

The relationship between primary care access and ER use

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Abstract

Context: Patient access to primary care is often noted to be poor. Improving access may reduce emergency room visits. Team-based care is frequently proposed as a solution to improve patient access to primary care.

Objective: To examine the relationship between primary care access and ER use and to test whether this relationship is moderated by team-based care.

Design and Setting: A longitudinal retrospective study of 627,276 patients receiving primary care from 6,398 primary care providers (PCPs) nationally within the Veterans Health Administration in 2009. Using primary care scheduling data we track weekly changes in PCP-level availability for patient appointment.

Main Outcome Measure: The number of a PCP's patients who went to the ER in a given week.

Results: Among all PCPs, a PCP being absent from patient care for the week had no effect on whether that PCP's patients used the ER in that week (incident rate ratio (IRR) 0.995, $p=0.54$). However, among PCPs practicing as part of a team the effect of a PCP being absent for a week or more had a larger and statistically significant effect on ER visits (IRR 1.04, $p=0.01$). The percentage of a PCP's weekly appointment slots that were fully booked (the booking density) had no significant effect on whether their patients used the ER in that week among all PCPs. However, among team-based PCPs a 10-percentage point increase in the booking density changed the IRR of ER visits in that week by 1.005 ($p=0.07$) and by 1.006 on weekdays ($p=0.05$).

Conclusions: We found that patient access to their PCP had a small effect on whether his or her patients used the ER, but only among those PCPs whose patients rarely saw another PCP. Among other PCPs, there was no effect of PCP access on ER use. These results suggest that a team-based approach to primary care may be effective in improving access to care and may be part of the solution to decreasing unnecessary ER use. Providing flexibility to patients facing a provider with high booking density seems to be warranted.

Patient access to primary care providers is often noted to be poor.¹⁻³ In 1999, a Kaiser Family Foundation survey reported that 27% of adults reported difficulty gaining timely access to a health care provider.² Between 1997 and 2001, the percentage of people reporting difficulty obtaining timely care rose from 23% to 33%.⁴ In a 2001 survey, 43% of adults reported being unable to get timely care for an urgent health condition.⁵ More recently, a 2006 survey reported that only 27% of adults with a usual source of care could easily contact their physician or obtain timely care.⁶

Delays in timely access to care have been associated with decreased patient satisfaction⁷ and have also prompted concerns that such delays in access may lead to inappropriately high rates of emergency room (ER) visits. Indeed, ER visits for non-urgent conditions are common, accounting for up to 40% of all ER visits.⁸ Improving timely primary care access has thus become a major focus in primary care for the past decade and recently many providers have restructured their practices to improve patient access to care.^{9,10}

However, the evidence linking poor primary care access to ER overuse is mixed. Several surveys of ER patients have reported a link between self-reported primary care access and ER use.¹¹ For example, a 2006 California survey of ER patients reported that poor primary care access was one of the main reasons for ER use.¹² Another study found that ER use is higher among patients who self-report worse access to primary care.¹³ Other research has examined whether ER use is higher among patients with worse primary care access using non-self-reported measures of primary care access.¹⁴⁻¹⁹ These studies generally focus on the correlations between ER use and primary care characteristics such as lack of a regular physician or poor continuity of care, and find that ER use rises as continuity and having a usual source of care falls. However, without direct measures of primary care access (i.e. how easy it is to get an appointment when needed)¹⁵⁻¹⁹ and, by relying on cross-sectional relationships, these studies may mismeasure the relationship between practice characteristics and ER use.

To get more directly at the relationship between primary care access and ER use, a few studies use changes in scheduling procedures designed to increase timely primary care access (i.e. implementation of open-access scheduling) to study the relationship between primary care access and ER visits. However, to our knowledge the two studies that used this approach examined changes at a single site or in a small group of clinics, limiting generalizability. While one study found a decrease in urgent care visits with the implementation of open-access scheduling,²⁰ neither found a consistent effect of open access on ER visits.^{20,21} Thus, the relationship between primary care access and ER use remains questionable.

How to successfully improve access to primary care is also unknown. Adopting a team-based approach to primary care may be a key component of successfully improving primary care access—whereby primary care providers are available to substitute for one another if needed and non-clinician extenders add capacity by sharing in the management of patient care.²² While team-based care is a frequently proposed solution, particularly in the setting of the medical home model of care,²³ the evidence to support this approach is lacking.

Our objective in this study is two-fold. First, we examine the relationship between primary care access and ER use. Second, we test whether this relationship is moderated by the ready availability of a team-based approach to providing primary care (i.e. whether substitute primary care providers are available if the patient's assigned provider is not available). We use longitudinal data to examine how changes in a provider's availability affect ER use by that provider's patients. We measure provider availability using primary care scheduling data, enabling us to estimate weekly urgent care (or unscheduled) capacity in over 6,000 primary care providers nationally. We do this among a large, national population of US patients—recipients of care from the Veterans Health Administration (VHA).

