than other physicians. Howie et al. (1991) finds a very similar result and shows that less visit duration translates to 60% more prescribe medications and less quality. Heaney et al. (2002) studies prescription medications among UK physicians, and finds that there is a positive correlation between prescription quality and longer consultation time. This literature shows that volume of prescription is a good proxy for the quality of care provided by the physician. Physicians who have longer average consultation lengths prescribe less medication and are more likely to include lifestyle advice and recommend/provide preventive measures.

NAMCS database has been used in the past to examine the determinants of physician patient visit durations. For example, Gery et al. (2012) uses NAMCS 2006 and 2007 database to study the characteristics of oncology patients and their visits to outpatient, office-based physicians. They use a multivariate generalized linear model to conclude that performance-based payment mechanisms and capitated arrangements reduces the patient physician visit duration for oncology patients. Blumenthal et al. (1999) uses the 1991-1992 NAMCS database in a multivariate model analysis and conclude that physician, patient, geographical and visit characteristics affect the patient physician visit durations. And on average patients spend 16 minutes with physicians.

# 3 DATA

## 3.1 Overview of the data

The primary data used in this research is provided by the National Center for Health Statistics at the Centers for Disease Control and Prevention (CDC). Data from the National Ambulatory Care Survey were analyzed from 2006 to 2010. The National Ambulatory Medical Care Survey (NAMCS) is a national survey about the provision and use of ambulatory medical care services in the United States. Survey data is based on a random sample of patient visits to non-federally employed office-based physicians. Data contains 44,273 patient visits over the period of time. Physicians are classified by the American Medical Association and the American Osteopathic Association as delivering "office-based, patient care." Patient visits made to the offices of non-federally employed physicians are included, except visits to the following practices: anesthesiology, radiology, and pathology. NAMCS includes freestanding clinics, federally qualified health centers, neighborhood clinics, mental health centers, non-federal government clinics, family planning clinics, HMOs, faculty practice plans, and private, solo, and group practices. NAMCS utilized a multistage probability sample design to collect the data on geographic location, physician specialty, and individual patient visits within the practice. An additional sample of physicians and non-physician practitioners was selected from a separate stratum of community health centers. In the database, physician urban-rural location designations are identified. Rural locations were identified based on the designations of non-metropolitan statistical areas (MSAs) by the U.S. Office of Management and Budget. An MSA is defined as a county or group of contiguous counties that contain at least one city with a population of 50,000 or more or an urbanized area with a metropolitan population of 100,000 or more. Overall 86% office locations are identified as urban and rest are rural in the database.

Information on physician characteristics are provided in the database. Overall, 67% percent of physicians are owners of the office location. Physician practice areas are also specified in the database. Patient characteristics are provided as follows. Visit rate increases with the age of the patient in the database. But infants under the age of 1 also have considerable number of visits (more than 700 visits per 100 persons). Across gender, women have higher visit than men. There is no significant difference among visit characteristics across different race of the population.

Method of payment information is present in the database. Overall, more than 63% patients pay through private insurance, 12% pay through Medicare, 24% pay through Medicaid, 1.8% uninsured and rest are through other insurance.

Established patient status has been developed if they had at least one previous visit in the last 12 months. More than 76% patients are established patients in the database. Visit characteristics are categorized by reason for visit. Visit reasons are coded using the International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] for diagnoses, causes of injury, and procedures. Reasons for visit, like acute problem, routine, pre-post surgery, flare-up, preventive care etc. are accounted for as the major category of visits. Overall, a little more than 18% of visits are for preventive care, and it is more for women (65% for women than men) and for infants under the age of 1( 26% more than other age groups). Referred patient status are provided in the database. Most of the neurology

(47%) and general surgery (45%) patients are referred patients.

For women speciality, around 59% female patients order pap tests. Patients' blood pressure and other indicators are recorded. In the database, a little more than 80% surgical procedure orders are recorded.

