Distribution Agreement

Signature:

______________________________ _______________

Lindsay Allen Date

The Impact of Urgent Care Centers and Retail Clinics on Health Care Access and Emergency Department Use

By

Lindsay Allen
Ph.D.

Health Services Research and Health Policy

____
Janet Cummings, Ph.D.
Advisor

____
Jason Hockenberry, Ph.D.
Advisor

____
Stephen Pitts, M.D., M.P.H.
Committee Member

Accepted:

____
Lisa A. Tedesco, Ph.D.
Dean of the James T. Laney School of Graduate Studies

____
Date

The Impact of Urgent Care Centers and Retail Clinics on Health Care Access and Emergency Department Use

By

Lindsay Allen
M.A., University of Chicago, 2010
B.A., Johns Hopkins University, 2004

Advisor: Janet Cummings, Ph.D.
Advisor: Jason Hockenberry Ph.D.

An abstract of
a dissertation submitted to the Faculty of the
James T. Laney School of Graduate Studies of Emory University
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in Health Services Research and Health Policy
2017

Abstract

The Impact of Urgent Care Centers and Retail Clinics on Health Care Access and Emergency Department Use

By Lindsay Allen

Urgent care centers and retail clinics – collectively referred to as walk-in clinics – represent a large, rapidly growing sector of the health care delivery landscape. These clinics are purported to improve access to health care and reduce non-emergent emergency department (ED) visits, yet empirical evidence about their impact on these outcomes is notably lacking. This dissertation provides foundational evidence about 1) the community characteristics associated with walk-in clinic locations; 2) the percentage of ED visits that could be transferred to walk-in clinics; and 3) the impact of walk-in clinics on rates of non-emergent ED use. Special attention is paid to the role of insurance, including Medicaid. Overall, I find that urgent care center and retail clinics are unlikely to have as large an impact on these outcomes as is hoped. First, walk-in clinics are not located in areas where health care access is most limited. Second, the percentage of ED visits that could be shifted to walk-in clinics is limited by access to the clinics themselves. Finally, walk-in clinics do not appear to reduce non-emergent ED use. For walk-in clinics to improve meaningfully health care access or ED use, policy makers should invest in additional research about this industry.

The Impact of Urgent Care Centers and Retail Clinics on Health Care Access and Emergency Department Use

By

Lindsay Allen
M.A., University of Chicago, 2010
B.A., Johns Hopkins University, 2004

Advisor: Janet Cummings, Ph.D.
Advisor: Jason Hockenberry Ph.D.

A dissertation submitted to the Faculty of the
James T. Laney School of Graduate Studies of Emory University
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in Health Services Research and Health Policy
2017

Acknowledgements

I'm thankful to have a section of this dissertation in which I can publically acknowledge those to whom I've insufficiently expressed my gratitude during my time at Emory.

Jason Hockenberry, as my DGS, committee co-chair, fellow Philadelphian, and de facto therapist, has provided immeasurable (and fantastically frank) guidance for the past five years. He taught me that when it comes to work-life balance, life comes first. Thanks for the laughs when things got tough, for never doubting that I could do it, and above all, for never trying to "take the Philly out of the girl."

Janet Cummings, also in the role of committee co-chair, helped me become a better researcher than I ever could have been without her guidance. When I first got to Emory, her vision of what I could become made me believe it was all possible. Thank you for the weekly meetings, for always providing thoughtful feedback (even at 10:00 PM the night before a due date), and for instilling in me a deep appreciation for "pictures."

Steve Pitts was put on this earth to inspire others. His intellectual curiosity and enthusiasm for learning has convinced me that this research stuff is – more than anything – a heck of a lot of fun. Thanks for your real-world perspective, which has never been limited by real-world constraints.

None of us would get anything done around here without Kent Tolleson. Thank you for keeping us in line and keeping us laughing.

Guy David was my first mentor in this academic game. Not many people can do it all, but he does – and makes it look easy.

I might eventually stop acknowledging Ian McCarthy for preventing me from making a massively embarrassing error in my identification strategy, but that time has not come. Thanks for always knowing the answer – even if you deliver it in movie quotes.

David Jacho-Chavez and Kim Huynh, my "advisors-in-law," have raised me as one of their own and are mates for life. Thank you for all you've done for Alex and for me.

My mom, Deb Oberst, was the first PhD I ever knew, and is still my favorite. Thank you for everything. I love you.

Alex Lundberg is my favorite economist, and the world's best husband. I – quite literally – could not have done this without him. More importantly, I wouldn't have wanted to. You're the smartest guy I know, the Dre to my Slim Shady, and my coauthor for life. I.A.Y.

Table of Contents

CHAPTER 1: INTRODUCTION

The landscape of unscheduled, non-emergent health care is changing. Typically, when a patient becomes ill or injured, one imagines that he or she engages with the health care system in one of two common ways: a walk-in, same-day visit to a primary care physician or, when the condition is more serious, the emergency department (ED). Recently, however, the primary care has become less able to meet the demand for unscheduled care (1). In cases where seeing a primary care provider is not possible, patients turn to the health care site where they know they can always be seen, regardless of time of day or their ability to pay – the ED.

Though initially designed to provide care to only the most emergent, life-threatening cases, the ED has instead become a place where all levels of acuity are seen. Non-emergent ED visits are patient encounters that could have been safely delayed for up to 24 hours, or that could have been treated in a non-emergent care setting (2-4). Over half of the 136 million annual ED visits are estimated to be non-emergent (5). Pitts et al. find that ED physicians treat over a quarter of acute, non-emergent health care visits, despite only making up five percent of the physician workforce (6).

The negative consequences of non-emergent ED visits to the patient and the healthcare system are several fold, and include longer wait times, overcrowding, increased patient suffering, and higher costs to the patient and the healthcare system (4, 7, 8). Moving non-emergent patients out of the ED has become a primary target for health care policy makers. Further, several national organizations have identified the reduction of non-emergent ED use as a high priority research area (9-11).

The Walk-in Clinic Market

Against this backdrop, a new industry of walk-in clinics has evolved to meet rising demand for unscheduled, non-emergent care. Comprised of urgent care centers and retail clinics, the industry has been called a "disruptive innovation" in the field of health care, growing at a rate of 300-600 new sites annually (12, 13).

Urgent care centers are freestanding facilities that provide after-hours and weekend care for injuries or illnesses that are "not life or limb threatening," but are beyond the scope or availability of primary care facilities (14). Most commonly staffed by physicians, they offer a range of acute care, including immunizations, lab tests, x-rays, fracture and laceration treatment, and intravenous fluid delivery (14). Around 7,000 urgent care clinics are in operation today, delivering about 160 million annual patient visits (12, 14).

Retail clinics are ambulatory clinics that treat common, low-acuity conditions in retail settings, such as pharmacies, grocery stores, and other large retailers (e.g., Walmart) (15, 16). Retail clinics require no appointments, offer night and weekend hours, have predictable wait times, are located in convenient venues, accept most private health insurance plans, and post menus of fixed prices before care is delivered (17, 18). Typically staffed by nurse practitioners, retail clinics most frequently provide treatment for infections and pharyngitis, immunizations, and screening lab tests or blood pressure checks (16). From 2007 to 2010, the number of U.S. retail clinics grew fourfold to 1,200 (19). Since then, the number has risen to 1,900 clinics, which handle almost six million patient visits annually (19, 20).

Despite the rapid growth and popularity of these clinics, empirical research into their impact on health care access and utilization remains scarce. This dissertation provides important knowledge about the potential and realized impact of urgent care centers and retail clinics on health care access and ED use on these measures.

Conceptual Framework

To clarify the role that urgent care centers and retail clinics might play in the delivery of acute care, the following conceptual framework was developed. The framework shows several access-related factors, explained in more detail below, which must be in place for a visit to take place in a primary care physician's office. If one or more of the factors does not hold, the patient will need to seek care elsewhere. In my simplified framework, (and prior to the advent of the walk-in clinic industry) this "elsewhere" was the ED.

The framework builds on Penchansky's model of access, which has the benefit of considering of both supply- and demand- side factors that impact care-seeking behavior (21). Penchansky's framework delimited five "A's" of access: availability, accessibility, accommodation, affordability, and acceptability. I combine availability and accessibility into one domain, and add an additional dimension: appropriateness. I discuss each of these below, as they related to an episode of care seeking for acute, non-emergent condition.

Appropriateness

The first domain of access in my conceptual framework is "appropriateness." Notably, this domain does not appear in Penchansky's original model, but it is a necessary first step when considering a patient's decision to see care in a primary care provider's office versus an ED.

"Appropriateness" is often a fraught term in the health services research literature (22). Here, however, I use it exclusively to denote the clinical and resource match between the condition and the treatment. For example, it is not clinically appropriate for a patient with a known broken limb requiring X-rays and casting to seek care in a primary care physician's office, which typically will not have these resources. On the other hand, it is not clinically appropriate for a patient who needs a flu shot to seek care in the ED, since the ED offers resources far beyond those necessary to administer an immunization.

When a patient experiences a non-emergent injury or illness, he or she acts as the first line of triage, or as the primary diagnostician. That is, he or she must ascertain the severity of the condition, and have some idea of whether it can be treated at a primary care physician's office, or if it will need resources and/or skills beyond that of the typical primary care provider. Ignoring the presence of walk-in clinics for the moment, a patient who believes they require clinical resources beyond those offered in a primary care office will need to go to the ED for care.

Availability

Conditional on the injury or illness being appropriate for treatment in the primary care setting, the next requirement is availability of primary care providers, which I combine with the domain of accessibility of those providers. Penchansky defines *availability* as the adequacy of the supply of physicians or other health care providers. Within my framework, I use availability to mean the supply of practicing primary care providers in a given geographic area, including physicians, nurse practitioners, and physicians assistants. Penchansky defines care *accessibility* as the relationship between the location of providers and the location of clients, which encompasses the resources (including travel time and costs) to bridge the distance gap. As the availability of providers in an area expands, so also will the accessibility of those providers. If there are no primary care providers available/accessible to a patient in my conceptual framework, then he or she will turn to the ED for care, or perhaps forgo needed treatment.

Accommodation

Even if there is a supply of PCP providers in an area, they may not be able to accommodate demand. Penchansky defines *accommodation* as the way resources are organized to accept clients (including appointment systems, hours of operation, and walk-in availability). There are several ways in which primary care providers are unable to accommodate demand. First, their hours of operation might be too limited, especially given the increasing percentage of the population that is employed during typical operating hours. Second, primary care physicians might not have walk-in hours available for sick visits. Individuals with greater difficulty in accessing primary care physicians after hours have been shown to have more ED visits, compared to those who have an easier time reaching their provider (23).

Affordability

A crucial component of access to health care is its affordability, a term Penchansky uses to describe the prices of services, insurance that providers accept, and a client's insurance status and his or her ability to pay. Provider acceptance of Medicaid patients has become a particular problem, in part because of low reimbursement rates, long waiting times for reimbursement, and high levels of administrative work (24, 25). For those whose insurance is not accepted, or for those who do not have insurance, costs of care may be too high. In these instances, patients may turn to the ED, where expensive care becomes "inexpensive" to a patient who cannot afford to pay for care, since often these costs get absorbed by the hospital under the umbrella of charitable care.

Acceptability

Even after all of the above access conditions are met, patients may still prefer to seek care somewhere other than in a primary care provider's office. Penchansky defines *acceptability* as patients' attitudes about personal and practice characteristics. I use this term to introduce the idea of patient preferences. On the one hand, patients may prefer to visit a walk-in clinic due to perceptions that they offer shorter wait times and lower-cost treatment. On the other hand, patients may instead choose to visit the ED, perhaps because they are open around the clock, easily recognizable and accessible, or perceived as offering more sophisticated or better quality treatment (26).