Methods

Data

We used two data sources in this study. First, we used data from the VHA's Corporate Data Warehouse, a national repository comprising data from several VHA clinical and administrative systems that contain data on all patient encounters within the VHA and include consistent provider and patient identifying information. We used this data to identify all primary care visits within the VHA as well as all ER visits. Second, we used the VA-Medicare data from the VA Information Resource Center, which contained all Medicare claims for all veterans in our cohort who were dually enrolled in the VHA and Medicare to identify ER use outside of the VHA.

Study population

Using these data sources we identified all veterans receiving primary care within the VHA in 2009 and their primary care practitioners (PCPs). We identified a cohort of primary care enrollees as all patients with at least one primary care visit in 2008 and alive on January 1, 2009 (n=4,181,611 patients). We then assigned these patients to PCPs who were practicing in the VHA in 2009 (i.e. had scheduled primary care appointments in 2009; n=4,067,418 patients). We used a standard attribution rule to assign patients to PCPs, assigning patients to the PCP they saw most frequently that year. In cases of ties (where a patient saw two PCPs the same number of times) we assigned the patient to the tied PCP seen first in 2009. We then further refined the sample by including only patients assigned to a PCP with a panel of between 75 and 2,000 patients (because extreme outliers in panel size were likely due to data errors). Our final cohort of 3,983,922 patients (95% of the original cohort) was assigned to 6,426 PCPs.

Independent variables: PCP availability

We measured PCP availability in two ways. First, we simply measured whether the PCP was absent from seeing patients in a given week. To do this we created a weekly dichotomous measure

indicating whether the assigned PCP was not seeing patients (i.e. had zero patient appointments for the entire week) as would be the case for vacations or other leaves of absence.

Second, we created a continuous measure of availability during the weeks the PCP was seeing patients—the PCP’s booking density. Booking density was defined as the number of a PCP’s appointment slots that were booked in a week divided by the total number of a PCP’s appointment slots that week (including booked and open appointment slots). Conceptually, this represents the percentage of a PCP’s time that was unavailable if a patient called that week to get an urgent appointment, where higher values suggest the PCP had less available time to accommodate urgent visits in that week. We measured available appointments as a percentage of all appointments (rather than the absolute number of appointments) to normalize across clinical sites as some sites routinely use shorter appointments and thus schedule more appointments in a week. For part-time providers who do not see patients every weekday we counted non-patient weekdays as fully booked (booking density of 100%) and averaged the daily booking densities for the week. For all providers we accounted for week-long absences from patient care (e.g. vacations) by considering those weeks as fully booked.

We calculate both independent variables each week for the 6,426 VHA PCPs based on the 3,983,922 patients receiving primary care from them in 2009.

Dependent variable: ER use

Our main dependent variable was a provider-level weekly count of the number of a PCP’s patients who went to the ER in a given week. Our measure of ER use included ER visits within VHA and outside of the VHA (covered by Medicare). We examine ER use only among those veterans who exclusively use VHA for primary care—those ages 65 and older (and thus eligible for Medicare) who do not have any Medicare claims for primary care visits in 2008 or 2009. This sample includes 627,276 veterans who are seen by 6,398 PCPs within VHA and is the analytic sample for all presented results.

Analysis

In our main analysis we used a negative binomial model to estimate the weekly effect of PCP availability on their patients' ER use overall, on weekends (when availability should have less of an effect) and on weekdays (when the effect of availability should be concentrated). In all models we included medical center-level booking density as a covariate, week fixed effects (to control for seasonal variation), and PCP fixed effects. PCP fixed effects both controlled for unobserved time-invariant PCP characteristics that might affect the relationship between booking density and patient ER use and also allowed each PCP to serve as a control for him or herself. Thus, we estimate within-PCP effects of changes in booking density over the course of the year on patient ER use. This takes advantage of the longitudinal nature of our data and provides estimates of the effect that are less prone to bias than typical estimates from cross-sectional data.