Prescription medication information are recorded. Around 85% visits have at least one drug mentioned, more than 7 drugs are recorded in 5% of the visits. Health educations are documented. Around 11% receive nutrition education, 7% receive exercise education, and 18% receive some non-medication treatment. Less than 3% receive physical therapy treatment.

## 3.2 Variable definitions

The objective of this research is to analyze the determinants of patient physician visit duration, $D_{ij}$. Where $i$ indicates the patient and $j$ indicates the physician. Duration of visit information in minutes, $D_{ij}$ is obtained from NAMCS. This is the main dependent variable of this analysis. Figure 1 shows that most of the patient visits in the data last less than 25 minutes. Only less than 5% visits last more than 50 minutes. These are on average pre-surgery patient visits.

Urban-rural location of the physician $j's$ office, $U_j$ is defined as a zero one dummy variable. Duration of patient visit is assumed to be affected by the rural-urban location of the physician $j's$ office, $U_j$. Because considerable shortage of rural physicians (Pusey (1925), Andrus and Fenley (1974)) and rural urban health disparity (Mainous and Kohrs (1995)) indicate that rural-urban characteristic of physician office $j's$ location is important in explaining physicians' delivery of care.

Table I presents the average number of urban-rural physicians by specialty. Table I shows that, on average, each specialty has more physicians in urban regions than in rural regions. Psychiatry has the most physicians, followed by neurology. Standard deviations are presented in the parenthesis. Though in the dataset total urban physician offices are more, (about 87% more than rural physician office) but Table I presents the mean values by specialty. Therefore, it is worth to note that on average under each specialty rural areas have less specialized physicians.

Further we implement the difference in means tests (two-sample t-test) and present the p values in the fourth column of Table I. The p values show that we reject the null hypothesis that the means are same. Therefore, we conclude that two groups are significantly different.

Physician characteristics are included in the analysis. Physician specialty, $P_j$, is a categorical variable because physicians have different speciality as presented in Table I.

Ownership of the physician's office location affects the physician's own time management and the reputation of the entire office location. Therefore, we include a dummy variable $O_j$,to indicate whether the physician $j$ owns the office where he sees the patient.

Geographic location characteristics Northeast, South, Midwest, and West, are included in the categorical variable $G_j$. $G_j$ is an additional control variable in the analysis.

Patient characteristics are expected to affect the visit duration because the description of the data shows that as age increases duration of visit increases or women patients spend

on average more time than men. Therefore, patient characteristics are important control variables. We include the following patient characteristics in the analysis.

Patient age, $Age_i$ is a categorical variable, which controls for the effect of age on the duration of visit. Other control variables are $Female_i$, $Race_i$, $Insurance_i$,.

Patient status is a zero one dummy variable, $New_i$. A new patient needs more visit time because physician needs to know the patient for the first time. Therefore, this is an important control variable in the analysis of visit duration.

Visit characteristics, $Visit_i$ as categorized by reason for visits are expected to effect the duration of visit. As described in the data description causes of visits and procedures affect the patient physician visit duration. Literature (Gery et al. (2012) and Blumenthal et al. (1999)) established that all the above variables are important variables in affecting $D_{ij}$. Therefore, we need to control the effects of these variables. All the right hand side variables are tested for collinearity and they show no significant collinearity problem.

Please note that this is the first paper which analyzes the visit characteristics differences between rural-urban physicians (the time period is also longer than previous studies).

# 4 ESTIMATION AND RESULTS

The key dependent variable is the duration of visit, measured by physician-patient face-to-face time. In the duration of visit measure, wait time is not included. We estimate the following

$$\begin{aligned} D_{ij} &= \alpha_0 + \alpha_1 U_j + \alpha_2 P_j + \alpha_3 O_j + \alpha_4 G_j + \alpha_5 Age_i + \alpha_6 Female_i \\ &\quad + \alpha_7 Race_i + \alpha_8 Insurance_i + \alpha_9 New_i + \alpha_{10} Visit_i + \varepsilon \end{aligned} \tag{1}$$

$D_{ij}$ is the duration of the physician-patient visit for physician $j$, measured in minutes. The duration of visit $D_{ij}$ is a function of the urban-rural characteristics of the physician $j$'s office location $U_j$. Visit duration, $D_{ij}$ is also a function of physician $j$'s speciality, $P_j$, hospital ownership, $O_j$ and the geographical location $G_j$. We also control for patient characteristics such as, $Age_i$, $Female_i$, $Race_i$, $Insurance_i$ and patient status $New_i$. Visit characteristics are included as $Visit_i$, which indicates the reasons for visit.