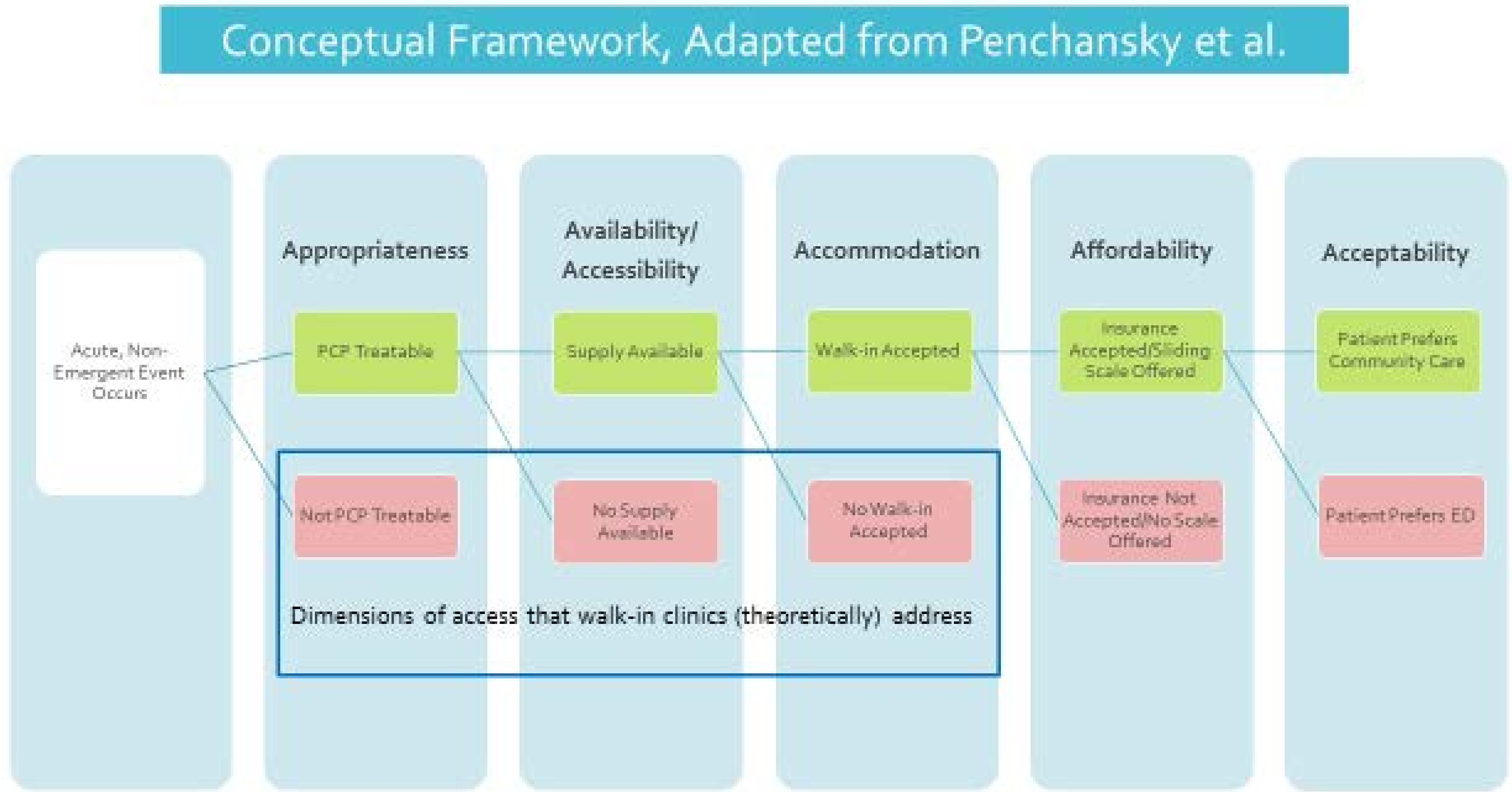
The Emerging Role of Walk-in Clinics

Urgent care centers, as they currently exist, have the potential to address several of the dimensions of access outlined above. First, they are able to treat conditions that are not clinically *appropriate* for the level of resources available in primary care physicians' offices, since they can provide x-rays, STI testing, laceration repair, and casting. Secondly, if primary care is needed, urgent care centers increase the *availability* of primary care supply in an area, since they can provide many of the same unscheduled services that primary care physicians can. Finally, urgent care centers are increasing the level of *accommodation* available for patients, since they offer weeknight/weekend hours and are based on a walk-in model.

Retail clinics do not offer care that is beyond the scope of the primary care physician's office, so they are less suited to address gaps in the appropriateness section of my conceptual framework. They are, however, a potential way to increase *availability* and *accommodation* for unscheduled care, similar in the ways urgent care centers are.

Despite their widespread use and potential for disrupting the acute care delivery market, empirical evidence about these clinics is notably lacking. In particular, there is a dearth of information about the types of communities in which these firms are located, the potential scope of their impact on the number of “unnecessary” ED visits, and their actual impact on ED usage rates. The following three chapters provide information to help answer these questions about this large, growing, and relatively unexamined sector of healthcare delivery.

Exhibit 1: Conceptual Framework



CHAPTER 2: ZIP CODE LEVEL FACTORS ASSOCIATED WITH URGENT CARE CENTER AND RETAIL CLINIC LOCATIONS

INTRODUCTION

Limited access to primary care and emergency department (ED) crowding are well-recognized public health problems (4, 7, 8, 27-29). With the Affordable Care Act's state Medicaid expansions and individual mandate, 16.4 million previously uninsured individuals have gained coverage in recent years (30). Research has shown that demand for acute health services, including those provided in the ED, rises when individuals begin receiving Medicaid or private insurance benefits, prompting concern about health care access and ED crowding moving forward (31-33).

Urgent care centers and retail clinics – collectively, "walk-in clinics" – offer a potential outlet for a substantial portion of rising demand for acute care. Given the provider shortages, long waiting periods for appointments, and low Medicaid acceptance rates found in the traditional primary care market, new enrollees in both Medicaid and private plans may turn to the ED for treatment of their non-emergent, acute conditions (23, 29, 34-39). In addition to increasing care costs, non-emergent ED visits place an additional burden on an already strained ED system (16, 40).

Walk-in clinics may improve healthcare access and, in turn, reduce non-emergent ED use in several ways. In the language of the conceptual framework set forth in the Introduction, walk-in clinics may increase access *availability* by increasing the supply of primary care delivered in areas that do not have many primary care physicians. Second, walk-in clinics might improve access *accommodation* for patients in areas that do have primary care physicians, but where the primary care physicians do not offer after hours care.

In addition to offering improved access for primary care services that might not otherwise be accessible, walk-in clinics – namely, urgent care centers – can provide care for conditions that are more clinically intensive. Urgent care centers offer a range of services beyond what is typically found in a primary care physician's office: lab tests, x-rays, fracture and laceration treatment, and intravenous fluid delivery (14). Turning back to the conceptual framework, urgent care centers thus have the ability to improve access to *appropriate* care in areas with sufficient primary care supply, but without the clinical ability to treat more resource-intensive conditions.

For these reasons, walk-in clinics are often touted as a "solution" to ED overcrowding and other healthcare access barriers (41, 42). However, despite their widespread use and potential for disrupting the acute care delivery market, empirical evidence about these clinics is notably lacking. In particular, there is a dearth of information about the types of communities in which these firms are located, an important consideration for policy-makers, administrators, and industry executives. To date, only one study has examined this question for urgent care centers, concluding that the centers are generally located in wealthier areas (43). The two known studies of retail clinics, conducted prior to the creation of the Affordable Care Act (ACA), found that retail clinics also tend to be located in areas of higher socioeconomic status (44, 45).

Since walk-in clinics are profit maximizers, it is unsurprising that they tend locate in areas with greater financial resources. However, by primarily locating in wealthier areas, walk-in clinics are unlikely to improve the availability, accommodation, and appropriateness dimensions of access where these barriers to care are greatest. Low-income communities are especially affected by provider shortages, and providers that are available in low-income areas often have limited hours during nights and weekends (23, 29, 35-38). Further, in areas with lower median incomes, rates of non-emergent ED visits are higher, and ED wait times and crowding are worsened (46-48).

In addition to these barriers, low-income areas are also more likely to be negatively affected by the *affordability* of health care. Given the payments models of most walk-in clinics, it is unlikely that they will improve financial access to unscheduled care. First, individuals living in poorer communities are more likely to be covered by Medicaid or uninsured (49, 50) . Unlike EDs, walk-in clinics are not obligated under the Emergency Medical Treatment and Active Labor Act (EMTALA) to treat all patients regardless of ability to pay (51). Further, walk-in clinics do not receive financial incentives to offset losses incurred by treating patients who cannot afford to pay for care. Therefore, most walk-in clinics only accept patients who are privately insured, or those who are uninsured and are able to pay for their care entirely out of pocket. Further, few urgent care centers accept Medicaid, perhaps due to its low payment rates and the high administrative burden associated with reimbursement (24, 25). At this time, only 7.6 percent of urgent care visits are for Medicaid recipients (52). Medicaid acceptance rates at retail clinics are higher (60%), but retail clinics make up a much smaller segment of the walk-in clinic market (53).

When assessing the ability of walk-in clinics to improve access to either primary or acute care, and reduce ED visits, understanding the factors associated with their location is critical. To improve the availability of primary care, walk-in clinics will need to locate in areas with low rates of primary care physicians. To reduce ED visits directly, by offering a substitute site of care for acute conditions, walk-in clinics would need to be located near an ED. Studies have shown that access to federally qualified health centers (FQHCs) near an ED is associated with sizable reductions in ED use among Medicaid-enrolled and uninsured children and adults (54-56). Walk-in clinics might be able to serve in the same capacity.

To have an impact at all, clinics will need to accept Medicaid or provide sliding scale payment assistance for the uninsured. This study offers an important precursor to this potential policy shift by providing information about how impactful walk-in clinics might be in improving access for low-income populations. This study expands on previous literature by diving more deeply into the relationship between area-level economic status and walk-in clinic locations. I provide important foundational knowledge about these centers in two key ways. First, I use a novel, comprehensive, national dataset to summarize the geographic distribution of both urgent care centers and retail clinics in the U.S. Next, I identify the area-level characteristics that are associated with urgent care center and retail clinic location, paying special attention to poverty-related traits, such as Medicaid concentration and the supply of providers, including primary care physicians, EDs, and FQHCs. Results are discussed from a policy perspective.

METHODS

Data

We used data from the largest, independently-verified directory of urgent care centers and retail clinics in the U.S (57). Over 90% of clinics in the U.S are indexed in this proprietary database (58). The 2013 edition of the database, which I used for this study, contains 6,655 urgent care centers and 1,639 retail clinics. These numbers are in line with numbers released from industry trade organization estimates *(59-61)*. Clinic addresses and hours of operation were verified and are kept up-to-date via a call center employed by the database's owner (58).

The unit of analysis for this study is the ZIP code tabulation area (ZCTA). Data on median household income, age, employment rates, insurance, race/ethnicity, land area, urban residents, and total population came from the U.S. Census American Community Survey (ACS, 2013) (62). The number of federally qualified health centers (FQHCs, 2010) and clinically active primary care physicians per ZCTA was downloaded from the Health Resources and Serves Administration website (63). Data on ED locations (2012-2013) were downloaded from the Centers for Medicare and Medicaid Services' Hospital Compare website (64).

Measures and Analysis

To capture the geographic distribution of walk-in clinics in the United States, I mapped them using ArcGIS software (version 10.2.2, ESRI, Redlands, CA). Then, using mean-comparison and proportions tests, I determined whether ZCTAs in which walk-in clinics are located differ systematically from those without walk-in clinics in terms of several area-level factors.

Next, I estimated multivariate logistic models to determine the adjusted probability that a ZCTA has a walk-in clinic. My outcome variables were whether the ZCTA had at least one urgent care center, and whether the ZCTA had at least one retail clinic. Since the small body of work conducted thus far in this area consistently demonstrate a positive association between area wealth and having clinics in the community, I begin my model progression with a measure of median household income. To allow for different effects across the distribution of household income, I divide this measure into quartiles.

To explore further the relationship of area-level income and potential access to walk-in clinics, I include a quartile measure of Medicaid concentration. Next, I examine the relationship between walk-in clinic and the supply of other providers by including an indicator for whether the ZCTA has an ED, another indicator for whether the ZCTA has at least one FQHC, and a continuous measure of the number of primary care physicians per 100 residents. Because EDs differ in the types of areas in which they locate, I include an interaction tern between ED location and household income. The inclusion of this term allows us to examine whether walk-in clinics tend to locate near or avoid safety net hospitals (i.e., those that tend to be located in poorer areas).

Because of their unique characteristics, I exclude rural ZCTAs from my analysis. All models control for ZCTA-level continuous measures of age, percent of full time employees, percent of residents that are living in an urban area, percent of non-Hispanic White individuals, total population, and land area in square miles. For ease of interpretation, these measures are all standardized. I conducted all analyses separately for urgent care centers and retail clinics. All regression models include state fixed effects, with standard errors clustered at the hospital service area (HSA) level. All analyses were conducted in Stata version 14.0 (StataCorp LP., College Station, TX).

Limitations

Potential limitations should be noted. First, my data capture clinic locations at a single time point, so the exact date of entry into or exit from the market is unknown. Thus, I do not capture characteristics of markets in which walk-in clinics may have opened and then closed, data that may also be useful to policy makers. Second, there are likely interrelationships between some of my variables (i.e., poverty, Medicaid rate, FQHC location). To ensure these relationships do not introduce collinearity into my models, I estimated variance inflation factors for the models, all of which were satisfactory.

RESULTS

Exhibit 1 shows the U.S. ZCTAs with at least one urgent care center (in blue) or retail clinic (in red). The number of clinics in the ZCTA is conveyed by the size of the dot. Because there are far fewer retail clinics than urgent care centers, dots for the retail clinics are overlaid on top of those for urgent care centers. Urgent care centers tend to cluster near major cities, and are present but less common in western states. Retail clinics also locate near cities, but are predominantly located in the eastern portion of the US. Almost no ZCTAs in the northwest US have a retail clinic.