We ran all analyses in two groups of PCPs. First, we include all PCPs described above in the study population. Second, because the relationship between primary care access and ER use may be moderated in part by whether or not primary care is practiced in a team-based setting, we stratify our sample by those PCPs that did and did not appear to be part of a primary care team. While there is not a direct measure of the availability of primary care teams in the data, we can measure team-based care indirectly. To do so we calculate the proportion of a patient's visits that is with his or her assigned PCP. By taking the proportion of non-assigned visits averaged across all patients in a PCP's panel we get a measure of the availability of team-based care—that is, how often a PCP's panel sees his or her own PCP rather than a substitute PCP. Among PCPs whose panel of patients saw them at least 95% of the time ($n=2,527$ PCPs or 39% of all PCPs in our cohort), we assumed those PCPs were not practicing primary care as part of a team (either they were geographically isolated or organizationally separated from other

PCPs) whereas PCPs whose panel of patients saw other PCPs more frequently were assumed to function in a more team-based setting where PCPs can more easily substitute for one another.

Results

Our study sample is described in Table 1. Patients were predominantly male and were 75 years old on average. The average patient visited the ER less than once in the year 2009 (0.4 times per year). The majority of their PCPs were physicians (MD or DO) though over one quarter of the PCPs were nurse practitioners or physician assistants. Over half of the PCPs practiced in a medical center (i.e. a hospital-based clinic) and just under half practiced in an outpatient clinic setting. PCPs were 83% booked on average in any given week and the average PCP's panel of patients saw their assigned PCP 89% of the time.

Among all PCPs, a PCP being absent from patient care for the week had no effect on whether that PCP's patients used the ER in that week (Table 2). The incident rate ratio (IRR) of ER visits among patients' whose PCP was absent for the week was 0.995 ($p=0.54$). There was also no relationship between PCP absence and ER use on neither weekdays nor weekends.

However, among PCPs whose patients saw them at least 95% of the time, the effect of a PCP being absent for the week had a larger and statistically significant effect on ER visits (Table 2). In weeks when a PCP was absent, the IRR for an ER visits was 1.04 ($p=0.01$) or an increase in the incidence of ER visits of 4%. This effect was consistent for weekday ER visits (IRR 1.04; $p=0.02$) but was close to zero for weekend ER visits, when PCP availability should have little effect on ER use (IRR 1.003; $p=0.85$).

Among all PCPs, the PCPs' booking density had no significant effect on whether their patients used the ER in that week (Table 3). A 10-percentage point increase in booking density changed the IRR of ER visits in that week by 1.002 ($p=0.22$). The effect of booking density remained close to zero and

non-statistically significant for both weekday ER visits and weekend ER visits (IRR 1.003 ($p=0.15$) and 1.000 ($p=0.97$) respectively).

Among PCPs whose patients saw them at least 95% of the time, the effect of PCP booking density was, in some cases, statistically significant though the magnitude of the effect was smaller (Table 3). A 10-percentage point increase in the booking density changed the IRR of ER visits in that week by 1.005 ($p=0.07$) overall and by 1.006 ($p=0.05$) for weekday ER visits. There was no effect of booking density on weekend ER visits, as expected.

Discussion

We found that patient access to their PCP (as measured by PCP absence from clinical care) had a statistically significant effect on the incidence of ER use, but only in settings where patients rarely saw a substitute PCP. We also found that a PCP's booking density affected whether his or her patients used the ER among patients who rarely saw another PCP, though this effect was small. Among PCPs who appeared to routinely share patient care responsibilities with other PCPs there was no effect of PCP access on ER use for either absence from patient care or for booking density.

The effect of PCP availability on ER use was modest. However, in the setting of a large number of ER visits, an increase in ER visits of 4% translates into a meaningful number of ER visits. Based on our study cohort, there were over 97,000 ER visits in 2009 among patients whose PCPs were the near-sole provider of care. Our study implies that by implementing systems to promote team-based care and ensuring sufficient capacity to accommodate patient access to primary care, the VA could eliminate close to 4,000 ER visits annually. Although improving primary care access will not solve the problem of overuse of the ER, it can help address it.

These results highlight several important lessons. First, these results are consistent with prior research suggesting that simple interventions like advanced-access scheduling may not solve the problem of ER overuse.^{20,21} Our results suggest that the challenge of improving primary care access is more complex than simply increasing appointment availability and may only work in certain settings where patients have few alternatives outside of seeing their usual PCPs. Furthermore, our results suggest that increasing appointment availability by 10 percent might have a very small effect on ER use.

Additionally, our results offer some insight into ways to potentially improve primary care access. PCP availability had an effect on ER use only among PCPs who appeared to be solely responsible for the care of their patients. For PCPs who shared the care of their patients with colleagues, their availability was not related to ER use. This suggests that a team-based approach to primary care may be effective in improving access to care and decreasing unnecessary ER use. While faster access is certainly desirable from a patient perspective, our study suggests that it might not have the desired effect of reducing ER usage. Providing flexibility to patients facing a provider with high booking density, in contrast, seems to be warranted.