Visit duration, $D_{ij}$ could be affected by the ability of the physician to adopt and implement new technology such as electronic health record, clinical decision support system etc. The adoption of new technologies and its effect on the variation on visit duration may or may not have an impact on the quality of care [3]. Since we include individual patient and physician specific characteristics in equation (1) (physician specialty, region, ownership), technology adoption effect has been control for in equation (1) through these variables. Physician characteristics and patient characteristics are highly correlated with the adoption of new technology and its implementation. Therefore, the estimated value of $\alpha_1$ depicts the quality of care by rural versus urban physicians.

[3] We thank an anonymous referee for raising this argument.

We estimated equation (1) using a multivariate generalized linear regression model (Gery et al. (2012) and Blumenthal et al. (1999))[4]. Results are presented in Table II. Table II shows that rural physicians spend significantly less time (eight minutes) with their patients than urban physicians. Physician specialty significantly affects the duration of visit. Gynecology and neurology have significantly longer visits than other specialties. The ownership criteria – that is, whether the physician owns the office or not – does not affect the duration of physician-patient visit time. Patient characteristics show that as patient age increases, physicians spend more time with the patient, but patient gender is not important in explaining visit duration. Table II also shows that method of payment or type of insurance is not important in influencing the duration of visit.

Patient status is important in explaining the visit duration. New patients spend a little more than 8 minutes with physicians than established patients. This result shows than returning patients have less visit time. This is because new patients need more time to communicate with the physicians, information documentation etc.

Next, we estimate equation (1) separately by rural and urban physicians. This analysis helps us to understand the differences between rural and urban physician-patient visit durations across patient characteristics, physician specialty, region and insurance [5]. It is important to analyze the differences between visit durations across these variables because we found patient characteristics, physician specialty and region significantly affect visit duration in Table II. Though not all insurance variables were significant in affecting duration of visit in Table II, but given the importance of insurance in health care delivery it is worth to perform the robustness check across insurance variables. Results are presented in Table IIa. Column 3 and 6 of Table IIa support results from Table II, that is duration of visit increases with age of the patient. Column 3 and 6 show that duration of visit increases with specialty delivery like gynecology, oncology, neurology, etc. Effect of insurance is either not significant or small in Table IIa though the coefficient of Medicaid becomes positive significant for rural physicians in Table IIa.

Comparing column 3 and 6 of Table IIa we conclude that across all the important variables, physician-patient visit duration (column 6) is always less for rural physicians than urban physicians (column 3). For patients in the age group 15 to 24 years, urban physicians spend 2 minutes more comparing to the 15 years group patients. But rural physicians spend around 1.4 minutes more comparing to the 15 years group patients. Across age group 25 to 44 years urban physicians spend around 8 minutes more comparing to the 15 years group patients. While rural physicians spend 7 minutes more comparing to the 15 years group patients. Therefore, rural physicians spend less time than urban physicians. This trend is same across all other groups.

Across physician specialty, urban gynecologists spend 4 minutes more with their patients than rural gynecologists. Urban neurologists spend 6 minutes more with their patients than rural neurologists. Urban oncologists spend 2 minutes more with their patients than rural oncologists. These results hold for all other specialties and verify that rural physicians spend less lime across all specialties.

[4] As a robustness check we use a fixed affect model. We find no qualitative difference in the result.

[5] We thank an anonymous referee for the suggestion.