Exhibit 2 displays unadjusted summary statistics about ZCTAs that do and do not have urgent care centers and retail clinics. About 17.5% of ZCTAs have at least one urgent care center, and 6.2 % have a retail clinic. Consistent with previous literature, walk-in clinics tend to locate in wealthier areas. Areas with clinics have lower rates of Medicaid enrollees. Both urgent care centers and retail clinics tend to locate near EDs. Urgent care centers are more likely to be located in areas with an FQHC, while retail clinics are less likely to be located in areas with one.

Urgent Care Centers

Findings from the multivariate logistic regression models (**Exhibit 3**) confirm the bivariate results while clarifying the respective roles of area-level poverty, insurance status, and provider supply. In my first model, I find that ZCTAs in the highest quartile of median household income are about 4 percentage points ($p < 0.001$) more likely to have an urgent care center in the ZCTA, after adjusting for confounders.

Having confirmed that my findings thus far are consistent with previous research, I turn next to my models that include measures of insurance status and healthcare supply.

Once I adjust for Medicaid concentration (Model 2), the association between household income and having an urgent care centers is weakened. ZCTAs in the areas with the heaviest Medicaid concentrations are 2.6 percentage points ($p < 0.01$) less likely to have an urgent care center.

However, after adjustment for supply-related factors, this effect disappears. Urgent care centers are 5.8 percentage points ($p < 0.001$) more likely to locate in ZCTAs with an ED. Further, ZCTAs with higher rates of providers per resident (versus those with the lowest quartile of providers) are more likely to have urgent care centers, with those in the top quartile almost 14 percentage points ($p < 0.001$) more likely to do so. After controlling for supply factors, the relationship between median household income the probability of an urgent care center locating in a ZCTA is strengthened. In my final model, I test for an interaction effect between area-level income and ED location, and find that urgent care centers are 3.2 ($p < 0.001$) and 3.4 ($p < 0.001$) percentage points less likely to locate in ZCTAs with an ED and which are in the 3^{rd} and 4^{th} quartiles (respectively) of median household income (versus the first quartile).

Retail Clinics

Similar to my findings for urgent care centers, I find that ZCTAs in the second, third, and fourth highest quartiles of median household income are more likely to have a retail clinic, with those in the top quartile 5.5 percentage points more likely ($p < 0.001$) to do so. After controlling for Medicaid concentration, this effect is reduced, and I find that ZCTAs in the highest (versus lowest) quartiles of Medicaid concentration are 3.2 percentage points ($p < 0.001$) less likely to have a retail clinic. Unlike urgent care centers, these findings remain very stable after controlling for ED and primary care supply. Still, ZCTAs with the highest (versus lowest) numbers of primary care physicians per 100 residents are 4.2 percentage points ($p < 0.001$) more likely to have a retail clinic.

DISCUSSION

Walk-in clinics have been touted as a way to address rising demand for acute healthcare services, an especially important policy target in light of the national insurance changes and concern about non-emergent ED use. Limited evidence indicates that walk-in clinics are located in wealthier areas. However, the complex relationships of factors underlying the association between area income and walk-in clinic locations have not been explored until now.

Both types of WIC are more likely to locate in areas with higher median household income, which is in line with previous research (43-45). However, a stronger predictor of clinic location is the supply of other providers, including EDs (in the case of urgent care only) and primary care physicians. My finding that provider supply ended up being a more prominent indicator than area-level Medicaid concentration of walk-in clinic location warrants additional discussion.

A priori, I were unsure of the direction of influence of the ED component of provider supply on walk-in clinic location. I hypothesized that walk-in clinics would be less likely to locate in low-income areas, with heavy Medicaid concentration, since clinics preferentially treat those with private insurance or those who can afford to pay for care out of pocket. Results from Model 2 confirm this hypothesis. When adding in measures of provider supply, however, I considered competing hypotheses. I expected that walk-in clinics would be more likely to locate near EDs, especially if they are aiming to act as substitutes for care delivered in the ED, but considered that this association might moderated by the safety-net status of the hospital.

EDs in safety net hospitals that treat a higher proportion of low-income, uninsured, or Medicaid-enrolled patients (65). Thus, they are more likely to be located in areas with higher concentrations of these groups. Safety net hospitals account for about a quarter of all hospitals in the US (66). The relationship between safety-net status and walk-in clinic location, however, is less straightforward (see **Exhibit 5**). On the one hand, walk-in clinics may prefer to avoid safety net hospitals, since the clinics do not tend to treat safety-net patients. On the other hand, walk-in clinics might prefer to locate near safety-net hospitals, since these are the hospitals most affected by ED crowding and might provide clinics with a higher volume of patients needing an ED substitute. Since urgent care centers offer the clinical resources most similar to the ED (compared to resources available in a retail clinic, which are limited to those found in a primary care physician's office), I would expect to find this relationship only for urgent care centers.

The final model in my paper provides information about the directionality of the relationship between safety-net status and walk-in clinic location. Urgent care centers are *less* likely to locate in ZCTAs that have an ED and are in the highest two quartiles (versus lowest) of median household income. This suggests that they may be preferentially locating near safety-net EDs, conditional on locating near an ED at all. Among areas without an ED, all walk-in clinics (including urgent care centers and retail clinics) still prefer to locate in wealthier areas, as evidenced by the relationship between median household income and walk-in clinic locations growing stronger after including my interaction effect. Taken together, these results suggest that urgent care centers aim to increase their patient volumes in two ways: by locating where patients or their providers can readily pay for care, or by capturing overflow ED patients in poorer areas where ED crowding is worse. Retail clinics, however, are less likely to treat patients looking for an ED substitute, and tend only to consider the income level of the communities in which they are located.

By locating in safety net areas, urgent care centers might be a viable way to provide acute (yet non-emergent) services for those patients needing services beyond the scope of primary care. This would require, however, that they begin accepting Medicaid, or offering sliding scale fee schedules to uninsured patients. Policy makers may consider providing incentives for this model, similar to those used in the FQHC program (67). Under this mechanism, only walk-in clinics that operate in underserved areas with heavy Medicaid concentrations would be offered reimbursement incentives.

If walk-in clinics begin offering Medicaid/sliding scale fee structures, it is likely that they would reduce non-emergent ED visits in a manner similar to that of FQHCs. Since my results demonstrate that walk-in clinics are not locating near FQHCs, this might be a reasonable way to expand the geographic coverage of the safety net.

Both urgent care centers and retail clinics locate in areas with higher densities of primary care physicians. At first, it may seem counterintuitive for clinics to locate near providers that are presumed to be their competitors. However, Hotelling's model of horizontal differentiation provides some illumination around why this may be the case (68). Walk-in clinics can provide a substitute site of primary care (e.g., for minor sick visits, immunizations). If one considers a "Main Street," upon which an walk-in clinic and primary care provider are located at opposite ends (left and right, respectively), and both offer sick visits during the day, patients from the center to the left of the street will visit the urgent care center to minimize their travel costs, while those on the right half of the street will visit the primary care physician's office. If the walk-in clinic wanted to attract more of the market, it would locate its office closer to the primary care physician's office, thereby capturing all those patients who live to the left of the new location, plus half of those who live in the now shortened distance between the new office and the primary care office. The primary care physician's office would respond by moving closer to the walk-in clinic. Following this train of thought through to equilibrium, both the walk-in clinic and the primary care physician's office would end up locating directly next to each other.

This result partly explains why urgent care centers would locate near primary care providers. Since there are already many providers in place in these locations, my results suggest that walk-in clinics are not likely to improve *availability* of care where there are physician shortages. Another reason is that when primary care physicians do have walk-in appointments available or they are closed for the day, urgent care centers (and retail clinics) will automatically capture those visits. Based on my results, it appears that walk-in clinics are poised to improve *accommodation* for patients needing primary care.

Overall, I find that walk in clinics preferentially locate in wealthier areas, and that this finding remains after controlling for insurance status and physician supply. Urgent care centers locate near safety-net hospitals, suggesting that they might be a viable outlet for reducing ED demand, conditional on changes to their payment models. Retail clinics do not show the same preference for safety-net locations. Both types of walk-in clinics locate near primary care providers, suggesting that they are not poised to improve access issues related to primary care shortages.

Exhibit 1: Map of Urgent Care Location and Retail Clinics in United States

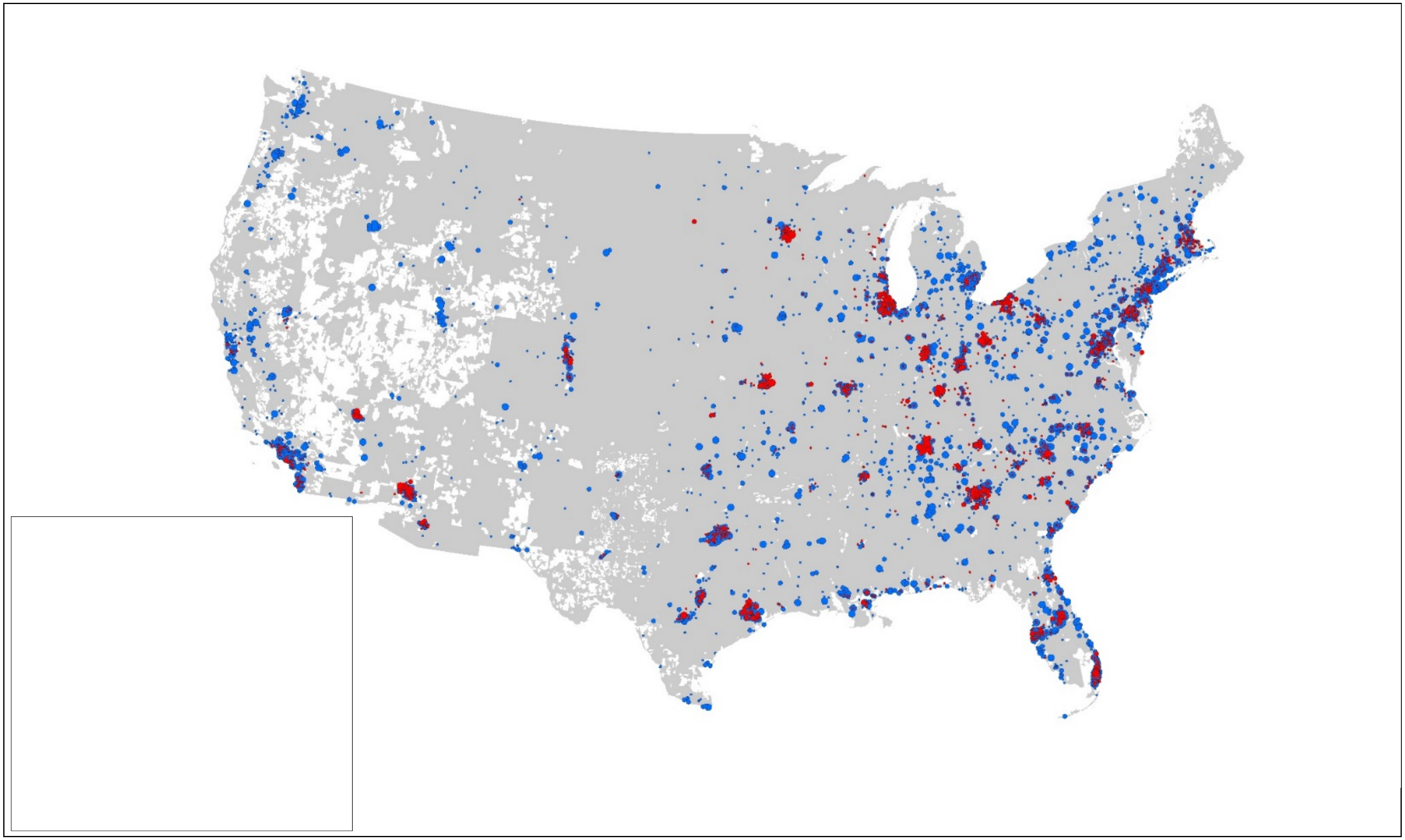


Exhibit 2: Characteristics of Non-Rural ZCTAs with and without Urgent Care Centers and Retail Clinics

	Without Urgent Care Center	With Urgent Care Center	Without Retail Clinic	With Retail Clinic
Median Household Income (mean)	$53,628	$60,284***	$54,077	$67,994***
Medicaid enrollees (%)	16.8	15.0***	16.8	11.7***
ED in ZCTA (%)	8.6	34.9***	12.2	28.5***
FQHC in ZCTA (%)	24.2	28.0***	23.8	19.9***
PCPs/100 Residents (mean)	0.3	0.2***	0.3	0.2***
Age (mean)	41.4	38.1***	40.9	38.3***
Employed Full Time (%)	57.0	58.2***	57.1	60.7***
Urban Residents (%)	37.6	88.5***	44.2	91.6***
Non-Hispanic White (%)	78.9	67.0***	77.2	70.8***
Total Population (mean)	8,266	29,942***	10,855	32,731***
Land Area (sq. mi.)	69.4	51.7***	61.2	34.3***
Observations (ZCTAs), N, (%)	20,204 (82.6%)	4,270 (17.5%)	21,176 (93.8%)	1,408 (6.2%)