When interpreting our results, it is important to remember our measure of access as well as the clinical setting of our research. Our measures of PCP availability capture information about the speed or ease with which a patient might be able to get an appointment with their established PCP. However, it is noteworthy that all patients in our sample had an ongoing relationship with a PCP. Thus, we do not measure PCP access in terms of ability to establish a relationship with a PCP in the absence of an ongoing pre-existing relationship. In the absence of an established PCP relationship access may simply be impossible for some patients. For such patients, waiting an extra couple of days is not an option – they face the choice between no care and care in the ER. Thus, it is plausible that ability to access primary care might drive ER usage, but the speed of access for established patients is less important.

The clinical setting of our research is also important. Our results show that within the VHA system patients needing urgent care are generally able to obtain access, even when their PCPs are unavailable. Since the mid-1990s the VHA has invested heavily in the establishment and growth of primary care. More recently, the VHA has begun investing in team-based approaches to primary care such as the medical home model. Indeed, we found evidence that patients are more likely to see a provider other than their PCP in weeks when their PCP was unavailable. Additionally, patients who are managed by PCPs who tend to not share the patient-management responsibilities with other PCPs are more likely to be affected by PCP availability. In other words, the VA system has created a certain amount of operational flexibility that provides patients seeking urgent care an alternative to using the ER even when faced with a high booking density of his PCP. Such flexibility provides a substitute for a fast access to the PCP and thus negates the effect of PCP availability on ER use in our study.

Our measures of access and the clinical setting of the VHA limit the generalizability of our results on the effect of access on ER usage. Nevertheless, to our knowledge our research provides the largest study to date examining the effect of PCP availability on ER use. We provide new and robust evidence suggesting that there is a relationship between a patient's ability to make an urgent primary care appointment and their rate of ER use.

Several venues for future research exist. If faster access to a PCP has only a small affect on ER usage, it suggests that there are benefits to patients of visiting the ER over primary care other than same-day access. Identifying these features and replicating them in primary care thus seems one fruitful opportunity. As discussed above, access is a more complicated construct than the PCP availability. Many patients have no ongoing relationship with a PCP and understanding if and to what extent these patients are more likely to seek ER care needs to be studied further. Finally, PCP access might have other undesirable consequences outside of ER use. For example, patients discharged from the hospital, patients that have seen specialists, or patients that were seen in the ER often require primary care

follow-up. Future research could investigate if such patient populations have to compromise in the continuity of their care by foregoing PCP follow-up appointments when their PCP is not available. In the meantime, this research helps to confirm the effect of PCP availability on ER use and focus primary care efforts on reducing unnecessary ER use.

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Table 1. Characteristics of study sample

Patient characteristics (n=627,276)		
Age, mean (SD)	74.6	(7.0)
Male, %	98.2	
White race, %	85.8	
Black race, %	10.8	
Number of ER visits per patient in 2009, mean (SD)	0.4	(1.1)
PCP characteristics (n=6,398)		
Booking density, mean (SD)	82.5	(15.4)
MD or DO, %	72.2	
NP or PA, %	27.8	
Practice located in a medical center, %	51.1	
For assigned panel, % of visits with assigned PCP, mean (SD)	89.1	(10.9)
No. weeks absent from outpatient care, mean (SD)	7.0	(10.0)
ER visits per PCP/week		
Total ER visits per week, mean (SD)	0.7	(1.2)
1 ^o care treatable ER visits per week, mean (SD)	0.3	(0.7)

Table 2. The effect of a PCP being absent from patient care on the rate of other types of patient visits among that PCP's patients

	Among all PCPs (n=6,398)			Among PCPs whose patients rarely see non- assigned PCPs (n=2,527)		
	IRR	95% CI	P-value	IRR	95% CI	P-value
Total ER visits	0.995	(0.978 to 1.011)	0.54	1.037	(1.008 to 1.067)	0.01
Weekday ER visits	0.998	(0.980 to 1.172)	0.86	1.040	(1.007 to 1.074)	0.02
Weekend ER visits	0.999	(0.979 to 1.018)	0.89	1.003	(0.967 to 1.150)	0.85

Table 3. The effect of a 10-percentage point increase in PCP booking density on the rate of ER visits among that PCP's patients

	Among all PCPs (n=6,398)			Among PCPs whose patients rarely see non- assigned PCPs (n=2,527)		
	IRR	95% CI	P-value	IRR	95% CI	P-value
Total ER visits	1.002	(0.999 to 1.005)	0.22	1.005	(1.000 to 1.010)	0.07
Weekday ER visits	1.003	(0.999 to 1.006)	0.15	1.006	(1.000 to 1.012)	0.05
Weekend ER visits	1.000	(0.996 to 1.004)	0.97	1.000	(0.993 to 1.007)	0.96