Next, we estimated the number of medications prescribed by the urban and rural physicians separately. We control for all physician and patient characteristics as described above. The estimated results are presented by age group in Table III. Each row presents the estimated number of prescribed medications by the urban and rural physicians. Comparing the estimated coefficients, we see that for each age group, rural physicians prescribe significantly more medications than urban physicians. Therefore, when the physician spends less time with his/her patient, he/she prescribes more medications.

As a robustness check we repeat the prescription medication regression to test the overall effect of rural-urban location of physician office location on medication. Table IV shows the overall impact of rural physician office on prescription medication in a GLM model specification. The dependent variable is the prescription medication. Results show that rural physicians significantly prescribe more medication than urban physicians.

This result shows the association between less attention and over-prescription of medications by physicians. If physicians pay more attention to their patients and spend more time in their diagnoses, then, on average, they prescribe fewer medications and encourage more health education. Using the same data in a separate test, it has been shown that rural physicians recommend less health education than urban doctors. Results are available from the authors.

# 5 CONCLUSION

This paper investigates the determinants of quality of care by urban and rural physicians across United States. We use patient-physician visit duration and prescription volume as measures of quality of care. Visit duration are associated with patient satisfaction (Lin et al. (2001) and Gross et al. (1998)) which reflects the quality of care (Wilson and Childs (2002)). Shorter visit duration are also associated with higher volume and lower quality of prescription medication and poor quality of care (Bensing et al. (1993), Howie et al. (1991), Hughes (1983), and Heaney et al. (2002)). Results show that the length of time a physician spends with a patient is strongly associated with urban-rural physician office setting. On average, rural physicians spend 8 minutes less with patients than urban physicians. Across all the age groups we find that rural physicians spend less time with their patients than urban physicians. Results further show that rural gynecologists spend 4 minutes less with their patients than urban gynecologists. Similarly rural neurologists and oncologists spend 6 and 2 minutes less with their patients than urban specialty physicians. Across all specialties these results prevail.

We conclude that rural physicians pay less attention to patients when they spend less time with them on consultations. Results in this analysis show that rural physicians prescribe more medications and recommend less health education. Overall, results show more prescribe medications by rural physicians. Therefore, we conclude that the quality of care delivered by rural physicians are of inferior quality than urban physicians. Rural physicians need to improve their diagnostic practice styles by spending more time with patients, listening to

their concerns, and ordering more clinical tests for better diagnoses. These results hold for all specialties.

It is important to note that due to data limitation we cannot estimate the quality of care through delay with following visits etc. It would be interesting to explore the rate of follow-up visits in a future study with more detailed patient specific data.