Notes: The categories of ZCTAs with an urgent care center and ZCTAs with a retail clinic are not mutually exclusive. Stars represent statistical differences between ZCTAs with versus without the care site of interest. *$p \leq 0.05$, **$p \leq 0.01$, ***

Exhibit 3: Marginal Effect of ZCTA-Level Characteristics on Probability of Having an Urgent Care Clinic in Non-Rural ZCTA

	1	2	3	4
1^{st} Quart. of Median Household Income (mean=$30,705)	Ref	Ref	Ref	Ref
2^{nd} Quart. of Median Household Income (mean=$43,064)	0.016^{*}	0.011	0.017^{*}	0.026^{**}
3^{rd} Quart. of Median Household Income (mean=$53,659)	0.033^{***}	0.024^{**}	0.039^{***}	0.051^{***}
4^{th} Quart. of Median Household Income (mean=$81,841)	0.038^{***}	0.024^{*}	0.047^{***}	0.058^{***}
1^{st} Quart. of % Medicaid (mean=5.6)		Ref	Ref	Ref
2^{nd} Quart. of % Medicaid (mean=12.4)		-0.007	-0.001	-0.001
3^{rd} Quart. of % Medicaid (mean=18.8)		-0.009	0.000	0.001
4^{th} Quart. of % Medicaid (mean=31.1)		-0.026^{**}	-0.014	-0.015
ED in ZCTA			0.058^{***}	0.081^{***}
1^{st} Quart. of Median Household Income & ED in ZCTA				Ref
2^{nd} Quart. of Median Household Income & ED in ZCTA				-0.021
3^{rd} Quart. of Median Household Income & ED in ZCTA				-0.034^{*}
4^{th} Quart. of Median Household Income & ED in ZCTA				-0.032^{*}
FQHC in ZCTA			0.003	0.003
1^{st} Quart. of PCPs/100 Residents (mean=0.00)			Ref	Ref
2^{nd} Quart. of PCPs/100 Residents (mean=0.05)			0.087^{***}	0.087^{***}
3^{rd} Quart. of PCPs/100 Residents (mean=0.14)			0.132^{***}	0.132^{***}
4^{th} Quart. of PCPs/100 Residents (mean=0.94)			0.138^{***}	0.138^{***}
Median Age	-0.001	-0.001	-0.004	-0.003
% Employed Full Time	0.006	0.005	0.007^{*}	0.007^{*}
% Urban Residents	0.138^{***}	0.136^{***}	0.120^{***}	0.120^{***}
% Non-Hispanic White	0.040^{***}	0.037^{***}	0.030^{***}	0.029^{***}
Total Population	0.084^{***}	0.084^{***}	0.075^{***}	0.075^{***}
Land Area (sq. mi.)	0.012^{***}	0.012^{***}	0.004	0.003
State Indicators	Yes	Yes	Yes	Yes
Intercept	0.150	0.167	0.132	0.124
Observations	24,474	24,474	24,474	24,474

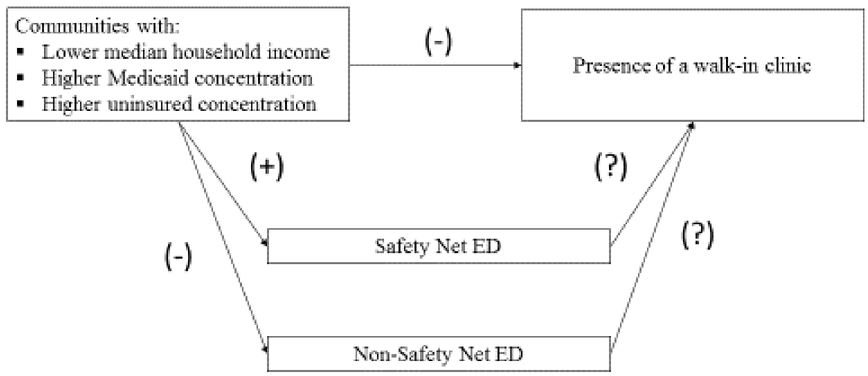
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Exhibit 4: Marginal Effect of ZCTA-Level Characteristics on Probability of Having a Retail Clinic in Non-Rural ZCTA

	1	2	3	4
1st Quart. of Median Household Income (mean=$30,705)	Ref	Ref	Ref	Ref
2nd Quart. of Median Household Income (mean=$43,064)	0.019**	0.012	0.012*	0.011
3rd Quart. of Median Household Income (mean=$53,659)	0.030***	0.017**	0.018**	0.018*
4th Quart. of Median Household Income (mean=$81,841)	0.055***	0.032***	0.034***	0.037***
1st Quart. of % Medicaid (mean=5.6)		Ref	Ref	Ref
2nd Quart. of % Medicaid (mean=12.4)		-0.012**	-0.011**	-0.010**
3rd Quart. of % Medicaid (mean=18.8)		-0.020***	-0.018***	-0.018***
4th Quart. of % Medicaid (mean=31.1)		-0.044***	-0.041***	-0.041***
ED in ZCTA			0.006	0.010
1st Quart. of Median Household Income & ED in ZCTA				Ref
2nd Quart. of Median Household Income & ED in ZCTA				0.002
3rd Quart. of Median Household Income & ED in ZCTA				0.002
4th Quart. of Median Household Income & ED in ZCTA				-0.011
FQHC in ZCTA			-0.001	-0.002
1st Quart. of PCPs/100 Residents (mean=0.00)			Ref	Ref
2nd Quart. of PCPs/100 Residents (mean=0.05)			0.037***	0.037***
3rd Quart. of PCPs/100 Residents (mean=0.14)			0.042***	0.041***
4th Quart. of PCPs/100 Residents (mean=0.94)			0.042***	0.042***
Median Age	-0.003	-0.003	-0.003	-0.003
% Employed Full Time	0.014***	0.012***	0.013***	0.013***
% Urban Residents	0.074***	0.070***	0.067***	0.067***
% Non-Hispanic White	0.023***	0.017***	0.017***	0.016***
Total Population	0.035***	0.035***	0.034***	0.034
Land Area (sq. mi.)	-0.001	-0.001	-0.003	-0.003
State Indicators	Yes	Yes	Yes	Yes
Intercept	0.03	0.06	0.05	0.05
Observations	22,584	22,584	22,584	22,584

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Exhibit 5: Direction of Omitted Variable Bias



CHAPTER 3: HOW MANY NON-EMERGENT EMERGENCY DEPARTMENT VISITS COULD BE MANAGED AT WALK-IN CLINICS?

INTRODUCTION

Despite the hope that walk-in clinics will reduce unscheduled, non-emergent visits to the ED, little is known about the percentage of ED visits that could potentially be shifted to these alternative care sites. In the only and oft-cited study conducted on this topic, Weinick et al. estimated that up to 27.1 percent of ED visits could take place at a walk-in clinic (4).

The authors used claims data from urgent care centers and retail clinics to determine the top ICD-9 codes treated in the respective care sites. Then, they applied a well-known algorithm to ED visits captured in the 2006 National Hospital Ambulatory Medical Care Survey (NHAMCS), for each of the ICD-9 codes they identified. The algorithm determines the percentage of ED visits that could be treated outside of the ED (69). Specifically, the authors estimate that 13.7 percent of ED visits could have occurred at a retail clinic and another 13.4 percent at urgent care centers. When they limit their analysis to only those visits that occurred during hypothetical hours of operation for the clinics – (9 AM to 9 PM, Monday through Friday; 9 AM to 5 PM Saturday; 10 AM to 5 PM Sunday), these percentages fall to 7.9 and 8.9 percent, respectively.

The Weinick et al. paper represents an important first step toward understanding the potential impact of the walk-in clinic industry. I aim to build upon the authors' contribution in several ways. First, I calculate estimates that require the walk-in clinics to be – in the language of my previously described conceptual framework – geographically *available* and financially *affordable* to patients. These are notable barriers to patients receiving care in a walk-in clinic, and it is essential to account for them when estimating the percentage of ED visits that could be diverted to walk-in clinics.

From the previous chapter and other studies, I know that certain areas are more likely to have walk-in clinics than others are (43-45). In my analysis, I only consider ED visits as transferrable to a walk-in clinic if there is a walk-in clinic nearby. Additionally, few walk-in clinics accept Medicaid, and they are not required by federal law to treat patients who cannot afford to pay for care (51). Since the percentages of visits that can therefore be treated outside the ED will differ by insurance status, I subset the ED visits by payer.

We further build on the previous study by using more recent ED data (2012, versus 2006), real-world hours of operation for the clinics, and a recently updated algorithm for classifying ED visits.

METHODS

Data

My data on walk-in availability come from a database, previously unused in the literature, which contains the names, addresses, and hours of operations for almost all of the urgent care centers and retail clinics in the U.S. The dataset comes from an online searchable database that allows patients to view the urgent care centers within a certain distance of their ZIP code. The dataset represents the most comprehensive, independently-verified directory of walk-in clinics in the country, with over 90% of clinics indexed (57, 58). The 2013 edition of the database, which I used for this study, contains 6,655 urgent care centers and 1,625 retail clinics, which are in line with numbers released from industry trade organization estimates (60, 61). Clinic addresses and hours are regularly updated via a call center (58).

Emergency department visit data come from the Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD), which is the largest collection of all-payer, encounter level ED visit data in the U.S. For states choosing to participate in the HCUP, the data contain information on every ED visit that did not result in a hospital admission (70). The data include patient and visit characteristics, such as patient ZIP code, payer status (i.e., Medicaid, Medicare, private, uninsured), discharge code (ICD-9), and hour (not minutes) of ED visit. Six states (Arizona, Florida, Nebraska, New Jersey, New York, and Rhode Island) included all of the variables necessary to run my analysis. I use data from the year 2012, the most recent year for which the variables are available.

To determine which visits are non-emergent, I use a recently updated version of the NYU ED visit algorithm, which classifies the urgency, preventability, and optimal care site of ED visits (71-73). For all discharge (ICD-9) codes available in the SEDD, the algorithm assigns a probability that the visit fell into one of four categories: 1) not acute; 2) acute, primary care treatable; 3) emergent, ED care needed, but preventable/avoidable; 4) emergent, ED care needed, not preventable/avoidable (71). The probability is spread across the four categories, reflecting the variability in urgency within each code. One concern with using the original (non-updated) version of algorithm is that it was written in 1999, using ICD9 codes that were available at that time. Since then, new ICD-9 codes have been added to the coding dictionary, but the algorithm used in the Weinick et al paper had not been similarly updated. I use a recently (2016) updated version of the algorithm for improved measurement (73).

Following Weinick et al., I consider conditions that are classified by the algorithm as either not acute, or acute but treatable outside the ED (categories 1 and 2, from above) to be treatable in a walk-in clinic. In contrast to Weinick et al, I do not limit my analyses to only those ICD-9 codes that are most commonly treated in walk-in clinics. Rather, I assume that walk-in clinics have the clinical resources to treat all conditions falling into categories 1 and 2, since the original NYU algorithm creators defined these conditions to be "primary care treatable."

When the algorithm was created, visits due to injury were assigned to a carved-out injury category with a probability of 100%. Therefore, I do not have information on the urgency of visits due to injury. Since the urgent care model is designed to treat minor injuries (sprains, minor fractures, etc.), it is unreasonable to exclude all visits due to injury from my analysis. In their paper, Weinick et al. assume a varying percentage (25-50%) of injuries to be treated out outside the ED. According to the CDC, 90% of injury visits in the ED are "mild" (as opposed to moderate or severe), and almost all of these are treated and released. Therefore, I assume the same percentage of the injury visits can be assigned to categories 1 or 2 (rather than injury) with a probability of 100% (74).

Analytic Strategy

To determine the availability of walk-in clinics, I calculate the number of urgent care centers and/or retail clinics that are available in a patient's ZIP code, for each ED visit. I then define a time window for which these clinics are open, by using the first opening time of any clinic in the ZIP code and the last closing time of any clinic in the ZIP code

For every ED visit record in my six states, I created an indicator for whether there was at least one walk-in clinic in the patient's ZIP code *and* the visit occurred within the time window that the clinic(s) were open. Patients who had no nearby clinics, or patients whose visit occurred when local clinics were closed, received a zero for this indicator. To determine the percentage of SEDD visits that could have been treated outside of the ED, I apply the NYU ED algorithm to the census of visits that have a value of one for the indicator. My approach improves upon that of Weinick et al., as those authors used hypothetical hours of operation, and I am able to use actual hours of operation for the clinics in my sample. Unlike Weinick et al., however, I am unable to include weekend visits in my analysis. My ED data only note whether a visit occurred on a weekday or a weekend, not the specific day of the week. In my dataset, walk-in clinic hours were very consistent from Monday through Friday, but changed markedly from the workweek to Saturday and then again from Saturday to Sunday. For this reason, I limit my analysis to weekday visits.