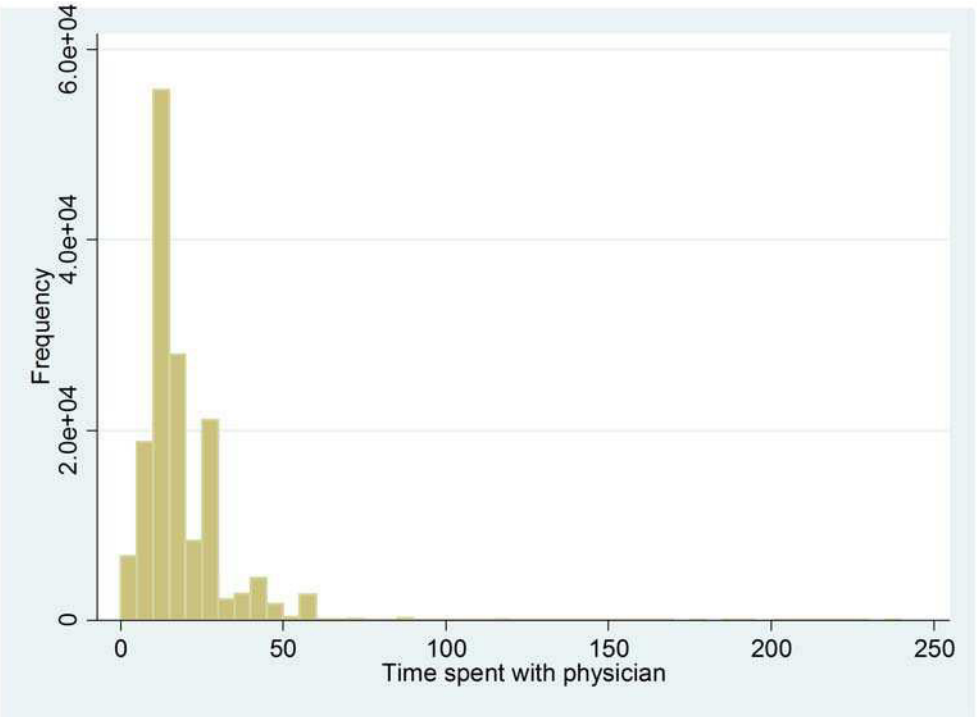


Figure 1: Frequency of duration of time spent with physician

Table I :Number of physicians by specialty

| Physician Speciality | Mean | Mean | P* |
|---|---|---|---|
| | Urban | Rural | |
| General/family practice | 19.01(3.93) | 16.44(4.82) | $< 0.0001$ |
| Internal medicine | 20.46(3.20) | 19.07(4.22) | $< 0.0001$ |
| Pediatrics | 17.87(4.22) | 15.29(4.87) | 0.003 |
| General surgery | 19.45(3.30) | 16.25(3.87) | $< 0.0001$ |
| Obstetrics and gynecology | 18.39(3.99) | 15.48(4.76) | $< 0.0001$ |
| Orthopedic surgery | 18.28(4.99) | 17.69(4.32) | $< 0.0001$ |
| Cardiovascular diseases | 20.52(3.00) | 18.63(5.88) | 0.003 |
| Dermatology | 17.67(3.33) | 15.67(4.98) | 0.004 |
| Urology | 19.42(3.00) | 12.08(5.84) | $< 0.0001$ |
| Psychiatry | 34.15(4.10) | 30.29(4.90) | $< 0.0001$ |
| Neurology | 27.83(4.98) | 23.10(5.99) | 0.01 |
| Ophthalmology | 18.79(3.10) | 16.58(4.00) | 0.002 |
| Otolaryngology | 19.39(4.00) | 17.33(5.00) | $< 0.0001$ |
| Other specialties | 24.87(3.09) | 22.95(4.99) | $< 0.0001$ |
| Oncology | 24.52(3.20) | 20.36(4.01) | 0.003 |

Note: Standard errors are presented in the parenthesis. *P presents the p value for the difference in means test.

Table II: Multivariate generalized linear regression model.

| Geographic characteristic | | Minutes | P>\|t\| | [95%Conf.Interval] |
|---|---|---|---|---|
| | Urban | Reference | | |
| | Rural | $-8.20 * **$ | 0.00 | $[-0.12 - -0.03]$ |
| Physician specialty | Internal medicine | Reference | | |
| | Pediatrics | $2.4 * **$ | 0.00 | $[0.05 - 0.19]$ |
| | General surgery | $5.38 * **$ | 0.00 | $[0.16 - 0.34]$ |
| | Obstetrics and gynecology | $9.66 * **$ | 0.00 | $[0.06 - 0.08]$ |
| | Orthopedic surgery | 2.35 | 0.74 | $[0.06 - 0.08]$ |
| | Cardiovascular diseases | $3.32 * **$ | 0.00 | $[0.23 - 0.40]$ |
| | Dermatology | $7.95*$ | 0.04 | $[0.00 - 0.15]$ |
| | Urology | 5.79 | 0.18 | $[0.02 - 0.14]$ |
| | Psychiatry | $6.78 * **$ | 0.00 | $[0.08 - 0.24]$ |
| | Neurology | $9.33 * **$ | 0.00 | $[0.84 - 1.02]$ |
| | Ophthalmology | $5.88 * **$ | 0.00 | $[0.51 - 0.66]$ |
| | Otolaryngology | $4.23 * **$ | 0.00 | $[0.33 - 0.51]$ |
| | Oncology | $4.46 * **$ | 0.00 | $[0.36 - 0.53]$ |
| Ownership | Owned | 2.00 | 0.91 | $[0.03 - 0.37]$ |
| Region | Northeast | Reference | | |
| | Midwest | $-4.93 * *$ | 0.04 | $[-0.09 - -0.00]$ |
| | South | $-10.25 * **$ | 0.00 | $[-0.14 - -0.05]$ |
| | West | $-4.76$ | 0.60 | $[-0.12 - -0.03]$ |
| Patient characteristic | | Minutes | P>\|t\| | [95%Conf.Interval] |
| Age,years | $< 15$ | Reference | | |
| | $15 - 24$ | 2.32 | 0.57 | $[0.05 - 0.10]$ |
| | $25 - 44$ | $7.02 * *$ | 0.04 | $[0.00 - 0.14]$ |
| | $45 - 64$ | $7.34 * **$ | 0.00 | $[0.06 - 0.20]$ |
| | $65 - 74$ | $9.09 * *$ | 0.03 | $[0.04 - 0.21]$ |
| | $\geq 75$ | 12.77 | 0.68 | $[0.02 - 0.03]$ |
| Sex | Female | Reference | | |
| | Male | $-6.79$ | 0.68 | $[0.26 - 0.39]$ |