In the next step, my approach necessarily diverges from that of Weinick et al. Because the previous authors limited their analysis to a certain number of ICD-9 codes, they are able to calculate their estimates by using the proportion of visits that the NYU algorithm classifies as falling into categories 1 or 2. **Exhibit 1** helps illustrate how this works. When a patient visits the ED for strep throat, that ICD-9 code will be listed in her visit record. According to the algorithm, 2/3 (66%) of visits for strep throat are not acute, and almost a third (28%) are considered acute, but treatable outside the ED. Only in rare cases (6% of the time) does strep throat need ED care. To calculate their results, Weinick et al. collected all ED records for the top ICD-9 codes (e.g., strep throat) treated in an ED, and calculated the percentage of them that fell into categories 1 or 2 (e.g., 66% +28% = 94%, for strep throat).

Because I am using the universe of *all* ED visits (regardless of ICD-9 code), I must establish a probability threshold above which the visit will be categorized as category 1 or 2. I created three indicators, using varying levels of conservatism. In my first analysis, I require that visits must fall into categories 1 or 2 with a probability of 100%. That is, for each ED visit record, I sum the algorithm probability across categories 1 and 2, and if this number adds up to 100%, the ED visit is classified as treatable outside the ED. This is the most conservative estimate, as it requires that the visit undoubtedly could be treated in a walk-in clinic. The next two thresholds, 75% and 50%, are more lenient. For each threshold, I further divide the visits by payer type: Medicaid, Privately Insured, or Self Pay/Uninsured.

We limit my sample to non-elderly adults (aged 18-64).

RESULTS

Of the 4,919 ZIP codes represented in my ED visit data, 15.8 percent (n=778) had at least one urgent care clinic. Of those ZIP codes that did not have an urgent care clinic, 2.9 percent (n=122) had a retail clinic; 4,019 ZIP codes had no walk-in clinics at all. The mean earliest opening time across all ZIP codes was 8:48 AM, and the mean latest closing time was 8:09 PM.

For the six states in this analysis, there were 6,510,448 ED visits for non-elderly, non-Medicare enrolled adult patients in the year 2012. The mean probability distribution of the NYU algorithm across all visits is as follows: 27.7% category 1; 46.7 % category 2 (after incorporating non-emergent injuries into this category; 6.6% category 3; and 16.7% category 4.

Table 1 presents the percentage of visits that occurred for patients that had least one walk-in clinic in their home ZIP code, while at least one of the clinics was open, for the different thresholds I examined. For the most conservative estimate (the 100 percent threshold), 8.6 percent of ED visits could be treated at a walk-in clinic, given availability and hours of operation. However, once insurance status is taken into account, only 3.4 percent of visits were by privately insured individuals, who are most likely to be able to be treated in a walk-in clinic. The remaining visits (2.4 percent by Medicaid patients and 2.8 percent by the uninsured) are less likely to be see in a walk-in clinic. Using the least conservative estimate, the 50 percent threshold, I find that 22.4 percent of ED visits could be treated in a walk-in clinic, but only 8.3 percent of total visits are by the privately insured.

DISCUSSION

Urgent care centers and retail clinic are thought to reduce ED visits by offering substitute sites of care for acute, non-emergent care. Despite this assumption, little is known about the proportion of ED visits that might feasibly be shifted to these walk-in clinics. To date, only one paper has examined this question. My study builds upon this prior paper's contribution by incorporating geographic availability, actual hours of operation data, and patient insurance status into my estimates.

When examining acute, non-emergent ED visits, I find that between 8.6 (most conservative) and 22.4 (least conservative) percent could take place at a walk-in clinic, given real-world availability of walk-in clinics and their opening times. Though the many differences between my approach and that of Weinick et al., prohibit direct comparison between my estimates and theirs, I note that their estimate of 16.8 percent (when hours are hypothetically restricted) falls right in the middle of my range.

When taking payer status into account, the percentage of ED visits that are treatable in walk-in clinics is notably reduced. Only a small portion of visits are by privately insured, the population mostly likely to be treated in a walk-in clinic, compared to those that are insured by Medicaid or uninsured. Considering that 32 percent of all ED visits are by Medicaid enrollees, my results demonstrate that the impact of walk-in clinics will necessarily be capped unless they begin accepting Medicaid (5). This is a potentially desirable policy target, especially in light of recent Medicaid expansions, which are known to increase ED use (32) .

There are several limitations to this study. First, my unit of observation, the ZIP code, can vary in size and it is possible that walk-in clinics are too far from the hospital to serve as reasonable substitutes. However, I think this limitation is balanced by the fact likely many residents in the ZIP code for whom walk-in clinics are *closer* than the ED is. Secondly, I group retail clinics and urgent care centers together in calculating the number of walk-in clinics in an HSA. Retail clinics offer fewer services and are unable to treat as many conditions as urgent care centers are, so this would bias my results away from the null. However, since under 3 percent of my sample of ZIP codes have a retail clinic alone, I do not expect this to dramatically bias my results.

Limitations notwithstanding, this study provides the first estimates of the percentage of ED visits that could take place at walk-in clinics, while allowing for the real-world geographic availability and hours of operation of the clinics, and the insurance status of patients. Taken together with the early and important work by Weinick et al., my estimates provide important information for policy makers interested in the utility of these clinics for reducing non-emergent ED visits.

Exhibit 1: Sample NYU ED Algorithm Probabilities

ICD-9 Code	**Category 1:** Not Acute	Category 2: Acute, but Treatable Outside ED	Category 3: ED Care Needed, Avoidable	Category 4: ED Care Needed, Not Avoidable
Streptococcal sore throat	66%	28%	6%	0%
Meningitis	0%	0%	0%	100%

Exhibit 2: Percentage of ED Visits Treatable at Walk-In Clinics, by Payer Status

Threshold	*100 Percent*		*75 Percent*		*50 Percent*	
	N	%	N	%	N	%
Total	**558,899**	**8.6**	**1,115,660**	**17.1**	**1,459,780**	**22.4**
Medicaid	154,953	2.4	335,372	5.2	440,664	6.8
Uninsured	182,233	2.8	365,583	5.6	475,844	7.3
Privately Insured	221,713	3.4	414,705	6.4	543,272	8.3

CHAPTER 4: THE IMPACT OF URGENT CARE CENTERS AND RETAIL CLINICS ON NON-EMERGENT EMERGENCY DEPARTMENT USE

INTRODUCTION

Reducing non-emergent emergency department (ED) use is an important health policy goal. Treatment for non-emergent conditions in the ED is more costly than that delivered in other care settings, without any concomitant rise in quality (4, 7, 8). Research indicates that up to half of the 136 million U.S. ED visits per year could be treated at a care site other than the ED (2-5). A major barrier to treating these visits in a more clinically appropriate setting is limited access to acute care in the community due to physician shortages, long wait times for appointments, and/or a lack of after-hours availability (23, 29, 35-38).

Urgent care centers and retail clinics offer an alternative care site for the treatment of unscheduled, acute, non-emergent conditions (16, 75). Care delivered in walk-in clinics is less costly, more efficient, and of similar or better quality than that delivered in the ED (4, 7, 8, 75).

Despite the potential impact of urgent care centers on healthcare access, cost, and efficiency, empirical research on their causal effect is conspicuously lacking. Several empirical challenges account for this gap in the literature. First, and perhaps surprisingly, given its size, the urgent care industry remains largely unregulated. To date, only Arizona and New Hampshire require urgent care centers to be licensed beyond what is required for any medical clinic (76, 77). Two states, Illinois and Delaware, regulate the use of the term "urgent care," but not the facilities themselves (12). Other than these exceptions, clinics can choose to label themselves as urgent care centers, or as any one of a number of related designations including "immediate care," "convenient care", and "walk-in care."

The Urgent Care Association of America (UCAOA) delineates urgent care centers from other delivery models based on whether a facility 1) is open on weekday evening and weekends, 2) does not require an appointment, 3) has an x-ray on site, and 4) has the ability to perform suturing and casting procedures (12). Nonetheless, services offered in an urgent care center can vary widely, from primary care to less common offerings, such as occupational medicine, weight loss, and physical therapy services (12).

This variability in regulation and designations makes it difficult collect good data on the urgent care market, especially concerning when urgent care centers enter and/or exit geographic markets. This makes identification of their impact difficult using conventional yearly panel data approaches. Another data-related challenge is that insurance claims – often used in health care research – do not always identify which services were offered under the auspices of urgent care. Though there are some after-hours and other urgent care-specific insurance codes, which need to be pre-negotiated with an insurer, most urgent care billing relies on the evaluation and management codes also used in the primary care setting (12). Despite serving an extremely large number of patients, urgent care visits are also not captured in any large-scale national surveys, unlike primary care and ED visits, which are routinely recorded by the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey, respectively. Tracking the retail clinic industry is more straightforward, since the clinics must definitionally open in an established retail setting. However, retail clinics comprise only a small portion of the walk-in clinic market.

A second empirical challenge is that a patient's decision to choose the ED versus a walk-in clinic is likely an endogenous one, partly determined by patient preferences that are unobservable. Adding to the problem of data scarcity, unobservable patient preferences make it difficult to establish the causal impact of walk-in clinics on non-emergent ED use. Given the choice between receiving treatment at a walk-in clinic and an ED for a given, non-emergent acute condition, a patient may choose one over the other for reasons unknowable to a researcher in the limited data available. On the one hand, patients may prefer to visit a walk-in clinic due to perceptions that urgent care centers offer shorter wait times and lower-cost treatment. On the other hand, patients may instead choose to visit the ED, perhaps because they are open around the clock, easily recognizable and accessible, or perceived as offering more sophisticated or better quality treatment.

An additional dimension of patient preferences has to do with one's ability to act as a first-line diagnostician of their own condition. Before deciding to go to a walk-in clinic instead of an ED, a patient needs to have some idea of the seriousness of their condition, along with an idea of what clinical resources will be needed to treat it. Some patients may be unwilling or unable to conduct this initial triage process, while others may have more experience or education that allows them to select their optimal care site.

Despite these challenges, a small body of work has begun examining the influence of the walk-in clinic market. Weinick et al. estimate that about 27 percent of all ED visits could take place at a urgent care center or retail clinics instead (4). A working paper by Friedman et al. indicates that twelve urgent care centers reduced non-emergent ED visits in two Delaware hospitals (78, 79). In another working paper, Hollingsworth finds that Florida retail clinics (which share some similarities with urgent care centers, including walk-in availability and later hours of operation) decrease the number of ED visits for bronchitis and upper respiratory infection (80). Yet, no published paper has empirically evaluated the impact of walk-in clinics on non-emergent ED use.

In this paper, I provide the first multistate empirical examination of the causal impact of urgent care centers and retail clinics on non-emergent ED use. I address the challenge of unobserved patient preferences with a difference-in-differences strategy that exploits daily closure times of clinics. Specifically, I compare pre- and post-daily closure rates of non-emergent ED use in ZIP codes with a walk-in clinic to those in ZIP codes without a clinic, at the same time of day. Rather than relying on insurance claims data, I use ED visit records to measure health care utilization. To determine which ED visits are non-emergent, I use a recently updated version of the New York University (NYU) ED algorithm (73). I focus on treatment effects for those with private insurance, since these are the most likely to be impacted by the actions of urgent care facilities. I use the uninsured and Medicaid populations as placebo tests for my analysis, since walk-in clinics do not typically treat many uninsured or Medicaid individuals (**Exhibit 1**).

My results reveal that daily closure of walk-in clinics leads to a 0.01 percentage point increase in the rate of non-emergent visits immediately following closure. I conclude that walk-in clinics reduce non-emergent ED use by only an extremely small amount during the hours they are open, for individuals with private insurance. I find no effect of walk-in clinics on non-emergent ED use for uninsured individuals.

METHODS

My difference-in-differences strategy hinges on daily closure times of walk-in clinics, which I use as a proxy for market exit. In markets with a walk-in clinic, demand for acute, non-emergent care is spread across a larger care supply (i.e., the walk-in clinic and the ED), as long as the walk-in clinic is open. Once this center closes, the latent demand for acute services is spread over a smaller number of suppliers. I would expect this to manifest as an increase in non-emergent ED visit rate immediately after urgent care closure.

My empirical approach obviates the need for year-to-year panel data on walk-in clinics, and addresses any endogeneity from unobserved patient preferences. For ZIP codes with a walk-in clinic, I compare rates of non-emergent ED use immediately before and immediately after walk-in clinics close for the evening. If walk-in clinics are effective in drawing non-emergent visits from EDs during the hours they are open, I would expect an increase in non-emergent ED visits when those facilities close for the evening. I would not expect a similar jump during the same period in patient ZIP codes without a walk-in clinic; these ZIP codes comprise my control group.

The Role of Insurance

Unlike EDs, walk-in clinics are not bound under the Emergency Medical Treatment and Labor Act (EMTALA) to treat all patients, regardless of their ability to pay (51). This means that profit-maximizing walk-in clinics can preferentially treat only those patients who can afford to pay for care, via their insurance plan. As such, walk-in clinics and EDs have very different payer mixes (**Exhibit 1**). Whereas 51% of urgent care visits are by the privately insured, only 12% of visits are by uninsured individuals, and 10% are by Medicaid enrollees. In the ED, these percentages are 33%, 31%, and 21%, respectively. Medicaid acceptance rates at retail clinics are higher (60%), but retail clinics comprise a much smaller segment of the walk-in clinic market (53). Given these numbers, I would expect walk-in clinic closures to have a measurable effect for patients with private insurance, but not for patients who are uninsured or enrolled in Medicaid. For this reason, I limit my main difference-in-differences analysis to privately insured individuals, and use the impact on the uninsured and Medicaid population as placebo tests for my results.

Data

My data on walk-in clinics come from the location database described in detail in the previous paper; ED visit data come from the SEDD, also as described in detail in the previous paper. I aggregate the encounter-level ED records to the ZIP code level for my analysis. To determine which visits are non-emergent, I apply the NYU Algorithm described in the previous paper.

We include additional information on ZIP code characteristics that might account for some of the relationship between urgent care center availability and non-emergent ED usage rates. A small body of work has shown that more populated areas with higher median incomes are more likely to have an urgent care center (43). Additionally, areas with higher employment rates may experience patterns of care-seeking that revolve more around the typical workday hours. I control for these measures using Census data from the 2013 American Community Survey (81). As described in the previous paper, urgent care centers choose to locate near EDs, perhaps because ED signal potential demand for acute care (82). I control for this possibility using data on 2012-2013 ED locations from the Centers for Medicare and Medicaid Services (CMS).

Methodology and Measures

First, I created graphs that show the unadjusted ZIP-code level rates of non-emergent ED visits by hour, in ZIP codes with and without walk-in clinics. For a more formal examination, I estimate a difference-in-differences model in which the change in the non-emergent visit rate before and after clinic closure time in ZIP codes with a walk-in clinic is contrasted with that same change in ZIP codes without a walk-in clinic. My main model is

$$Y_{ih} = \alpha \ + \beta_0 T_i + \beta_1 C_i + \beta_2 (T_i \cdot C_i) + \ \boldsymbol{\beta X_i} + \varepsilon_i,$$

where Y_i is the rate of non-emergent ED visits for ZIP code i at hour h; T_i is an indicator equal to one if the ZIP code was assigned to the treatment group (i.e., has an urgent care center); C_i is an indicator equal to one if the visit occurred at 8 PM (8 AM) or later; $(T_i \cdot C_i)$ is the interaction between the two, allowing for different slopes on either side of the closure (opening) time cut point, X_i is a vector of ZIP code characteristics; and ε_i represents a random error term. my key policy parameter is the coefficient on the interaction, which estimates the causal impact on non-emergent visit rates attributable to urgent care centers closing (opening) for the day in ZIP codes with an urgent care center.

My ZIP code-level covariates include continuous measures of population, median household income, and the employment rate, all of which are standardized for ease of interpretation. I include an indicator variable that is equal to one if the ZIP code contains an ED.

Because there are likely unobserved factors that could be simultaneously influencing my independent and dependent variables, I also estimate a different model that includes ZIP code-level fixed effects. Functionally, this is equivalent to including in my regression an indicator for each ZIP code, which will “capture” any time-invariant, ZIP-code specific characteristics that might be influencing my estimates. This changes my approach from a cross-sectional difference-in-difference design to a panel difference-in-difference design. The new model is

$$Y_{ih} = a + \beta_0 C_i + \beta_1 (T_i \cdot C_i) + \varepsilon_i,$$

since the treatment effect (whether there is an urgent care center in the ZIP code), previously denoted by the coefficient on T_i, does not change my time window. In essence, the impact of having an urgent care center is “swept up” by the fixed effect. Because the ZIP code fixed effects control for all area-level factors that are relevant for my analysis, the vector of ZIP code characteristics, previously denoted by $\boldsymbol{X_i}$, becomes unnecessary.

For both approaches described above, I include dummy variables for each state. I cluster my errors at the Hospital Service Area (HSA) level, which can be thought of as roughly equivalent to a hospital’s catchment area. This allows for the possibility that my estimates might be correlated within HSA areas. Estimates were weighted by the number of visits coming from each ZIP code.

We estimate this model for the rate of non-emergent visits that occur within two hours before and two hours after the closure time. I chose this bandwidth because wider times windows would include visits that are unlikely to be impacted by urgent care opening and closing times. Conversely, using only those visits that occur within an hour before and after the cutoff may be confounded by anticipatory effects (e.g., patients who would have visited urgent care going to ED because they know the walk-in clinic would be closing soon). I conducted analyses using varying time windows around the cutoff; these are presented in the appendix.

We limit my sample at the ZIP code level and at the patient visit level. First, I restrict my analysis to those ZIP codes with zero (control group) or at least one walk-in clinic. Regardless of the number of walk-in clinics in the ZIP code, I first required that the closure time of the last-closing clinic be 8 PM, the modal opening and closure time across all walk-in clinics in the dataset. This allows us to have a clear hour threshold around which

I can compare changes in ED visit rates in both the treatment and control groups. I next repeat this analysis, using the two next most common closure times (7 PM and 9 PM). Together with the 8 PM sample, this comprises 60% of my raw patient visits (see appendix).

Because walk-in clinics also have regular daily opening times, it is theoretically possible to examine a pre/post-opening threshold, as well. I do not examine this threshold for two reasons. First, the modal opening time for walk-in clinics in my dataset was 8 AM. Unlike the 8 PM closure time, the 8 AM opening hour is likely to be confounded by many other factors, such as work commuting and the opening of primary care physician offices. Secondly, patient volume in the ED is much lower in the morning than it is in the evening, limiting my model's ability to detect an effect (83).

At the ED visit level, I limit my sample to adults aged 18-64, since the pediatric and the elderly populations may exhibit different care-seeking behaviors. I also restrict my analysis to visits that occurred on weekdays. In the SEDD, I can only identify whether a visit occurred on a weekday or a weekend, not the specific day of the week. In my dataset, walk-in clinic hours were very consistent from Monday through Friday, but changed markedly from the workweek to Saturday, and then again from Saturday to Sunday. **Exhibit 2** graphically depicts my analytic sample derivation.

We are left with a sample of about 1 million ED visits, which I aggregate up to the ZIP code level.

Limitations

My results should be placed in the context of the following limitations. First, my crude measure of access to a walk-in clinic (being located in a patient's ZIP code) may be masking several underlying patterns in access to urgent care. For example, a patient may live in a ZIP code without a walk-in clinic, but also live very close to a walk-in clinic in a neighboring ZIP code. To the extent this occurs, I may be erroneously assigning "treated" individuals to my control group, which would bias my results toward the null. Extensions of this research should include more refined measures of distance, but this would require getting more information about patients' home addresses, which fall under the umbrella of protected patient information.

Second, my outcomes rely on NYU ED algorithm, which is based on discharge codes. I noted previously the importance of a patient acting as a first-line diagnostician when choosing his care site. Discharge codes, which are assigned on the back end of a visit after a clinician has evaluated the patient's condition, do not tell us much about what was happening when the patient initially chose to seek care. A more valid measure might be a patient's reason for visit, in which the patient tells the provider what symptoms prompted his visit. Until these data are made available to researchers in the SEDD, the discharge code-based NYU algorithm remains the most reasonable and widely-used tool for assessing rates of non-emergent ED use (72, 73).

RESULTS

In **Exhibit 2,** I present the mean rates of non-emergent ED visits per ZIP code, per hour, for those ZIP codes that do and do not have a walk-in clinic. The rate of non-emergent visits is generally lower in areas with a walk-in clinic, though the trend appears to follow the same pattern over time. Interestingly, I do see a small increase in visits around 5 PM (when people would be getting off from work and/or when PCP offices are closing), but only in the areas without a walk-in clinic. This provides suggestive evidence that walk-in clinics are taking on some of the demand that would otherwise be going to the ED during this time period.

Exhibit 3 reports results from the difference-in-differences estimator in the OLS regression model that examines 8 PM closure time. The coefficients on the interaction term provides the percentage point change in the rate of non-emergent ED visits that occurred in ZIP codes with a walk-in clinic after closure time relative to the comparison group of ZIP codes without a walk-in clinic.

The first column reports results from an initial specification that controls for only a few ZIP-code level factors, and includes only the privately insured population. This reveals an increase in the rate of non-emergent ED visits of about one percentage point ($p<.05$), as a result of walk-in clinic closures. The next column displays results from my fixed effects model, also for the uninsured. The magnitude of the coefficient on my interaction term drops to 0.01 ($p<.05$) percentage points, though it remains positive and statistically significant.

Turning next to the uninsured population, I find a 0.01 percentage point decrease ($p<.05$) in non-emergent ED visits, after walk-in clinics close for the day; this represents the level effect. I find no statistically significant impact of walk-in clinic closures on non-emergent ED use for the Medicaid population.

My results for the privately insured population are robust to different bandwidths of time around the closure cutoff (see appendix). my results remain positive and statistically significant when I include data within a six-hour window (5-11 PM) and eight-hour window (4 PM- 12 AM) around the cut point, but cease to be statistically significant when examining a ten-hour window (3 PM-1 AM). I also do not detect a statistically significant result when examining a two-hour window (7-9 PM). When examining the next most common cut off times (7 and 9 PM) , I do not detect an effect, perhaps due to my much smaller sample sizes.

DISCUSSION

We provide the first multistate empirical study of the impact of walk-in clinics on non-emergent ED use. In my initial specification, in which I control for only a few are-level characteristics, I find an increase in non-emergent ED use of about one percentage point, for the privately insured population. This is in line with similar single-digit effects found in the nascent literature on this topic (78, 79), and would suggest that while the centers are open, people are visiting them instead of the ED. After closure, then, patients no longer have the option of going to the walk-in clinics and turn to the ED at higher rate

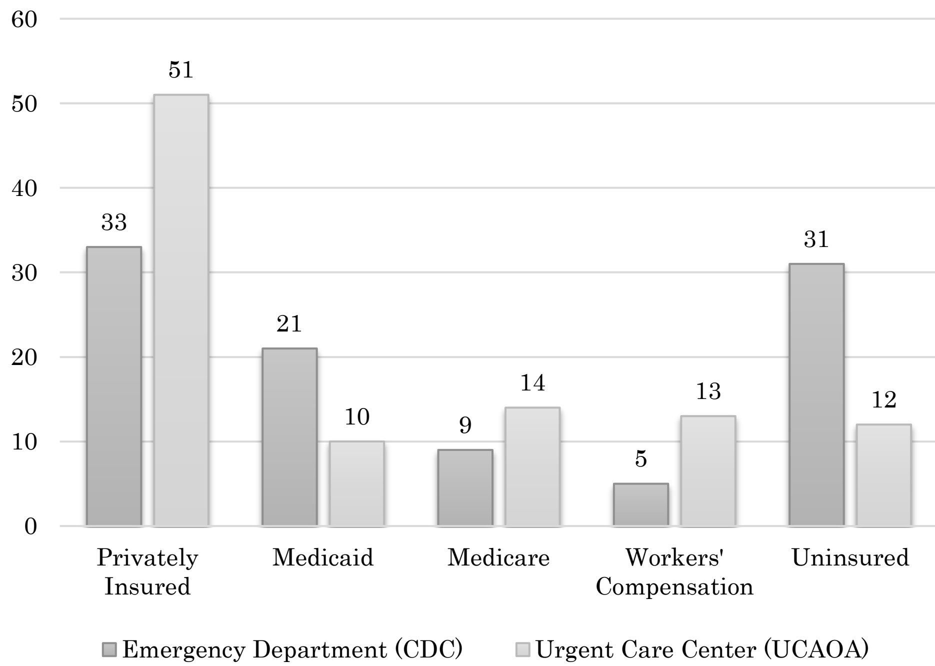
However, once I include ZIP code level fixed effects in my privately –insured model, my result is dramatically reduced, to about one one-hundredth of percentage point, though it is still precisely estimated. This suggests that other area-level factors are driving the association between walk-in clinics and non-emergent ED use found in previous studies.