Table II shows the estimation results of equation (1). The dependent variable is physician-patient visit time. ***, **, and * denote 99%, 95%, and 90% levels of confidence..

Table II: Multivariate generalized linear regression model (continued).

| | | | | |
|---|---|---|---|---|
| Race/ethnicity | Non-Hispanic White | Reference | | |
| | Non-Hispanic Black | $-6.46**$ | 0.01 | $[-0.12 - -0.11]$ |
| | Hispanic | 0.02 | 0.92 | $[-0.04 - 0.05]$ |
| | Asian | 0.06 | 0.14 | $[0.09 - 0.42]$ |
| | Native Hawaiian | 1.67 | 0.78 | $[0.11 - 0.15]$ |
| | Other | 1.87 | 0.74 | $[0.24 - 0.33]$ |
| Insurance | | Minutes | P>\|t\| | [95%Conf.Interval] |
| | Private insurance | Reference | | |
| | Medicare | 3.88 | 0.57 | $[0.09 - 0.17]$ |
| | Medicaid | 3.31 | 0.92 | $[0.11 - 0.51]$ |
| | Uninsured | 4.73 | 0.74 | $[0.24 - 0.33]$ |
| | Other insurance | $-3.7**$ | 0.00 | $[-0.11 - 0.29]$ |
| Patient status | Established patient | Reference | | |
| | New patient | $8.15**$ | 0.00 | $[0.20 - 0.29]$ |
| | | Minutes | P>\|t\| | [95%Conf.Interval] |
| Reason for visit | | | | |
| | Acute problem | Reference | | |
| | Routine | $-1.08$ | 0.62 | $[-0.05 - 0.03]$ |
| | Flare-up | $3.30**$ | 0.00 | $[0.07 - 0.19]$ |
| | Pre/Post-surgery | $-9.86**$ | 0.00 | $[0.16 - 0.32]$ |
| | Preventive care | $-6.90**$ | 0.00 | $[0.12 - 0.16]$ |

Table II shows the estimation results of equation (1). The dependent variable is physician-patient visit time. ***, **, and * denote 99%, 95%, and 90% levels of confidence.