That I do not find any effect of walk-in clinic closure on the rate of Medicaid non-emergent visits is unsurprising, given the small number of walk-in clinics (mostly retail clinics) that accept Medicaid. Given that Medicaid patients – especially those that are newly enrolled – tend to use the ED more frequently, this is a population for whom targeted walk-in clinic policies could potentially incentivize preferred patterns of behavior (32). The first step would be a pilot study, in which Medicaid enrollees are given access (financial, geographic, etc.) to urgent care centers and retail clinics, to determine whether the walk-in clinic approach reduces ED use for this population. If so, then policy makers can design financial incentives for walk-in clinics to accept Medicaid and locate in Medicaid-concentrated areas.

My estimate likely represents an upper bound on the impact of clinics on ED use, in the form that walk-in clinics currently take. First, the 9,000 clinics in operation today are probably located where the greatest privately insured patient demand is found. As the market matures, there will likely be diminishing returns to opening new clinics. Secondly, my analysis takes place during a time of day where ED visits are high (83). Because the number of visits is smaller at other times of the day, there are fewer visits for the walk-in clinics to impact.

Contrary to popular thought, it does not appear that walk-in clinics are acting as substitutes for the ED. That is, people who were going to the ED prior to the advent of walk-in clinics are still going to the ED for non-emergent conditions. Whether this is due to patient lack of awareness of the clinics and their capabilities, patient preferences for the ED, or other reasons remains unknown. Future research will need to examine these mechanisms in more detail before policies can be designed to divert ED patients to walk-in clinics, as policy mechanisms for incentivizing new patterns of patient behavior will vary.

Exhibit 1: Payer Mix for ED and urgent care center visits



Sources: CDC via http://www.cdc.gov/nchs/products/databriefs/db253.htm and Urgent Care Association of America, via http://www.beckershospitalreview.com/lists/25-things-to-know-about-urgent-care.html

Exhibit 2: Analytic Sample Derivation

Weekday visits: **9,453,370**

↓

Age 18-64: **6,517,976**

↓

Visit Occurred 6PM – 10 PM: **1,376,284**

↓

No Clinic, or Clinic Closure at 8 PM**: 955,157**

Privately Insured Visits:	Uninsured Visits:	Medicaid Visits:
*Privately Insured Visits: **369,427** (39%)*	*Uninsured Visits: **281,474** (30%)*	*Medicaid Visits: **303,163** (32%)*

↓

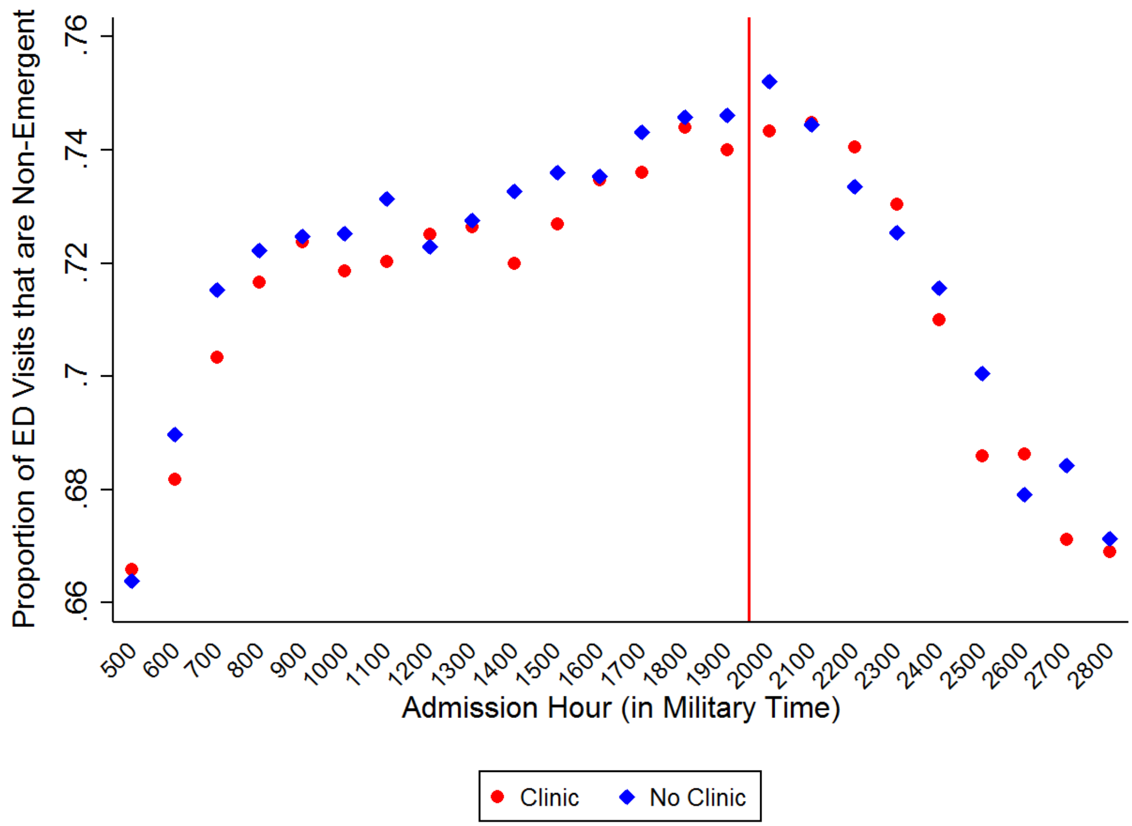
Roll Visits Up to Zip Code Level, For Each Hour between 6 PM and 10 PM

Privately Insured Data Points: **13,461**	*Uninsured Data Points:* **11,766**	*Medicaid Data Points:* **11,720**

Exhibit 3: Marginal Effect of Walk-in Clinic Closures on Non-Emergent ED Visit Rate

	Non-Fixed Effects Model		**Fixed Effects Models**					
	Privately Insured		*Privately Insured*		*Uninsured*		*Medicaid*	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Visit After 8 PM, UCC	**0.995***	**(0.435)**	**0.006***	**(0.003)**	**-0.006***	**(0.003)**	**0.003**	**(0.004)**
Visit After 8 PM	-0.210*	(0.097)	-0.002**	(0.001)	-0.003*	(0.002)	-0.006	(0.001)
Urgent Care in ZIP	-0.834*	(0.356)	-		-		-	
ED in Zip Code	Yes		-		-		-	
Median Income (Std.)	Yes		-		-		-	
Employment Rate	Yes		-		-		-	
Population (Std.)	Yes		-		-		-	
Clustered SEs	Yes		Yes		Yes		Yes	
State Dummies	Yes		Yes		Yes		Yes	
ZIP Code Fixed Effects	No		Yes		Yes		Yes	
Observations (ZIPS by hour)	13,461		13,461		11,766		11,720	

Exhibit 4: Hourly rate of non-emergent ED visits per ZIP code for those with private insurance, without an urgent care center in ZIP



APPENDIX

Appendix A:Last Closure Time of Walk-in Clinic

ziplastclose_wkday	Freq.	Percent	Cum.
500	8,256	0.22	0.22
1100	1,937	0.05	0.28
1130	5,371	0.15	0.42
1200	7,361	0.20	0.62
1530	7,157	0.19	0.82
1600	6,110	0.17	0.98
1630	5	0.00	0.98
1700	161,739	4.40	5.38
1730	24,557	0.67	6.05
1800	228,784	6.22	12.27
1830	11,741	0.32	12.59
1900	335,608	9.12	21.71
1930	343,235	9.33	31.04
2000	1,331,326	36.19	67.22
2030	53,827	1.46	68.69
2100	496,602	13.50	82.18
2130	3,853	0.10	82.29
2200	218,402	5.94	88.22
2300	171,884	4.67	92.90
2359	1,753	0.05	92.94
2400	259,606	7.06	100.00
Total	3,679,114	100.00	

Appendix B: Marginal Effect of Walk-in Clinic Closures on Non-Emergent ED Visit Rate, 9 PM and 7 PM

	Fixed Effects Models					
	Privately Insured		*Uninsured*		*Medicaid*	
	Coef.	SE	Coef.	SE	Coef.	SE
Visit After 9 PM, UCC	**0.006**	**(0.004)**	**0.000**	**(0.007)**	**-0.006**	**(0.005)**
Visit After 9 PM	-0.007***	(0.002)	-0.003*	(0.002)	-0.007***	(0.002)
Clustered SEs	Yes		Yes		Yes	
State Dummies	Yes		Yes		Yes	
ZIP Code Fixed Effects	Yes		Yes		Yes	
Observations (ZIPS by hour)	12,562		10,881		10,826	

	Fixed Effects Models					
	Privately Insured		*Uninsured*		*Medicaid*	
	Coef.	SE	Coef.	SE	Coef.	SE
Visit After 7 PM, UCC	**-0.001**	**(0.005)**	**0.007**	**(0.005)**	**0.002**	**(0.006)**
Visit After 7 PM	0.001	(0.001)	-0.003*	(0.002)	-0.001	(0.002)
Clustered SEs	Yes		Yes		Yes	
State Dummies	Yes		Yes		Yes	
ZIP Code Fixed Effects	Yes		Yes		Yes	
Observations (ZIPS by hour)	12,740		11,104		10,994	

Note: * p<.05; **p<.01; ***p<.001

Appendix C: Marginal Effect of Walk-in Clinic Closures on Non-Emergent ED Visit Rate, Various Time Windows

	Fixed Effects Models							
	2 Hour Window		6 Hour Window		8 Hour Window		10 Hour Window	
	Coef.	SE	Coef.	SE	SE	SE	Coef.	SE
Visit After 8 PM, UCC	**0.007**	**(0.005)**	**0.005***	**(0.002)**	**(0.002)**	**0.006***	**(0.002)**	**0.004**
Visit After 8PM	-0.002	(0.002)	-0.005***	(0.001)	(0.001)	-0.006***	(0.001)	-0.009***
Clustered SEs	Yes		Yes		Yes		Yes	
State Dummies	Yes		Yes		Yes		Yes	
ZIP Code Fixed Effects	Yes		Yes		Yes		Yes	
Observations (ZIPS by hour)	6,567		20,071		26,575		32,889	

CHAPTER 5: CONCLUSION

This dissertation aimed to answer questions about the large, rapidly growing, walk-in clinic market. The walk-in clinic industry has been purported to improve access to health care, and potentially reduce non-emergent ED visits. Overall, I find that urgent care center and retail clinics are unlikely to have as large an impact on these outcomes as is hoped. First, I find that walk-in clinics tend to locate in wealthier areas, which makes it unlikely that they will help improve access to care where improvements are most needed. I do find one exception to this, however: urgent care centers are more likely to locate in low-income areas, conditional on being located near an ED. Should urgent care centers begin accepting Medicaid at higher rates, or offering payment assistance to the uninsured, the walk-in clinic market would be more likely to improve access to care and reduce ED use.

This finding is underscored by my second major finding, which is that the number of ED visits that are potentially transferable to a walk-in clinic is limited by access (both geographic and insurance-based) to the clinics themselves. Finally, I find that walk-in clinics do not appear to reduce non-emergent ED use, even for the privately insured, which is the group most likely to be treated in an urgent care center or retail clinic. For walk-in clinics to improve meaningfully health care access or ED use, policy makers should invest in additional foundational research about this industry.

REFERENCES

1. Bodenheimer T, Pham HH. Primary care: current problems and proposed solutions. Health Aff (Millwood). 2010;29(5):799-805.

2. Niska RB, Farida; Xu, Jianmin National Hospital Ambulatory Medical Care Survey: 2007 Emergency Department Summary. National Health Statistics Reports. 2010;26.

3. Young GP, Wagner MB, Kellermann AL, Ellis J, Bouley D. Ambulatory visits to hospital emergency departments. Patterns and reasons for use. 24 Hours in the ED Study Group. JAMA : the journal of the American Medical Association. 1996;276(6):460-5.

4. Weinick RM, Burns RM, Mehrotra A. Many emergency department visits could be managed at urgent care centers and retail clinics. Health affairs. 2010;29(9):1630-6.

5. Centers for Disease Control and Prevention. National Hospital Ambulatory Medical Care Survey: 2011 Emergency Department Summary Tables. 2011.

6. Pitts SR, Carrier ER, Rich EC, Kellermann AL. Where Americans get acute care: increasingly, it's not at their doctor's office. Health affairs (Project Hope). 2010;29(9):1620-9.

7. Institute of Medicine. Hospital-Based Emergency Care: At the Breaking Point: The National Academies Press; 2007.

8. Uscher-Pines L, Pines J, Kellermann A, Gillen E, Mehrotra A. Emergency department visits for nonurgent conditions: systematic literature review. The American journal of managed care. 2013;19(1):47-59.

9. AHRQ Health Care Innovations Exchange. Reducing Non-Urgent Emergency Services. 2015. Contract No.: May 21.

10. Subcommittee on Primary Health and Aging. Subcommittee Hearing - Diverting Non-urgent Emergency Room Use: Can It Provide Better Care and Lower Costs? 2011.

11. National Quality Forum's National Prorities Partnership. Reducing Emergency Department Overuse: A $38 Billion Opportunity 2010 [Available from: https://www.qualityforum.org/NPP/docs/Reducing_ED_Overuse_CAB.aspx.

12. Urgent Care Association of America. Industry Frequently Asked Questions 2015 [Available from: http://www.ucaoa.org/general/custom.asp?page=IndustryFAQs.

13. California Healthcare Foundation. Proceedings of the California HealthCare Foundation/Health Affairs Roundtable: "Retail Clinics: Disruptive Innovation in Primary Care?" 2008 [Available from: http://www.chcf.org/~/media/MEDIA%20LIBRARY%20Files/PDF/PDF%20H/PDF%20HARoundtableRetailClinics.pdf.

14. Urgent Care Association of America. The Case for Urgent Care 2011 [Available from: https://ucaoa.site-ym.com/resource/resmgr/Files/WhitePaperTheCaseforUrgentCa.pdf.

15. Spetz J, Parente ST, Town RJ, Bazarko D. Scope-of-practice laws for nurse practitioners limit cost savings that can be achieved in retail clinics. Health affairs. 2013;32(11):1977-84.

16. Mehrotra A, Liu H, Adams JL, Wang MC, Lave JR, Thygeson NM, et al. Comparing costs and quality of care at retail clinics with that of other medical settings for 3 common illnesses. Annals of internal medicine. 2009;151(5):321-8.

17. Rudavsky R, Mehrotra A. The SocioDemographic Characteristics of the Communities Served by Retail Clinics. Journal of the American Board of Family Medicine : JABFM. 2010;23(1):42-8.

18. Kaissi A, Charland T. The evolution of retail clinics in the United States, 2006-2012. Health Care Manag (Frederick). 2013;32(4):336-42.

19. Mehrotra A, Lave JR. Visits To Retail Clinics Grew Fourfold From 2007 To 2009, Although Their Share Of Overall Outpatient Visits Remains Low. Health affairs (Project Hope). 2012;31(9):2123-9.

20. Iglehart JK. The Expansion of Retail Clinics--Corporate Titans vs. Organized Medicine. The New England journal of medicine. 2015;373(4):301-3.

21. Penchansky R, Thomas JW. The concept of access: definition and relationship to consumer satisfaction. Med Care. 1981;19(2):127-40.

22. Gill JM. Nonurgent use of the emergency department: appropriate or not? Annals of emergency medicine. 1994;24(5):953-7.

23. O'Malley AS. After-hours access to primary care practices linked with lower emergency department use and less unmet medical need. Health affairs (Project Hope). 2013;32(1):175-83.

24. Cunningham PJ, O'Malley AS. Do Reimbursement Delays Discourage Medicaid Participation By Physicians? Health affairs. 2009;28(1):w17-w28.

25. Sommers AS, Paradise J, Miller C. Physician Willingness and Resources to Serve More Medicaid Patients: Perspectives from Primary Care Physicians. Medicare & Medicaid Research Review. 2011;1(2):001.02.a01.

26. Capp R, Camp-Binford M, Sobolewski S, Bulmer S, Kelley L. Do adult Medicaid enrollees prefer going to their primary care provider's clinic rather than emergency department (ED) for low acuity conditions? Medical care. 2015;53(6):530.

27. Asplin BR, Magid DJ, Rhodes KV, Solberg LI, Lurie N, Camargo Jr CA. A conceptual model of emergency department crowding. Annals of emergency medicine. 2003;42(2):173-80.

28. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Annals of emergency medicine. 2008;52(2):126-36. e1.

29. Cunningham PJ. What accounts for differences in the use of hospital emergency departments across U.S. communities? Health affairs. 2006;25(5):w324-36.

30. Office of the Assistant Secretary for Planning and Evaluation. Health Insurance Coverage and the Affodable Care Act. Washington, DC; 2015.

31. Finkelstein A, Taubman S, Wright B, Bernstein M, Gruber J, Newhouse JP, et al. The Oregon Health Insurance Experiment: Evidence from the First Year. The Quarterly Journal of Economics. 2012;127(3):1057-106.

32. Taubman SL, Allen HL, Wright BJ, Baicker K, Finkelstein AN. Medicaid Increases Emergency-Department Use: Evidence from Oregon's Health Insurance Experiment. Science. 2014;343(6168):263-8.

33. Manning WG, Newhouse JP, Duan N, Keeler EB, Leibowitz A, Marquis MS. Health insurance and the demand for medical care: evidence from a randomized experiment. The American economic review. 1987;77(3):251-77.

34. Lowe RA, Localio AR, Schwarz DF, Williams S, Tuton LW, Maroney S, et al. Association between primary care practice characteristics and emergency department use in a medicaid managed care organization. Medical care. 2005;43(8):792-800.

35. Kellermann AL. Nonurgent emergency department visits: Meeting an unmet need. JAMA : the journal of the American Medical Association. 1994;271(24):1953-4.

36. Nadel V. Emergency departments: Unevenly affected by growth and change in patient use. US General Accounting Office: Report to the Chairman, Subcommittee on Health for Families and the Uninsured, Committee on Finance, US Senate Washington, DC: US Government Printing Office. 1993.

37. Rask KJ, Williams MV, Parker RM, McNagny SE. Obstacles predicting lack of a regular provider and delays in seeking care for patients at an urban public hospital. JAMA : the journal of the American Medical Association. 1994;271(24):1931-3.

38. Gindi RM, Cohen RA, Kirzinger WK. Emergency room use among adults aged 18–64: early release of estimates from the National Health Interview Survey, January–June 2011. National Center for Health Statistics. 2012.

39. Uscher-Pines L, Pines J, Kellermann A, Gillen E, Mehrotra A. Deciding to Visit the Emergency Department for Non-Urgent Conditions: A Systematic Review of the Literature. The American journal of managed care. 2013;19(1):47.

40. Derlet RW, Richards JR. Overcrowding in the nation's emergency departments: complex causes and disturbing effects. Annals of emergency medicine. 2000;35(1):63-8.

41. Derlet RW, Richards JR. Ten solutions for emergency department crowding. Western Journal of Emergency Medicine. 2008;9(1):24.

42. Borkowski S. Solutions for ED overcrowding: increasing urgent care centers. Journal of Emergency Nursing. 2012;38(2):116-7.

43. Le ST, Hsia RY. Community characteristics associated with where urgent care centers are located: a cross-sectional analysis. BMJ open. 2016;6(4):e010663.

44. Pollack CE, Armstrong K. The geographic accessibility of retail clinics for underserved populations. Arch Intern Med. 2009;169(10):945-9; discussion 50-3.

45. Rudavsky R, Mehrotra A. Sociodemographic characteristics of communities served by retail clinics. J Am Board Fam Med. 2010;23(1):42-8.

46. Lambe S, Washington DL, Fink A, Laouri M, Liu H, Scura Fosse J, et al. Waiting times in California's emergency departments. Annals of emergency medicine. 2003;41(1):35-44.

47. Hsia RY, Asch SM, Weiss RE, Zingmond D, Liang LJ, Han W, et al. California hospitals serving large minority populations were more likely than others to employ ambulance diversion. Health affairs. 2012;31(8):1767-76.

48. Begley CE, Vojvodic RW, Seo M, Burau K. Emergency room use and access to primary care: evidence from Houston, Texas. Journal of health care for the poor and underserved. 2006;17(3):610-24.

49. US Census Bureau. Health Insurance Coverage in the United States: 2007. 2008:22.

50. The Henry J. Kaiser Family Foundation. Medicaid Coverage Rates for the Nonelderly by Federal Poverty Level [updated 2015. Available from: http://kff.org/medicaid/state-indicator/rate-by-fpl-3/?currentTimeframe=0&selectedDistributions=under-

100percent&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

51. American College of Emergency Physicians. EMTALA 2014 [Available from: https://www.acep.org/news-media-top-banner/emtala/.

52. Urgent Care Association of America. 2012 Urgent Care Benchmarking Survey Results. 2012.

53. Rudavsky R, Pollack CE, Mehrotra A. The geographic distribution, ownership, prices, and scope of practice at retail clinics. Annals of internal medicine. 2009;151(5):315-20.

54. Nath JB, Costigan S, Lin F, Vittinghoff E, Hsia RY. Federally Qualified Health Center Access and Emergency Department Use Among Children. Pediatrics. 2016;138(4).

55. Falik M, Needleman J, Wells BL, Korb J. Ambulatory care sensitive hospitalizations and emergency visits: experiences of Medicaid patients using federally qualified health centers. Med Care. 2001;39(6):551-61.

56. Rothkopf J, Brookler K, Wadhwa S, Sajovetz M. Medicaid patients seen at federally qualified health centers use hospital services less than those seen by private providers. Health affairs (Project Hope). 2011;30(7):1335-42.

57. Urgent Care Locations Provides Verified Urgent Care Directory [press release]. July 08 2013.

58. Barber M. Personal Communication with Michael Barber. 2015.

59. Staff Care. Convenient Care: Growth and Staffing Trends in Urgent Care and Retail Medicine. Dallas, TX 2015.

60. Convenient Care Association. Convenient Care Clinics: Increasing Access. 2015.

61. Urgent Care Association of America Releases 2014 Urgent Care Survey, Shows Major Industry-Wide Expansion [press release]. 2014.

62. U.S. Census Bureau. 2006-2010 American Community Survey 2014 [Available from: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

63. Health Resources and Services Administration. Primary Care Service Area Data Download – 2010 (Census Tract Basis) 2014 [Available from: http://datawarehouse.hrsa.gov/Data/datadownload/pcsa2010Download.aspx.

64. Centers for Medicare & Medicaid Services. Hospital Compare Database - Timely and Effective Care Baltimore, MD2013 [Available from: https://data.medicare.gov/data/hospital-compare.

65. Altman S, Lewin ME. America's health care safety net: intact but endangered: National Academies Press; 2000.

66. Sutton J, Washington R, Fingar K, Elixhauser A. Characteristics of Safety-Net Hospitals, 2014: Statistical Brief# 213. 2006.

67. Health Resources and Services Administration. What are Federally qualified health centers (FQHCs)? Rockville, MD2016 [Available from: http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/Introduction/qualified.html.

68. Hotelling H. Stability in Competition. The Economic Journal. 1929;39(153):41-57.

69. Billings J, Parikh N, Mijanovich T. Issue brief no. 434—emergency department use: the New York story. The Commonw Fund. 2000.

70. Steiner C, Elixhauser A, Schnaier J. The healthcare cost and utilization project: an overview. Effective clinical practice: ECP. 2001;5(3):143-51.

71. Billings J, Parikh N, Mijanovich T. Emergency department use in New York City: a survey of Bronx patients. Issue brief (Commonwealth Fund). 2000(435):1-5.

72. Feldman J. The NYU Classification System for ED Visits: WSHA Technical Concerns. Washington State Hospital Association: Health Information Program; 2010.

73. Johnston K, Allen L, Melanson T, Pitts S. An Update to the NYU Emergency Department Algorithm. Health Serv Res. Forthcoming.

74. Villaveces A, Mutter R, Owens PL, Barrett ML. Causes of injuries treated in the emergency department, 2010. 2013.

75. Bohmer R. The Rise of In-Store Clinics — Threat or Opportunity? New England Journal of Medicine. 2007;356(8):765-8.

76. State of Arizona. Arizona Administrative Code Department of Health Services – Health Care Institutions: Licensing 2004 [Available from: http://apps.azsos.gov/public_services/Title_09/9-10.pdf.

77. State of New Hampshire. New Hampshire Code of Administrative Rules [Available from: http://www.dhhs.nh.gov/oos/bhfa/documents/he-p806.pdf.

78. Friedman A.B., Davis B.J., Reese C., J. J. Urgencies And Emergencies: The Differential Impact Of Urgent Care Centers On Emergency Department Visits From Low-severity, Privately-insured Patients. Society for Academic Emergency Medicine (SAEM) Annual Conference; Dallas, TX2014.

79. Martsolf G, Fingar KR, Coffey R, Kandrack R, Charland T, Eibner C, et al. Association Between the Opening of Retail Clinics and Low-Acuity Emergency Department Visits. Annals of emergency medicine.69(4):397-403.e5.

80. Hollingsworth A. Retail Health Clinics: Endogenous Location Choice and Emergency Department Diversion. 2014.

81. United States Census Bureau. 2009-2013 American Community Survey 5-Year Estimates, Mean Income in the Past 12 Months 2013 [

82. Allen L, Cummings J, Hockenberry J. Urgent Care Centers and Retail Clinics Locate Near Crowded Emergency Departments, Avoid Medicaid-Concentrated Areas. 2016.

83. Pitts SR, Pines JM, Handrigan MT, Kellermann AL. National trends in emergency department occupancy, 2001 to 2008: effect of inpatient admissions versus emergency department practice intensity. Annals of emergency medicine. 2012;60(6):679-86.e3.