Table IIa: Differences in Duration of Visit for Urban-Rural Primary Care Physicians

| | Urban | Minutes | P>\|t\| | Rural | Minutes | P>\|t\| |
|---|---|---|---|---|---|---|
| Patient characteristic | | | | | | |
| Age,years | $< 15$ | Reference | | $< 15$ | Reference | |
| | $15 - 24$ | $2.01 * **$ | 0.00 | $15 - 24$ | $1.47 * **$ | 0.00 |
| | $25 - 44$ | $7.78 * **$ | 0.00 | $25 - 44$ | $6.63 * **$ | 0.00 |
| | $45 - 64$ | $7.84 * **$ | 0.01 | $45 - 64$ | $6.83 * **$ | 0.01 |
| | $65 - 74$ | $9.11 * **$ | 0.00 | $65 - 74$ | $8.78 * **$ | 0.00 |
| | $\geq 75$ | 9.78 | 0.10 | $\geq 75$ | 4.73 | 0.20 |
| Physician specialty | Internal medicine | Reference | | Internal medicine | Reference | |
| | Pediatrics | $2.39 * **$ | 0.00 | Pediatrics | $1.00 * **$ | 0.00 |
| | General surgery | $5.29 * **$ | 0.00 | General surgery | $2.38 * **$ | 0.00 |
| | Obstetrics and gynecology | $9.66 * **$ | 0.00 | Obstetrics and gynecology | $5.62 * **$ | 0.00 |
| | Orthopedic surgery | 2.35 | 0.74 | Orthopedic surgery | 1.30 | 0.74 |
| | Cardiovascular diseases | $3.32 * **$ | 0.00 | Cardiovascular diseases | $2.32 * **$ | 0.00 |
| | Dermatology | $7.88*$ | 0.04 | Dermatology | $4.95*$ | 0.04 |
| | Urology | 5.79 | 0.18 | Urology | 3.79 | 0.18 |
| | Psychiatry | $6.78 * **$ | 0.00 | Psychiatry | $3.78 * **$ | 0.00 |
| | Neurology | $9.33 * **$ | 0.00 | Neurology | $3.33 * **$ | 0.00 |
| | Ophthalmology | $5.88 * **$ | 0.00 | Ophthalmology | $4.88 * **$ | 0.00 |
| | Otolaryngology | $3.23 * **$ | 0.00 | Otolaryngology | 2.23 | 0.10 |
| | Oncology | $4.36 * **$ | 0.00 | Oncology | 2.20 | 0.10 |
| Region | Northeast | Reference | | Northeast | Reference | |
| | Midwest | $-4.93 * *$ | 0.04 | Midwest | $-3.00$ | 0.32 |
| | South | $-8.25 * **$ | 0.00 | South | $-9.25 * **$ | 0.00 |
| | West | $-4.70 * *$ | 0.03 | West | $-5.70 * *$ | 0.03 |
| Insurance | Private | Reference | | Private | Reference | |
| | Medicare | $0.15 * *$ | 0.07 | Medicare | $0.01 * *$ | 0.02 |
| | Medicaid | $-0.15$ | 0.49 | Medicaid | $0.20 * *$ | 0.03 |
| | Uninsured | 0.03 | 0.88 | Uninsured | -0.11 | 0.12 |
| | Other insurance | 0.17 | 0.56 | Other insurance | $-0.10$ | 0.28 |

Table IIa shows the duration of visit differences between rural and urban setting across physician specialty, patient characteristics and insurance. The dependent variable is physician-patient visit time. ***, **, and * denote 99%, 95%, and 90% levels of confidence.

Table III. Number of medications prescribed by urban-rural primary care physicians.

| | Urban | Medicine | P>\|t\| | Rural | Medicine | P>\|t\| |
|---|---|---|---|---|---|---|
| Age,years | $< 15$ | $0.01 * **$ | 0.00 | $< 15$ | $0.20 * **$ | 0.00 |
| | $15 - 24$ | $0.16 * **$ | 0.00 | $15 - 24$ | $0.27 * *$ | 0.06 |
| | $25 - 44$ | $0.48 * **$ | 0.00 | $25 - 44$ | $0.61 * **$ | 0.00 |
| | $45 - 64$ | $1.03 * **$ | 0.00 | $45 - 64$ | $1.17 * **$ | 0.00 |
| | $65 - 74$ | $1.23 * **$ | 0.00 | $65 - 74$ | $1.74 * **$ | 0.00 |
| | $\geq 75$ | $1.26 * **$ | 0.00 | $\geq 75$ | $1.77 * **$ | 0.00 |
| Insurance | Private | $-0.91$ | 0.53 | Private | 0.72 | 0.30 |
| | Medicare | $-0.02$ | 0.82 | Medicare | $-0.88$ | 0.20 |
| | Medicaid | $0.42 * **$ | 0.00 | Medicaid | $-1.09$ | 0.30 |
| | Uninsured | $-0.59 * **$ | 0.00 | Uninsured | $-0.06$ | 0.21 |
| | Other insurance | $-0.30 * **$ | 0.00 | Other insurance | $-0.11$ | 0.28 |

Table III presents the prescription medication differences between rural and urban setting across patient characteristics and insurance. ***, **, and * denote 99%, 95%, and 90% levels of confidence.

Table IV: Number of medications prescribed by urban-rural primary care physicians.

| Geographic characteristic | | Medicine | P>\|t\| |
|---|---|---|---|
| | Urban | Reference | |
| | Rural | $0.06**$ | 0.07 |
| Physician specialty | Internal medicine | Reference | |
| | Pediatrics | $2.4***$ | 0.00 |
| | General surgery | $4.38***$ | 0.00 |
| | Obstetrics and gynecology | $8.66***$ | 0.00 |
| | Orthopedic surgery | 2.35 | 0.74 |
| | Cardiovascular diseases | $3.00***$ | 0.00 |
| | Dermatology | $7.95*$ | 0.04 |
| | Urology | 5.79 | 0.18 |
| | Psychiatry | $7.23***$ | 0.00 |
| | Neurology | $9.33***$ | 0.00 |
| | Ophthalmology | $5.88***$ | 0.00 |
| | Otolaryngology | $4.23***$ | 0.00 |
| | Oncology | $4.46***$ | 0.00 |
| Ownership | Owned | 2.00 | 0.91 |
| Region | Northeast | Reference | |
| | Midwest | $-4.93**$ | 0.04 |
| | South | $-10.25***$ | 0.00 |
| | West | $-4.76$ | 0.60 |
| Patient characteristic | | Minutes | P>\|t\| |
| Age,years | $< 15$ | Reference | |
| | $15-24$ | $0.17***$ | 0.00 |
| | $25-44$ | $0.48***$ | 0.00 |
| | $45-64$ | $1.04***$ | 0.00 |
| | $65-74$ | $1.29***$ | 0.00 |
| | $\geq 75$ | $1.31***$ | 0.00 |
| Sex | Female | Reference | |
| | Male | $-6.79$ | 0.68 |

Table IV shows the overall impact of physician's location on the medicine prescription. GLM model estimation. ***, **, and * denote 99%, 95%, and 90% levels of confidence.

Table IV. Number of medications prescribed by urban-rural primary care physicians.(continued).

| | | | |
|---|---|---|---|
| Race/ethnicity | Non-Hispanic White | Reference | |
| | Non-Hispanic Black | $-2.06**$ | 0.01 |
| | Hispanic | 0.02 | 0.92 |
| | Asian | 0.01 | 0.14 |
| | Native Hawaiian | 0.32 | 0.78 |
| | Other | 2.37 | 0.74 |
| Insurance | Private | Reference | |
| | Medicare | $0.21**$ | 0.02 |
| | Medicaid | $-0.70***$ | 0.00 |
| | Uninsured | $-0.46***$ | 0.00 |
| | Other Insurance | $-0.08$ | 0.58 |
| Patient status | Established patient | Reference | |
| | New patient | $4.15***$ | 0.00 |
| | | Minutes | P>\|t\| |
| Reason for visit | | | |
| | Acute problem | Reference | |
| | Routine | $-0.03$ | 0.43 |
| | Flare-up | $2.30***$ | 0.00 |
| | Pre/Post-surgery | $-8.86***$ | 0.00 |
| | Preventive care | $-5.50***$ | 0.00 |

Table IV shows the overall impact of physician's location on the medicine prescription. GLM model estimation. ***, **, and * denote 99%, 95%, and 90% levels of confidence.

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